



CABAT Consultancy LTD

Constructing Excellence Everyday

Job number: A0001

UWTSD Glyndŵr Development

BIM Execution Plan

Date: 29/10/2019

Revision: [TENDER]

Prepared by: Adam Meyrick (Project Manager, CABAT Consultancy LTD)

PART 1 - INTRODUCTION

This document forms part of CABAT Consultancy LTD BIM protocols. It should be completed by the Project Architect and the Information Manager before the creation of any BIM data relating to the project is produced.

The BIM Execution Plan should be used as a reference source for all members of the CABAT project team and should clearly state and explain any deviations from agreed practice standards. It should also clearly explain the project specific protocols, data exchange strategy, expected level of detail, etc. that has been agreed for this project.

The use of BIM will be implemented to varying extents across the project and this plan outlines exactly how BIM principles should be applied to this project and at which workstage they should be used. The project team should aim to implement BIM at the level needed

to maximise value while minimising the cost and impact of the modelling implementation. This requires the team to selectively identify appropriate areas for BIM implementation and plan these in detail.

This plan should be reviewed at regular intervals by the Project Architect and the Information Manager to ensure that it always remains consistent with agreed principles for the project and a valid reference for team members.

Before commencing work, key members of the project team should also discuss the strategy for building the model itself and record in this document which is to be used. As per PAS 1192-2:2013 this BEP sets out CABAT's proposed approach, capability, capacity and competence to meet the Employer's Information Requirements (EIR).

PART 1 - THE PROJECT

1.1 Project Summary

This project is to be completed by main contractor CABAT Consultancy LTD on behalf of the client University of Wales Trinity Saint David. The project is located in Kings Dock in the SA1 area of Swansea, which is an formal industrial site.

1.2 Project Characteristics

The University of Wales Trinity Saint David is submitting a planning application to City and County of Swansea Council to develop a private educational facility at Plot 15 & 16 at the SA1 Waterfront. The proposed development is for a high quality two/ three storey building which would provide a flagship 300 capacity main lecture theatre as well as 10 x 30 capacity classrooms and 4 x 80 capacity lecture theatres. Creche facilities, a café and a restaurant will complete this state-of-the-art facility.

1.3 Primary Project BIM Contacts

This page is to be reviewed and updated at each job stage as a minimum

Name	Primary BIM Contact	Role	Email Address	Contact No.
Client				
University of Wales Trinity Saint David	Alan Nantel	Client Designer	alan.nantel@uwtsd.ac.uk	
Architect				
Tracey King	//	//	taki43@msn.com	07817924932
Project Manager				
Adam Meyrick	//	//	adam_meyrick@outlook.com	07469217247
Civil Engineer				
Cerys Cole	//	//	ceryscole95@gmail.com	07816210410
Quantity Surveyor				
Bethan Stroud	//	//	bethanstroud1@gmail.com	07783415165
Building Surveyor				
Alex Morgan	//	//	alexjmorgan@hotmail.com	07488290440
Other Consultees				

1.4 Project BIM Standards

This project is to be modelled based upon the following standards and protocols. Please note that this is not an exhaustive list and does not include standards that the actual building should comply with, for example the Building Regulations. Where there is a conflict between named standards CABAT CAD standards take precedence unless outlined in Section 1.5 of this Execution Plan.

- CABAT CAD Standards
- AEC BIM Standards
- Client Standards

1.5 Deviations from established BIM Standards

Please outline here anything that affects or overrides the established CABAT CAD & BIM Protocols

In some situations, an agreement may be reached where client standards are only partially applied, please also outline in this section any additional agreements made as to the extent of use of client standards.

PART 2 – PROJECT AIMS

2.1 Project BIM Goals

The main objective of BIM is to enhance project performance and produce better outcomes. BIM helps the construction manager to gather data and information from the relevant disciplines and communicate them more effectively.

2.2 Project BIM Uses

The table below contains typical uses for BIM within projects, please add or delete items as appropriate. Please refer to Appendix1 of 'Preparing a BIM Execution Plan' for a more comprehensive list of suggested BIM uses. Replace text for agreed uses.

Work Stage	RIBA Stage 1	RIBA Stage 2	RIBA Stage 3	RIBA Stage 4	RIBA Stage 5	RIBA Stage 6	RIBA Stage 7
Relevant 'Data Drop'	<i>Preparation & Brief</i>	<i>Concept Design</i>	<i>Detailed Design</i>	<i>Technical Design</i>	<i>Construction</i>	<i>Handover & Close Out</i>	<i>In Use</i>
BIM Uses		Model existing site	Design modelling	Construction details	As-built model	Building maintenance	Facility Management
		Concept modelling	Cost estimation	Scheduling	Digital fabrication		
		Cost estimation	Structural Design	Cost estimation			
		Phase Planning	Mechanical Design				
			Clash detection				

PART 3 – PROJECT DELIVERABLES FORMAT

Enter full name and file path of the agreed list of deliverables for the project in the box below, any referenced documents should be added to this document as an appendix when printed or exported to PDF format.

Deliverables list location:

3.1 Drawings

What is the primary form of delivery for drawings listed on the agreed list of deliverables?

Please tick as appropriate

Hard copy ☐

PDF ☐

DWF ☐

Other

3.2 CAD Information

Does the client require drawings to be also issued in a CAD format as part of the agreed deliverables? NOTE: this does not include CAD information exchanged with other consultants as part of the collaborative working process.

DWG ☐

Other

3.3 BIM Information

Complete this section if the building model is to be issued to the client as an agreed deliverable?

RVT ☐

3D DWF ☐

Navisworks ☐

3.4 Use of BIM Information

below are the key dates/milestones at which the model is to be issued as a deliverable:

Project Stage/Data Drop	Model Issued as Deliverable?	Date for Issue
Definition & Brief (Stages 0-1)	No	23/09/2019
Concept Design (Stage 2)	Yes	30/10/2019
Developed Design (Stage 3)	Yes	13/11/2019
Technical Design (Stage 4)	Yes	04/12/2019
Construction (Stage 5)	Yes	08/01/2020
Sub Structure	Yes	08/01/2020
Super Structure	Yes	06/07/2020
External Façade	Yes	21/12/2020
Internal Finishes	Yes	25/01/2021
Watertight	Yes	12/03/2021
Handover & Close Out (Stage 6)	No	22/07/2021
In Use (FM) (Stage 7)	No	21/09/2021

Are the component parts of the model prepared by each consultant to be issued individually by each party or is the responsibility of a model manager to issue a combined/complete model? Please state the details of how the model is to be issued below.

3.5 Model File Names

Give details of model files that will be created to form the complete building model for the project and add to this register any new models that are created.

Model description	Local Project No.	Originator code	Role	Comments
		001		
		002		
		003		
		004		
		005		

3.6 Project Datum

An agreed reference point should be agreed by all parties so that all information can be easily referenced and linked when required. A shared Levels and Grids file should be created in Revit with the Project Datum clearly marked and the file should be distributed to all parties to make collaborative work much easier. Details of the Project Datum should also be stated in the table below.

The datum point for this project is the UWTSD IQ building.

PART 6 – QUALITY CONTROL CHECKS

Checks	Definition	Responsible Party	Software Programme(s)	Frequency	Documentation
Visual Check	Ensure there are no unintended model components and the design intent has been followed	BIM Authors: Design Consultants		Daily	
Interference Check	Detect problems in the model where two building components are clashing including soft and hard	Information manager: Design Consultants		Weekly	
		Clash detection report:			Summary document – PDF format
Standards Check	Ensure that the BIM and AEC CADD Standard have been followed (fonts, dimensions, line styles, levels/layers, etc)	Information manager:		Daily	
Model Integrity Checks	Describe QC validation process used to ensure that Project Facility Data set has no undefined, incorrectly defined or duplicated elements and reporting process on non-compliant elements and corrective action plans			At end of each design / project stage	



UWTSD Glyndŵr Development BREEAM Checklist

Project: UWTSD Glyndŵr Development**Scheme:** BREEAM Fit-Out 2018**Date:** 19/01/2020**By:** Adam Meyrick

CABAT	Principle Contractor
CABAT	Architect
WSP	M&E Designer
LS	M&E Contractor
CABAT	Structural
UWTSD	Client

Key:

	Credit Withheld
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Status	Rating	Score %
BREEAM Target	Outstanding	88.84

Credit Ref	Credit Name	Available	Responsibility	Timing for Evidence
Management				
Each Credit is worth 0.57%				
Man 01	Stakeholder Consultation (Project Deliver)	1	CABAT	
	Stakeholder Consultation (Third Party)	1		
	Sustainability Champion (Design)	1	CABAT	
	Sustainability Champion (Monitoring Progress)	1	CABAT	
Man 02	Elemental Life Cycle Cost	2	CABAT	
	Component Level LCC Plan	1		
	Capital Cost Reporting	1	CABAT	
Man 03	Environmental Management	1	CABAT	
	Sustainability Champion	1	CABAT	
	Considerate Construction	2	CABAT	
	Monitoring of Construction Site Impacts	2	CABAT	
Man 04	Commissioning & Responsibilities	1	CABAT	



	Commissioning Building Services	1	CABAT	
	Testing & Inspecting Building Fabric	1	CABAT	
	Handover	1	CABAT	
Man 05	Aftercare Support	1		
	Seasonal Commissioning	1		
	Post Occupancy Evaluation	1		
Health & Well-being				
Each Credit is worth 0.79%				
Hea 01	Glare Control	1		
	Daylighting	2		
	View Out	2		
	Internal & External Lighting	1	WSP	
Hea 02	Indoor Air Quality Plan	1	CABAT	
	Ventilation Air Quality	1	CABAT	
	VOC Specification	1	CABAT	
	VOC Testing	1	CABAT	
	Potential Adaptation for Nat Vent	1		
Hea 04	Thermal Modelling	1	WSP	
	Climate Change Modelling	1	WSP	
	Thermal Zoning and Control	1	WSP	
Hea 05	Acoustic Performance	3	CABAT	
Hea 06	Safe Access	1	CABAT	
	Security of Site & Building	1	WSP	
Energy				
Each Credit is worth 0.65%				
Ene 01	Reduction of Energy Use and Carbon Emissions	12	WSP	
Ene 02	Energy Sub Metering	1	WSP	
	Sub Metering Department Areas	1	CABAT	
Ene 03	External Lighting	1	WSP	
Ene 04	Passive Design Analysis	1	CABAT	
	Free Cooling	1	CABAT	
	Low & Zero Carbon Feasibility Study	1	CABAT	
Ene 06	Lifts – Energy Consumption	1	CABAT	
	Lifts – Energy Efficient Features	2	CABAT	
Ene 08	Energy Efficient Equipment	2		
Transport				
Each Credit is worth 0.9%				
Tra 01	Public Transport Accessibility	5	CABAT	
Tra 02	Proximity to Amenities	1	CABAT	
Tra 03	Cycle Storage	1	CABAT	



	Cyclist Facilities	1	CABAT	
Tra 04	Maximum Car Parking Capacity	1		
Tra 05	Travel Plan	1	CABAT	
Water				
Each Credit is worth 0.88%				
Wat 01	Water Fittings	5	LS	
Wat 02	Water Monitoring	1	WSP	
Wat 03	Solenoid Valves	1		
	Leak Detection System	1	WSP	
Materials				
Each Credit is worth 0.96%				
Mat 01	Life Cycle Impacts	6	CABAT	
Mat 02	Hard Landscaping and Boundary Protection	1	CABAT	
Mat 03	Sustainable Procurement Plan	1	CABAT	
	Responsible Sourcing of Materials	3	CABAT	
Mat 04	Insulation	1	LS	
Mat 05	Designing for Durability and Resilience	1	CABAT	
Mat 06	Material Efficiency	1		
Waste				
Each Credit is worth 1.06%				
Wst 01	Construction Resource Efficiency	3	CABAT	
Wst 02	Diversion of Resources from Landfill	1	CABAT	
Wst 03	Recycled Aggregates	1		
Wst 06	Operational Waste	1	CABAT	
Wst 05	Adaptation to Climate Change	1		
Wst 06	Functional Adaptability	1	CABAT	
Land Use & Ecology				
Each Credit is worth 1%				
LUE 01	Previously Occupied Land	1	CABAT	
	Contaminated Land	1		
LUE 02	Ecological Value of Site	1	CABAT	
	Protection of Ecological Features	1	CABAT	
LUE 03	Minimising Impact on Existing Site Ecology	2	CABAT	
LUE 04	Ecologists Report & Recommendations	1	CABAT	
	Increase in Ecological Value	1		
LUE 05	Long Term Impact on Biodiversity	2	CABAT	
Pollution				
Each Credit is worth 0.77%				
Pol 01	Impact of Refrigerant	2		
	Refrigerant Leak Detection	1		



Pol 02	NOx Emissions	3	WSP	
Pol 03	Flood Risk	2	WSP	
	Surface Water Run Off	2	WSP	
	Minimising Watercourse Pollution	1	WSP	
Pol 04	Reduction of Night-time Light Pollution	1	WSP	
Pol 05	Noise Pollution	1	CABAT	
Exemplary Credits				
Each Credit is worth 1%				
Man 03	Responsible Construction Practices CCS 40	1	CABAT	
Man 05	Aftercare 3yrs Data Collection	1	CABAT	
Hea 01	Visual Comfort	1	CABAT	
Hea 02	Indoor Air Quality	2	CABAT	
Ene 01	Reduction of Energy Use and Carbon Emissions	5		
Wat 01	Water Consumption	1	CABAT	
Mat 01	Life Cycle Impacts	2		
Mat 03	Responsible Sourcing of Materials	1		
Wst 01	Construction Waste Management	1	CABAT	
Wst 02	Recycled Aggregates	1		
Wst 05	Adaptation to Climate Change	1		



CABAT Glyndŵr Development Design & Access Statement (D&A)

1.1 Introduction

The University of Wales Trinity Saint David (UWTSD) has appointed CABAT Consultancy LTD to coordinate a multi-disciplinary team and provide Town Planning and Design services in respect to the first phase of development of the “Swansea Waterfront Innovation Quarter”. This Design and Access Statement is prepared in support of a reserved matters planning submission.

Project Overview

The University of Wales Trinity Saint David is submitting a planning application to City and County of Swansea Council to develop a private educational facility at Plot C5 at the SA1 Waterfront, as illustrated on **Figure 1**. The redevelopment and regeneration of the SA1 waterfront is seen as an opportunity to deliver positive and lasting impacts across a wide range of academic and development sectors, consistent with the Welsh Government’s priorities, and the City and County of Swansea’s emerging regeneration plans for the City. The first phase of the development focused on part of the Peninsula where the construction of the Library and the Faculty of Architecture, Computing and Engineering (FACE) and associated central teaching and faculty space is proposed. FACE is contained in the Dockside, which forms the eastern face of Trinity Quarter bounded by Prince’s Street.

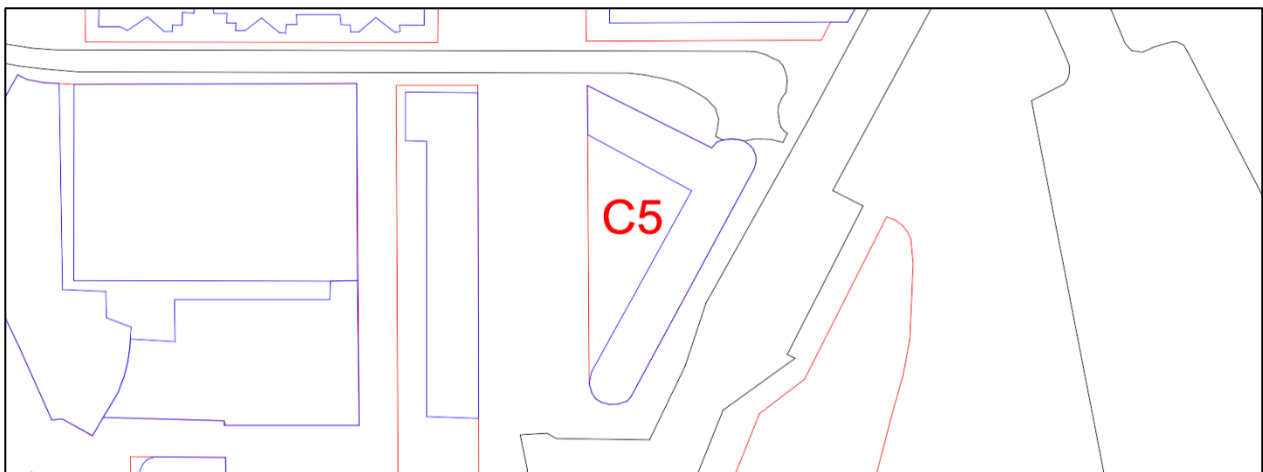


Figure 1: Site location plan.

The Glyndwr site measures approximately 0.85 hectares (2.1 acres approximately), whilst its North side fronts onto Langdon Road and its eastern side faces onto the former dry dock forming part of the existing tidal basin. The proposed new development is for a high quality two/ three storey building which would provide a flagship 300 capacity main lecture theatre as well as 10 x 30 capacity classrooms and 4 x 80 capacity lecture theatres. Student union facilities, a café and a restaurant will complete this state-of-the-art facility.

1.1.1 Urban Grain of SA1 Waterfront

By analysing the figure ground plan of SA1 and its surrounding neighbourhoods, patterns and arrangements of buildings and their sizes reveal the type of urban grain present. The working docklands, with their large, linear building footprints stand in stark contrast to the fine, regular grid forms of Saint Thomas and Port Tennant. This fine grain is present in the north east of SA1, with clustered townhouses overlooking the Prince of Wales Dock.

SA1 includes a mix of urban grains which filter through from the surrounding neighbourhoods. The Technium Square area consists of irregular, medium sized building developments clustered around an existing square. The arrangement of buildings is primarily informed by the waterfront on the western side of SA1, with buildings taking advantage of the views to the water. The southern side of SA1 is largely empty of development.

1.1.2 Movement

The freedom of movement of individuals during the construction phase and post completion is vital to the success of this project. Below, main travel routes to the facility have been assessed.

Bus

Public transport will serve the wider site in several ways. A bus route will be extended down from Langdon Road along Kings Road, with a bus stop at Trinity Saint David Square. In addition, the Fabian Way Park and Ride will be promoted to reduce private vehicular traffic at SA1 and increase traffic on local public transport instead.

Road

The City & County of Swansea Council (CCSC) are in the process of modelling current and future demands on the local highway network with the view of presenting a business case to the Welsh Government for funding for the trunking of Fabian Way and improvements to associated highways. The site is located at the Eastern termination of Kings Road. The main access to the site is from the SA1 access/gateway off Fabian Way or A4067 Roundabout from Swansea City Centre. The site has recently been laid out (by Welsh Government) as a temporary car park.

Cycle

Cycling forms an important part of the wider context at SA1. With the National Cycle Network Route 04 running through the site to the north and west, there is scope to further increase the usable cycle routes elsewhere. City and County of Swansea's aspiration to create an innovation corridor along Fabian Way will increase cycle movement to and from the east. Cycling facilities are provided at key locations throughout SA1, which consist of secure cycle storage and showering facilities.

Rail

Swansea Railway Station is situated less than a mile to the west.

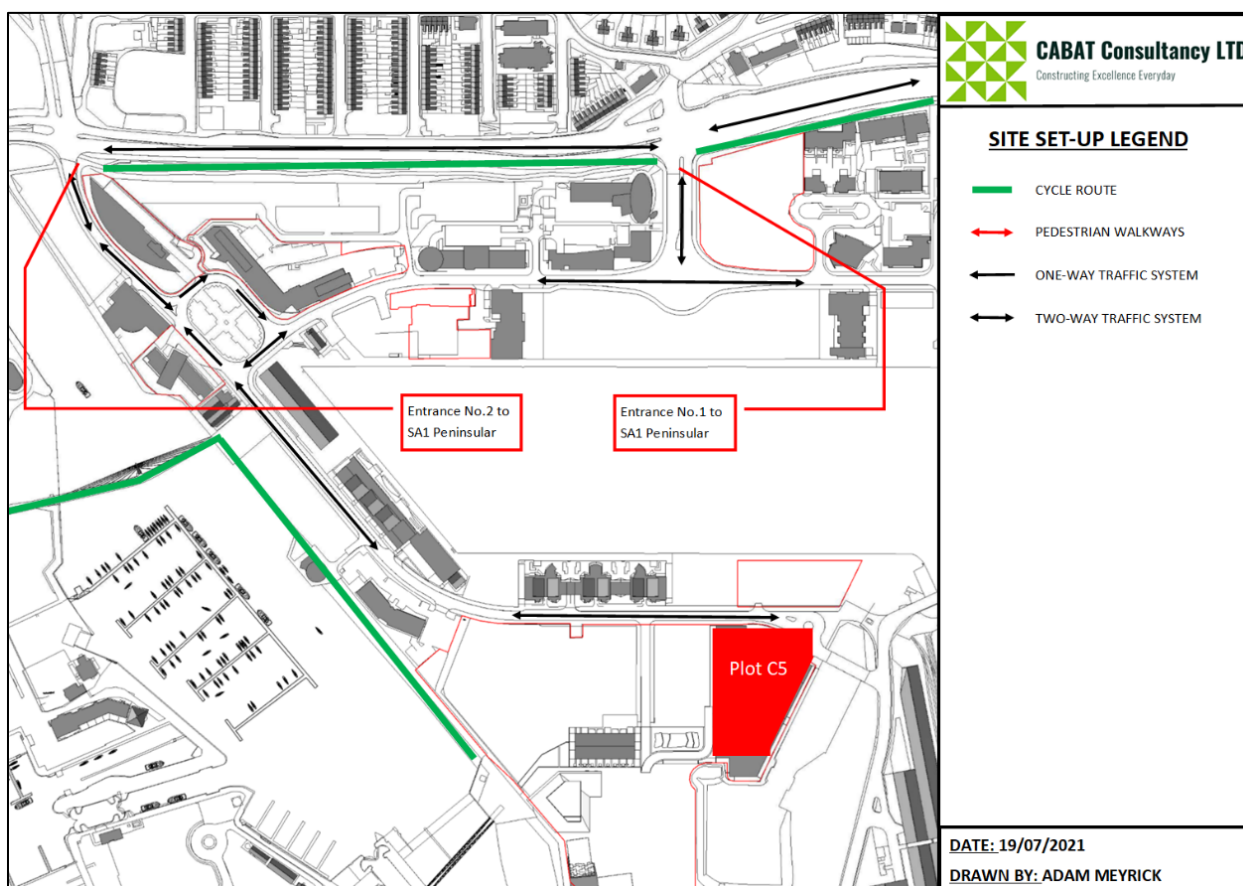


Figure 2: Existing vehicle, pedestrian and cyclist routes.

The graphic in *Figure 2* presents a visual aid of the access to site; it has been assessed that entry to the site is adequate and requires no special council permits, closures or alterations.

1.1.3 Topography

Site contours are level within the site boundary with no discernible features of interest or known issue to construction.

1.1.4 Surrounding Landscape and Ecology

The existing vegetation within the SA1 Development is a mix of the typical vegetation to be found on a derelict dockland site and the more recent ornamental landscape associated with the new roads, developments and the public open space areas. The site location provides a challenge to the introduction of soft landscape elements. Plant species need to be chosen to withstand strong onshore winds and salt spray. There are no existing trees on site.

1.2 Design

The design segment of this DAS supports the planning application, providing a framework for CABAT to explain how the proposed development is a suitable response to the site and its setting, demonstrating that it can be adequately accessed by prospective users.

1.2.1 SA1 Design Code

The SA1 Swansea Waterfront Innovation Quarter Design and Development Framework has a Design Code that sets out principles and components with guidance in order to generate the physical development of the site. The design code therefore provides clarity over what constitutes acceptable design quality. The general principles of urban coding developed for the University of Wales Trinity St David's estate on the SA1 Peninsula also applies to the University's overall landholding throughout the Waterfront Innovation Quarter including Plot C5. The code sets out what materials, architectural detail and composition is permitted, this is aimed at delivering better quality places and include requirements for streets, blocks and massing, to architectural form composition and materials.

1.2.2 Proposed Design

Layout

The primary public entrance is aligned with the vehicular approach to the site. This aims to give prominence and clarity on approach in navigation. This is further enhanced in site layout and landscaping arrangements. The public entrance is also approached by pedestrians on the west façade where a formal entrance is proposed.

Appearance

The proposed design utilises a combination of brick, timber and metal cladding. In order to achieve a more tactile and softer contrasting material palette timber cladding has been employed strategically throughout the elevation to break up the massing. This is particularly prominent within the West block where vertical elements in line with the masterplan strategy have been employed to break up the horizontal nature of the building. Metal cladding is used mainly at roof level to provide definition at the junction and to complement the solar shading elements.

Sustainability

The aspiration for any development within the SA1 Waterfront development area is to achieve a BREEAM "Very Good" rating, however, this project looks to encapsulate an improved "Excellent" rating (see *BREEAM Checklist Client Handout document*). In support of the Building Regulations requirements for the site, renewable energy in the form of photovoltaic panels are proposed. This has been designed at roof level to not impact the elevations and cannot be seen from ground level. In addition, the incorporation of a Modular Living Wall System (MLWS) will improve the health and wellbeing of passers-by and occupants whilst increasing biodiversity elements (see *Living Wall Life Cycle Cost Analysis document*). The building utilises solar shading to elements of the south, east and west elevations to protect against the effects of solar gain and providing a comfortable internal atmosphere.

Natural Ventilation

The building layout accommodates natural ventilation to appropriate areas of the building, particularly in the bedroom and consultant areas where mechanical ventilation is not a clinical requirement. Student comfort is achieved with sustainable building design.

Natural Daylight

The facilities orientation combined with appropriate window sizing strategy allows a significant portion of the building to benefit from natural daylight. Where appropriate solar shading has been provided and employed strategically within the elevations to mitigate the effects of solar gain.

Ease of Maintenance

Through the selection of a simple palette of materials and design strategy the requirement for maintenance has been limited. Where maintenance is required appropriate access has been provided in the interests of health and safety requirements.

Views

The building has been positioned and designed accordingly to take advantage of this in combination with the peninsular. All users can benefit from access to external views from most of the building.

Cyclist Facilities

In line with BREEAM requirements, cyclist storage facilities have been provided for both staff and public. Changing and shower facilities are provided for staff use promoting a sustainable approach to commuting by bicycle.

Minimising Watercourse Pollution

Storm water treatment and attenuation will be achieved through a combination of Sustainable Urban Drainage Systems (SUDS) and hard engineering solutions. Additionally, the MLWS will help prevent pluvial surface water for formulating.

1.3 Client Critical Success Factors for the Project

The client's key objectives are as follows:

- Commencement of construction in May 2020.
- Completion of the new facility by August 2021.
- Adherence to a budget.
- A minimum BREEAM rating of Very Good achieved for the new building.
- Develop a robust programme to deliver high quality standards expected of a modern educational institution (*see CABAT Glyndŵr Project Programme*).
- Soft landings principal for commissioning and handover.
- Target Recruitment and Training (TR&T) targets achieved through local engagement, 50% of SEWSCAP targets (*see Glyndŵr Development Social Aspects Assessment document*).
- Control of site won material on site by the development of Materials Management Plan (MMP).
- Early involvement with Client Facilities manager from existing facility.
- Efficient and safe site layout (*see Integrated Project Site Set-ups document*).
- Innovative means of construction supplemented by effective communication across all parties (*see BIM Execution Plan (BEP) document*).



UWTSD Glyndŵr Development Labour Resource Distribution

It is important to analytically plan the number of laborers that will be on site before programme acceptance for many reasons. Firstly, this approach ensures that the site will not be overcrowded and will not endanger laborers health & safety. This works directly into CABAT's role as the principle contractor to comply with the Construction (Design & Management) Regulations 2015. Conversely, with little labourers on site at one point there could be opportunity for additional trades to be on site to accelerate the programme. The number of labourers on site can also be benchmarked against other projects of similar value and function.

This is contractor excellent practice as this monitoring can act as an incentivisation mechanism to improve productivity. Additionally, the number of weekly labourers and labour costs can be earmarked as a key performance indicator (KPI) to measure how the project is progressing in accordance to what was programmed. This will allow CABAT to make real-time changes to the running of the project to help get the project back on track or to forward-plan any scope-change the discrepancy should cause. These results can thereafter be scrutinised post-project as a means of continuous improvement.

Perhaps the principle reason although is labour cost with the association of material and plant cost. Given the number of laborers on site, their programmed time on site and labour costs, a labour cash flow forecast can be formulated. This tool will permit the principle contractor to have control over redistributing labour and resultantly cost. Presenting this data in this format moreover allows the contractor to visually analyse where costs can be saved, driving higher profits. Illustrated within *Table 1* is the number of labourers and total and daily costs associated with each construction activity. Highlighted in **RED** are the project phases, inclusive of total duration and total cost data.

Table 1: Construction stage (Tasks 15-55) total and daily labour costs.					
Task	Activity	No. of Labourers	Duration	Estimated Cost £	Daily Cost £
15	Stage 5 - Construction	-	45w	/ £2,629,475	= £8,349.5
16	Site Establishment	14	2w	/ £16,050	= £1,146.43
17	Site Hoarding, Office & Welfare Facilities	7	1w	/ £7,800	= £1,114.3
18	Site Clearance	7	1w	£ 8,250	= £1,178.6
19	Substructure	-	11w 2d	/ £562,000	= £7,113.9
20	Excavation	5	1w	/ £7,500	= £1,071.2
21	Piling	5	4w	/ £200,000	= £7,142.9
22	Pile Caps and Ground Beams	7	4w	/ £200,000	= £7,142.9
23	Tower Crane Installation	5	1w	/ £15,000	= £2,142.9
24	RC Slabs	10	2w	/ £100,000	= £7,142.9
25	Excavate Drainage Runs	8	1w	/ £15,500	= £2,214.3

26	Lay Drains, Test, Backfill	8	1w 2d	/ £25,000	= £2,777.7
27	Superstructure	-	9w	/ £721,750	= £11,456.4
28	Steel Frame Erection	15	4w	/ £315,000	= £11,250
29	Metal Decking	10	2w	/ £120,000	= £8,571.4
30	Roofing (Warm Roof)	10	2w	/ £94,500	= £6,750
31	Slabs Upper Floors	15	1w 4d	/ £140,000	= £12,727.3
32	Staircase Installations & Lift Shaft	12	2w	/ £52,250	= £3,732.1
33	Envelope	-	11w 3d	/ £543,175	= £6,789.7
34	SIPS Partitions	8	4w	/ £55,500	= £1,982.1
35	Metsec SFS Weatherboards	8	3w	/ £32,500	= £1,547.6
36	Brick & Blockwork, DPM, Cavity Ties & Fire Stops	20	5w	/ £187,750	= £3,650
37	Windows & External Door	7	2w	/ £90,000	= £5,364.3
Watertight					
39	Cladding Rails & Metal Profiling Cladding Panel Installation and Flashings	12	2w 3d	/ £162,425	= £10,151.6
40	Remove Tower Crane	5	1w	/ £15,000	= £2,142.9
41	Internals	-	15w 4d	/ £467,500	= £4,289
42	Partition 1st Sideboard	7	3w	/ £35,000	= £1,666.6
43	1st Fix M&E	5	3w 4d	/ £65,000	= £2,600
44	Partition 2nd Sideboard	7	2w 3d	/ £35,000	= £1,666.6
45	Tape and Joint	7	3w	/ £35,000	= £1,666.6
46	Decoration	7	2w 2d	/ £25,000	= £1,562.5
47	Ceilings	7	2w 2d	/ £35,000	= £1,666.6
48	FFE	15	2w	/ £100,000	= £7,142.9
49	Final Fix M&E	5	4w	/ £95,000	= £3,392.9
50	Snag & Clean	5	2w 4d	/ £42,500	= £2,361.1
51	Externals	-	9w 4d	/ £261,500	= £4,023.1
52	Road, Footpath & Carpark Construction	25	6w 2d	/ £178,500	= £4,056.8
53	Soft Landscaping	5	3w 2d	/ £83,000	= £3,608.7
54	Testing & Commissioning	-	3w 3d	/ £57,500	= £2,395.8
55	Commissioning (M & E Certification, BREEAM, SAP, Air Tightness)		3w 3d	/ £57,500	= £2,395.8

Following the establishment of the number of laborers required for each task and their associated daily costs, the formulation of weekly labour and labour cost distribution can occur. In reference to the **CABAT Glyndŵr Project Programme** document **Table 1** demonstrates this weekly analysis in tabulated form.

Table 2: Weekly labour and labour costs.						
Week	Weekly Activities	Activity Labourers	Weekly Labourers	Duration	Daily Cost £	Weekly cost
1	Site Hoarding, Office & Welfare Facilities	7	7	1w	X £1,114.3	= £5,571.5
2	Site Clearance	7	7	1w	X £1,178.6	= £5,893
3	Excavation	5	5	1w	X £1,071.2	= £5,356
4	Piling	5	5	1w	X £7,142.9	= £35,714.5
5	Piling	5	5	1w	X £7,142.9	= £35,714.5
6	Piling Pile Caps and Ground Beams	5	13	1w	X £7,142.9	= £57,143.2
		7		3d	X £7,142.9	
7	Piling Pile Caps and Ground Beams	5	13	1w	X £7,142.9	= £71,429
		7		1w	X £7,142.9	
8	Pile Caps and Ground Beams	7	7	1w	X £7,142.9	= £35,714.5
9	Pile Caps and Ground Beams	7	7	1w	X £7,142.9	= £35,714.5
10	Pile Caps and Ground Beams Tower Crane Installation	7	13	2d	X £7,142.9	= £25,000.3
		5		1w	X £2,142.9	
11	RC Slabs	10	10	1w	X £7,142.9	= £35,714.5
12	RC Slabs Excavate Drainage Runs	10	18	1w	X £7,142.9	= £40,143.1
		8		2d	X £2,214.3	
13	Excavate	8	31	3d	X £2,214.3	= £74,003.7
	Drainage Runs					
	Lay Drains, Test, Backfill	8		4d	X £2,777.7	
14	Steel Frame Erection	15	23	1w	X £11,250	= £64,583.1
15	Lay Drains, Test, Backfill	8	23	3d	X £2,777.7	= £64,583.1
16	Steel Frame Erection	15	15	1w	X £11,250	= £56,250
17	Steel Frame Erection	15	15	1w	X £11,250	= £56,250
18	Metal Decking	10	10	1w	X £8,571.4	= £42,857
19	Metal Decking Roofing (Warm Roof)	10	20	1w	X £8,571.4	= £76,607
		10		1w	X £6,750	
19	Roofing (Warm Roof)	10	25	1w	X £6,750	= £97,386.5
				1w	X £12,727.3	

	Slabs Upper Floors	15				
20	Slabs Upper Floors	15	27	4d	X £12,727.3	= £69,569.7
	Staircase Installations & Lift Shaft	12		1w	X £3,732.1	
21	Staircase Installations & Lift Shaft	12	20	1w	X £3,732.1	= £28,571
	SIPS Partitions	8		1w	X £1,982.1	
22	SIPS Partitions	8	8	1w	X £1,982.1	= £9,910.5
23	SIPS Partitions	8	16	1w	X £1,982.1	= £17,648.5
	Metsec SFS Weatherboards	8		1w	X £1,547.6	
24	SIPS Partitions	8	36	1w	X £1,982.1	= £35,898.5
	Metsec SFS	8		1w	X £1,547.6	
	Weatherboards					
	Brick & Blockwork, DPM, Cavity Ties & Fire Stops	20		1w	X £3,650	
25	Metsec SFS	8	35	1w	X £1,547.6	= £42,080
	Weatherboards					
	Brick & Blockwork, DPM, Cavity Ties & Fire Stops	20		1w	X £3,650	
	Windows & External Door	7		3d	X £5,364.3	
26	Brick & Blockwork, DPM, Cavity Ties & Fire Stops	20	27	1w	X £3,650	= £45,071.5
	Windows & External Door	7		1w	X £5,364.3	
27	Brick & Blockwork, DPM, Cavity Ties & Fire Stops	20	27	1w	X £3,650	= £45,071.5
	Windows & External Door	7		2d	X £5,364.3	
28	Brick & Blockwork, DPM, Cavity Ties & Fire Stops	20	27	1w	X £3,650	= £23,249.8
	Partition 1st Sideboard	7		3d	X £1,666.6	

29	Brick & Blockwork, DPM, Cavity Ties & Fire Stops	20	32	1w	X £3,650	= £36,983
	Partition 1st Sideboard	7		1w	X £1,666.6	
	1st Fix M&E	5		4d	X £2,600	
30	Partition 1st Sideboard	7	24	1w	X £1,666.6	= £69,291
	1st Fix M&E	5		1w	X £2,600	
	Cladding Rails & Metal Profiling	12		1w	X £10,151.6	
31	Cladding Panel Installation and Flashings		24			= £64,491.1
	Partition 1st Sideboard	7		2d	X £1,666.6	
	1st Fix M&E	5		1w	X £2,600	
32	Cladding Rails & Metal Profiling	12	17	1w	X £10,151.6	= £58,558
	Cladding Panel Installation and Flashings					
33	1st Fix M&E	5	42	3d	X £2,600	= £39,331.5
	Cladding Rails & Metal Profiling	12		1w	X £10,151.6	
	Cladding Panel Installation and Flashings					
34	Remove Tower Crane	5	39	1w	X £2,142.9	= £36,950
	Partition 2nd Sideboard	7		1w	X £1,666.6	
	Road, Footpath & Carpark Construction	25		1w	X £4,056.8	
35	Road, Footpath & Carpark Construction	25	46	1w	X £4,056.8	= £36,741.8
	Partition 2nd Sideboard	7		3d	X £1,666.6	
	Tape and Joint	7		1w	X £1,666.6	
36	Road, Footpath & Carpark Construction	25	46	1w	X £4,056.8	= £36,741.8
	Partition 2nd Sideboard	7		3d	X £1,666.6	
	Tape and Joint	7		1w	X £1,666.6	
37	Decoration	7	46	2d	X £1,562.5	= £36,741.8

36	Road, Footpath & Carpark Construction	25		1w	X £4,056.8	= £39,762.7
	Tape and Joint	7		1w	X £1,666.6	
	Decoration	7		1w	X £1,562.5	
	Ceilings	7		2d	X £1,666.6	
37	Road, Footpath & Carpark Construction	25	39	1w	X £4,056.8	= £36,429.5
	Decoration	7		1w	X £1,562.5	
	Ceilings	7		1w	X £1,666.6	
38	Road, Footpath & Carpark Construction	25	47	1w	X £4,056.8	= £64,331.5
	Ceilings	7		1w	X £1,666.6	
	FFE	15		1w	X £7,142.9	
39	Road, Footpath & Carpark FFE	25	45	2d	X £4,056.8	= £60,792.6
	Final Fix M&E	15		1w	X £7,142.9	
		5		1w	X £3,392.9	
40	Final Fix M&E	5	10	1w	X £3,392.9	= £35,008
	Soft Landscaping	5		1w	X £3,608.7	
41	Final Fix M&E	5	10	1w	X £3,392.9	= £35,008
	Soft Landscaping	5		1w	X £3,608.7	
42	Final Fix M&E	5	15	1w	X £3,392.9	= £46,813.5
	Soft Landscaping	5		1w	X £3,608.7	
	Snag & Clean	5		1w	X £2,361.1	
43	Snag & Clean	5	5	1w	X £2,361.1	= £11,805.5

This tabulated data has been transferred to a clustered-line histogram for ease of interpretation (see **Figure 1**). The number of labourers on site each week across the 43-week construction process has been exposed in correlation to the weekly labour costs. Observed is a direct correlation whereas the number of staff on site increased, so does the cost. An “S-curve” is also evident, this is justified by RICS as:

“The construction s-curve is a graphical report which displays the cumulative progress of a project and is a tool which construction companies use to track a specific metric over time”.

This cost S-curve demonstrates steep start-up costs with a “tail-off” as the project nears completion. This is vague in line with the amount of labour on site, except for between weeks 33 and 39 where M&E, decorator and roadwork contractors are all on site at once.

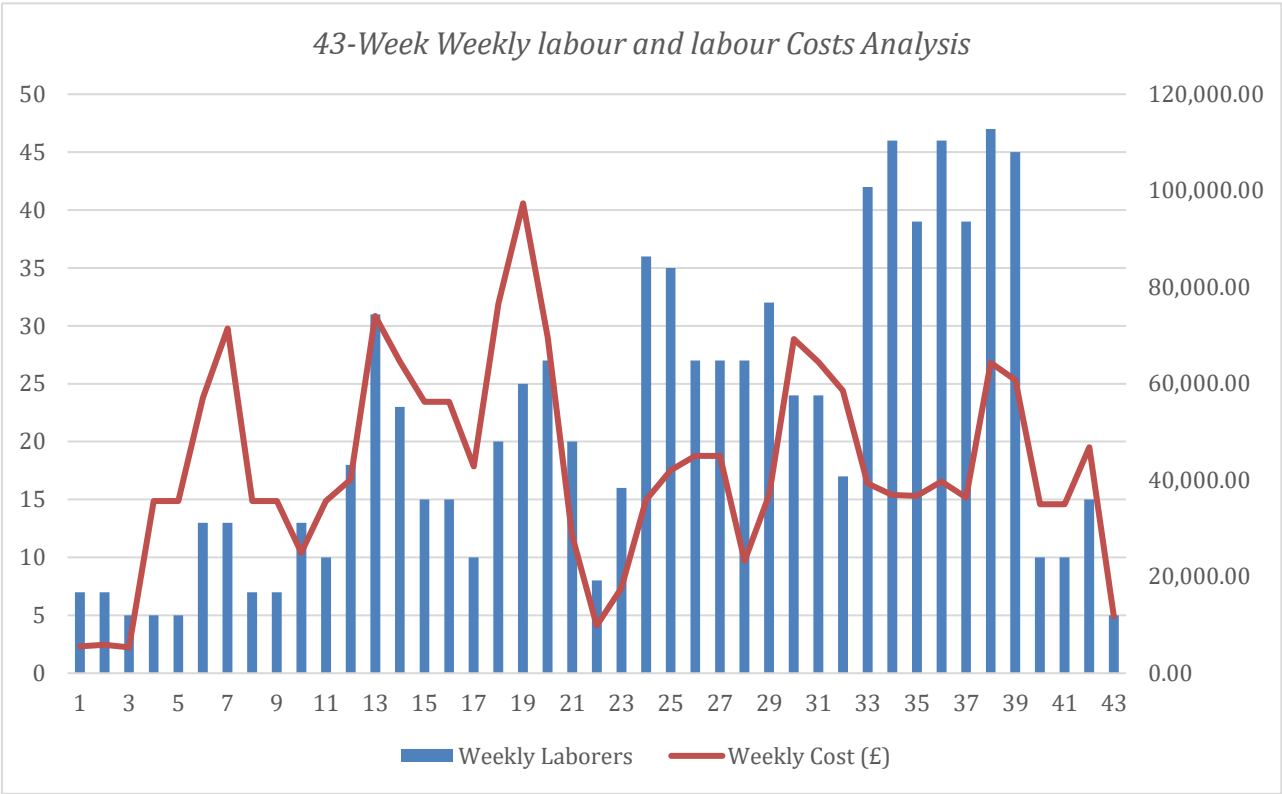
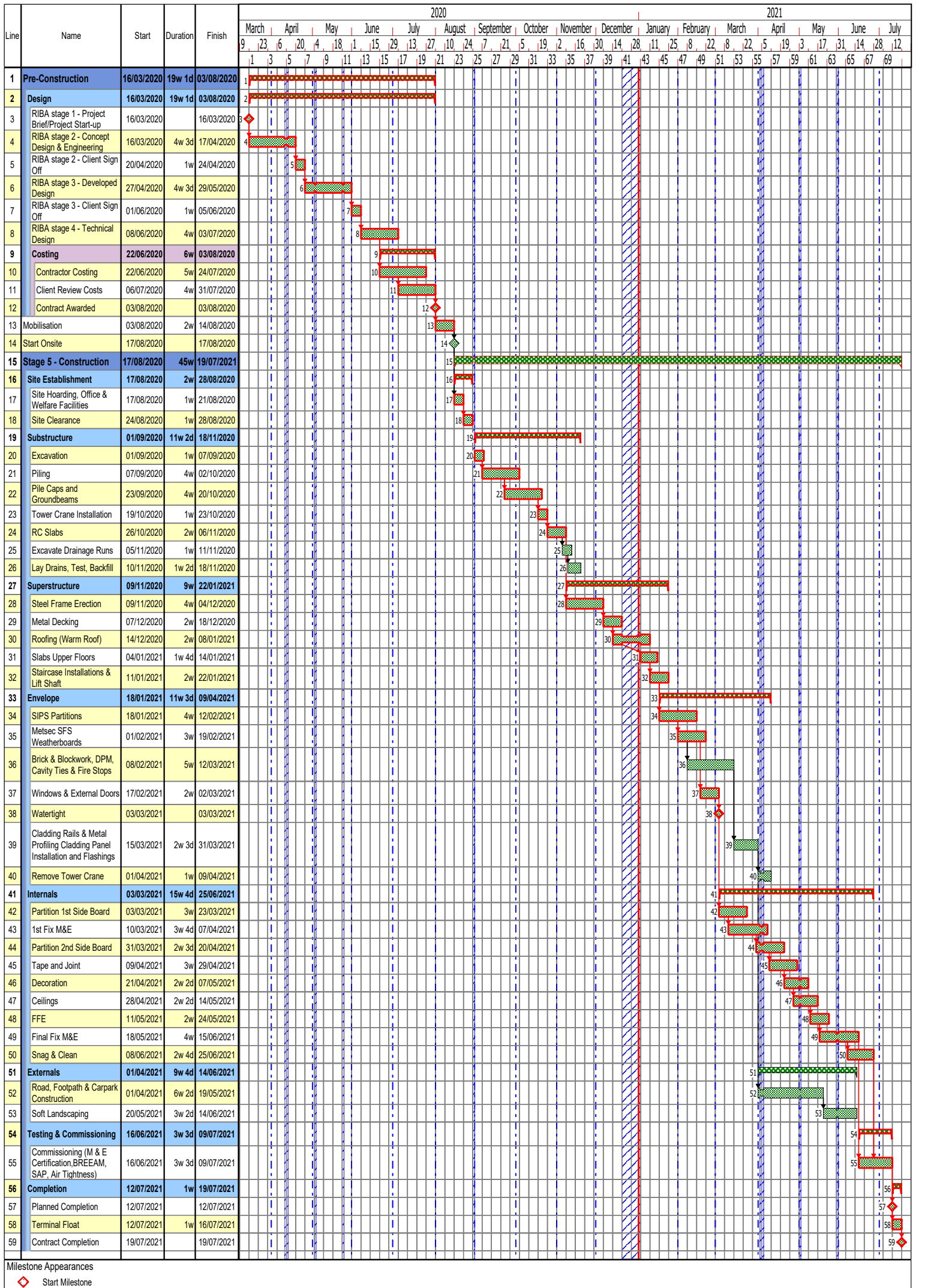
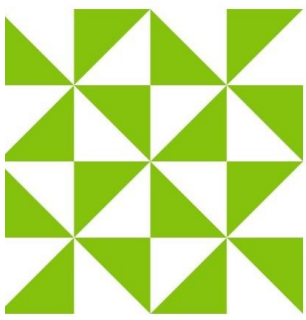


Figure 1: Weekly labour and labour costs at CABAT’s Glyndwr project.





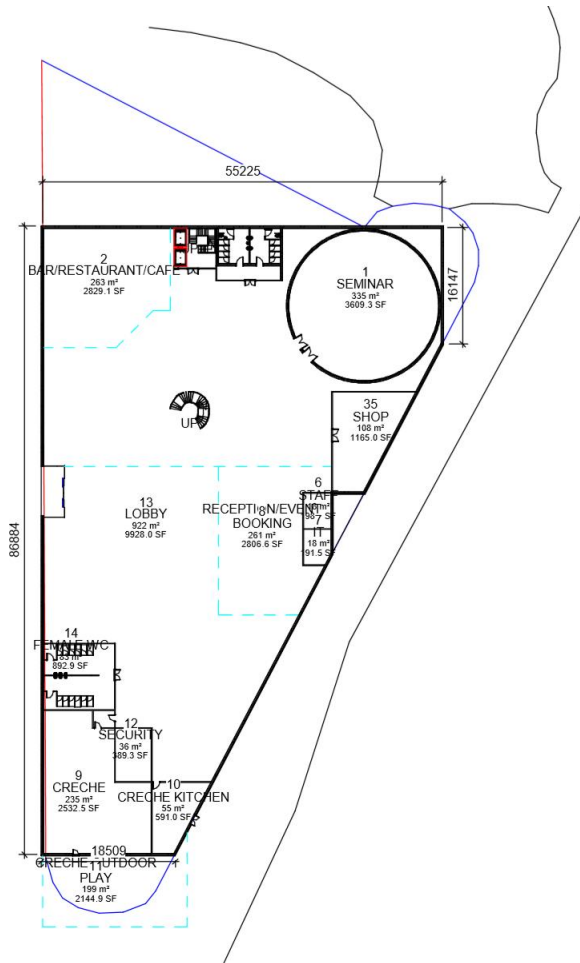
CABAT Consultancy LTD

Constructing Excellence Everyday

UWTSD Glyndŵr Development

Client: University of Wales Trinity Saint David

Wednesday 26th February 2020



Contextual

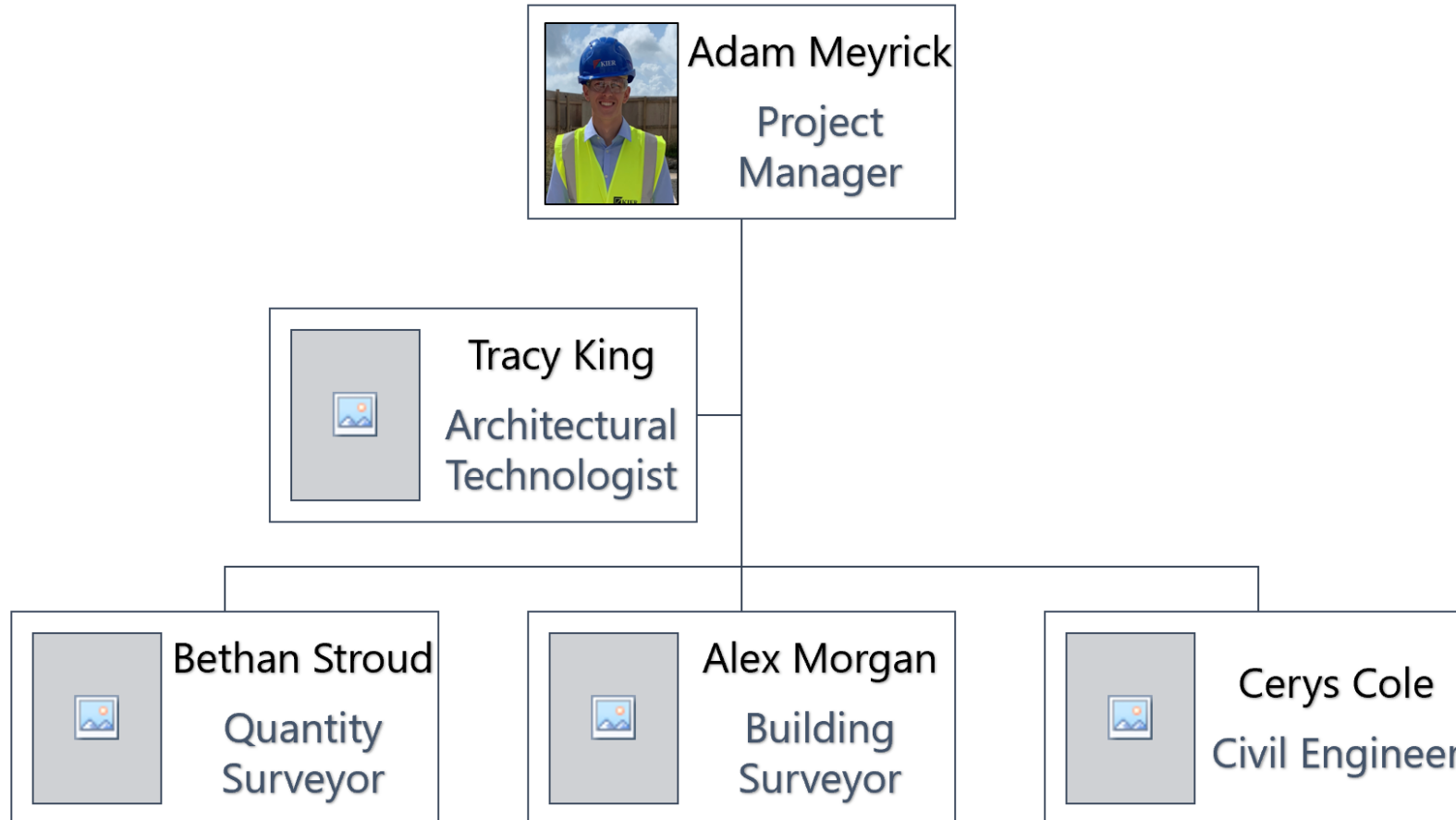
The University of Wales Trinity Saint David is submitting a planning application to City and County of Swansea Council to develop a private educational facility at Plot 15 & 16 at the SA1 Waterfront. The proposed development is for a high quality three storey building which would provide a flagship 300 capacity main lecture theatre as well as 10 x 30 capacity classrooms and 4 x 80 capacity lecture theatres. Student union facilities, café, crèche, games room and a restaurant will complete this state-of-the-art facility.

Client Critical Success Factors for the Project:

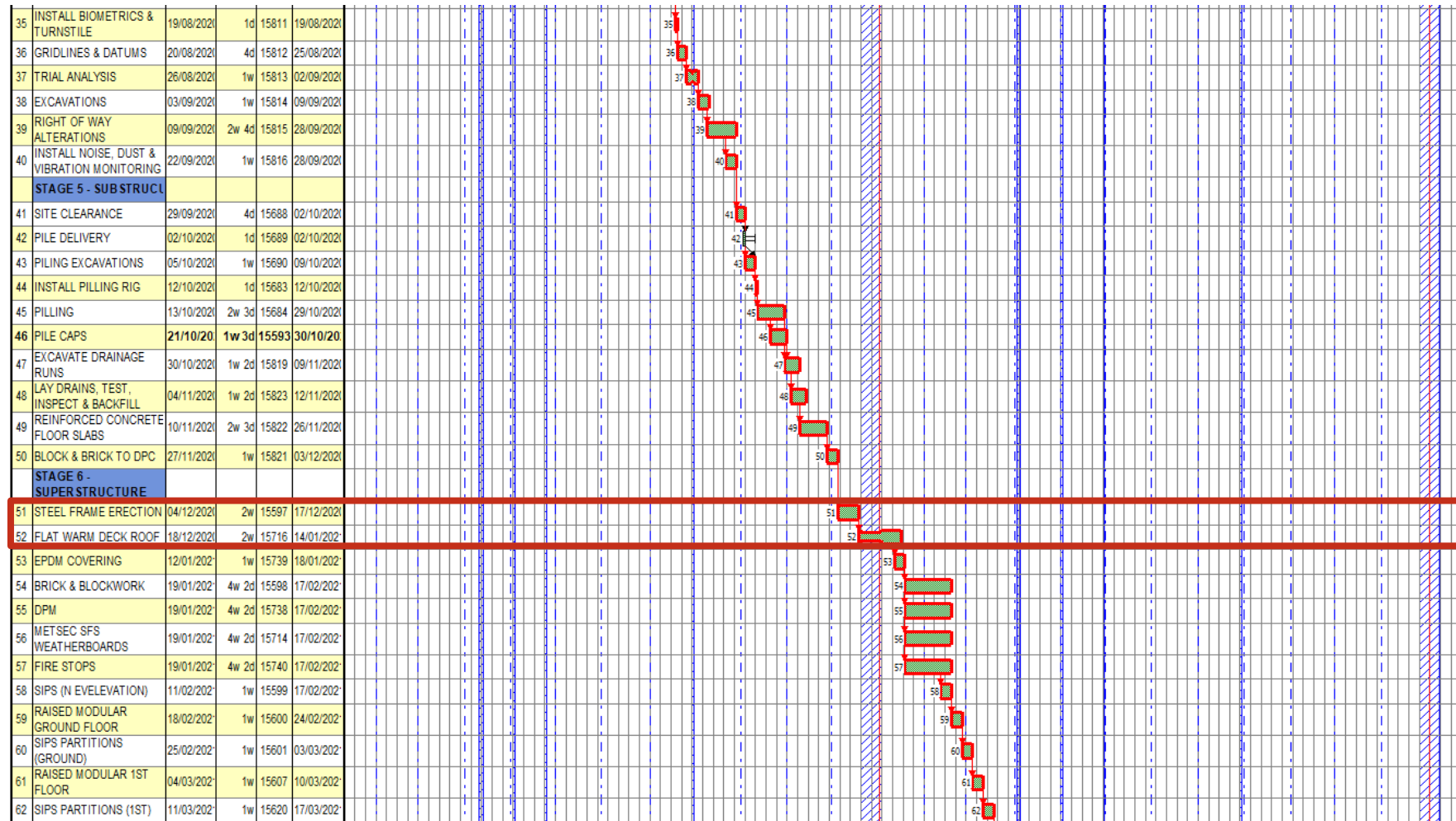
- ▶ Commencement of construction in May 2020,
- ▶ Completion of the new Hospital by end of August 2021,
- ▶ Adherence to a strict client budget,
- ▶ A minimum BREEAM rating of "Excellent",
- ▶ Develop a robust programme to deliver high quality standards expected of a modern educational institution,
- ▶ Soft landings principal for commissioning and handover,
- ▶ TR&T targets achieved through local engagement, 50% of SEWSCAP targets,
- ▶ Early involvement with Client Facilities Manager.



Your CABAT Project Team



Construction Programme 1



Please refer to Construction Programme 1 (Steel Frame) document.

Core Characteristics

Low cost, quick
with slight decrease
in quality



Steel Frame Construction:

- Versatility;
- Lightweight;
- Reduced construction time;
- Long lead time;
- Improved life cycle and change of use adaptability;
- Oxidization (Intumescent galvanising);
- 6 week frame assembly.

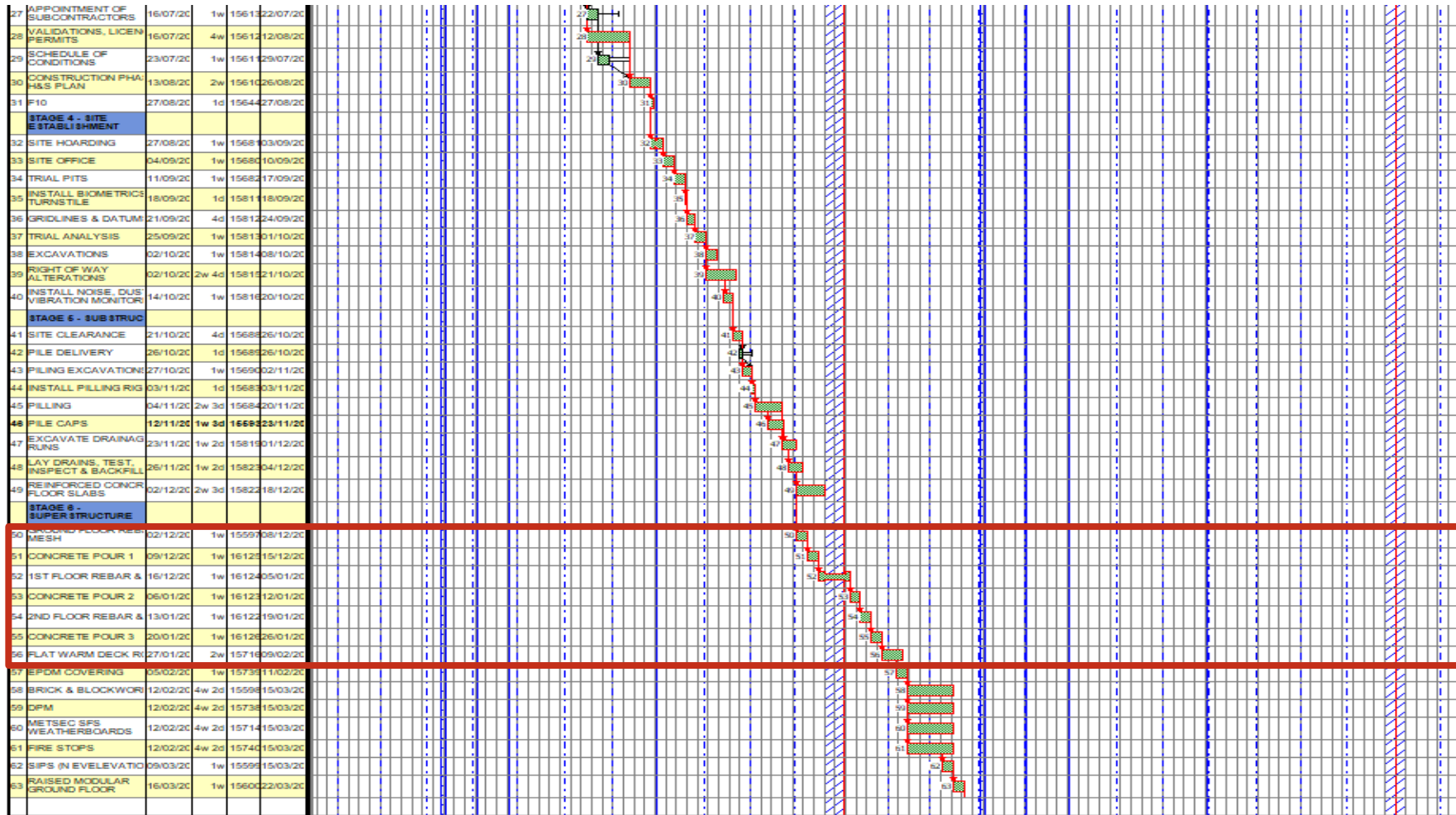
Programme 1 Programme 1 Summary

Element	Programme 1
Construction Begins	04/05/2020
Programme End	27/08/2021
Cost	£TBC* by QS (Cheaper)
Cladding	TBC
Foundations	Piles (Cheaper & Smaller)
Sustainable Technology	▪ Modular Living Wall System (MLWS) ▪ Rainwater harvesting ▪ Solar Photovoltaic (PV)



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Construction Programme 2



Planned by Powerproject

Please refer to Construction Programme 2 (Reinforced Concrete Frame) document.

Core Characteristics

Reinforced Concrete Frame Construction:

- Less sustainable materials;
- Higher quality;
- Fire resistance;
- Sacrificial galvanic anode protection;
- Greater thermal insulation;
- 8 week frame assembly.

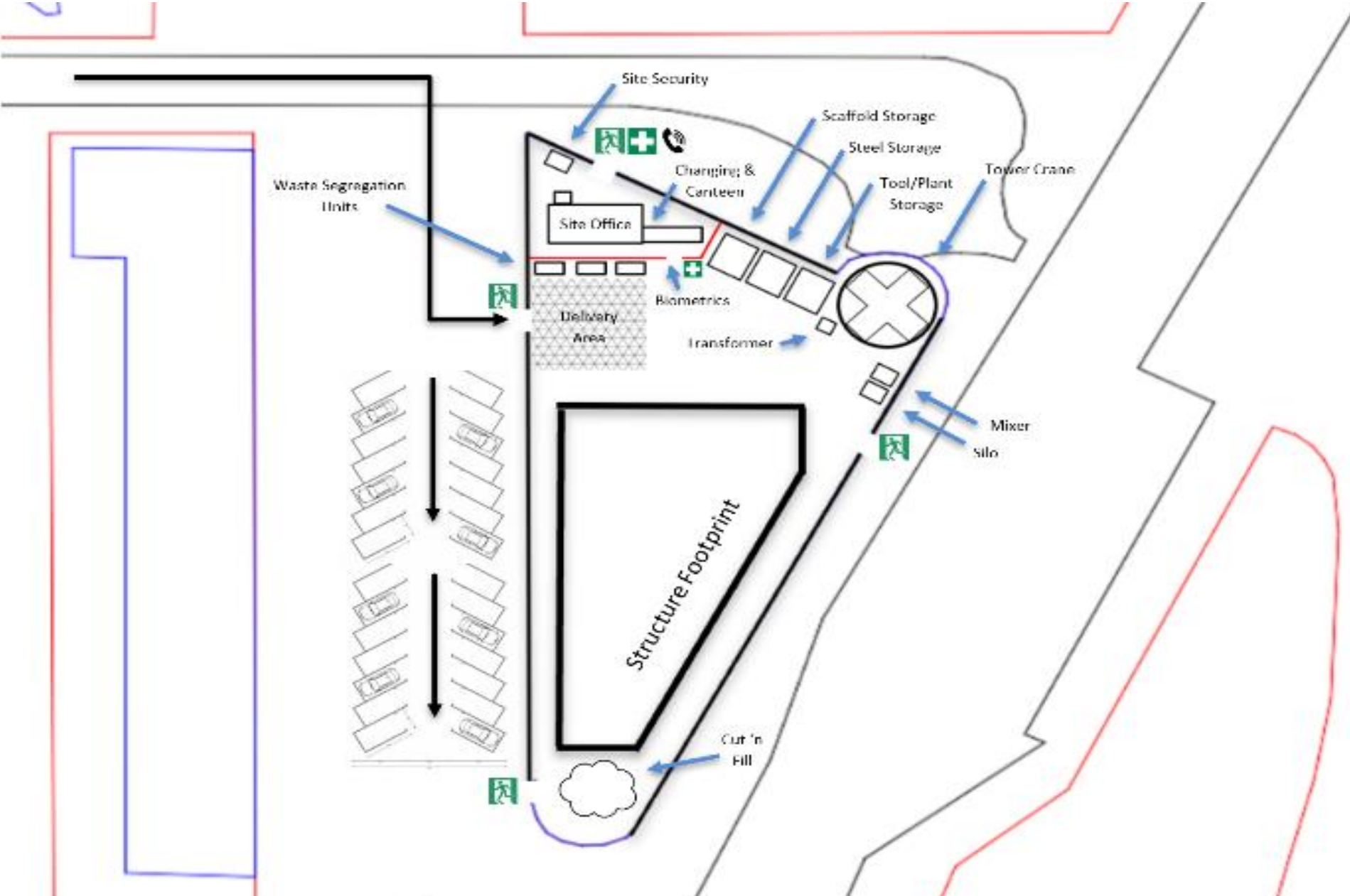


High cost, Slower with slight increase in quality



Programme 1 Programme 2 Summary	
Element	Programme 2
Construction Begins	20/04/2020 (2 Weeks Earlier)
Programme End	27/08/2021
Cost	£TBC* by QS (More expensive)
Cladding	TBC
Foundations	Piles (Expensive & Larger)
Sustainable Technology	▪ Modular Living Wall System (MLWS) ▪ Rainwater harvesting ▪ Solar Photovoltaic (PV)

Preliminary Site Setup



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BIM Execution Plan (BEP)

The project team will utilise BIM on this project, regularly updating a BEP; a live document that helps the project team identify and execute the role BIM plays in the various phases of construction management.

- ▶ **Communication:** BIM execution plans encourage instant communication among teams at the very start of the construction project, helping to manage responsibilities and expectations.
- ▶ **Collaboration:** Because a BIM execution plan is a living, breathing document, the project team should collaborate in real time on various phases of the project, allowing for proper attention to be given to the project.
- ▶ **Saving time by sharing data:** Now, contractors to clients and everyone in between can have direct access to BIM implementation data (such as file formats, details and dimensions of the model) in a way that's easily shareable and can be updated frequently.
- ▶ **Stronger execution:** Composing a BEP focused on the project at hand means the team can communicate and collaborate better from the very start of the project, it ensures a strong finish and execution, pleasing project owners and investors.

Refer to BIM Execution Plan (BEP) document



Image 1: Waterfront Community Church (Meyrick, 2019).



Image 2: St Thomas Primary School (St Thomas Community, 2018).

CABAT Project Targets

Activity	SEWSCAP Requirement
Person Weeks	416
Previously Unemployed Weeks	200
Jobs Created (NEETS/Unemployed)	8
Training Weeks	16 Trainee Weeks
Apprentice Weeks	120 Weeks
Graduate Weeks	40 Weeks
Work Experience Weeks	32 Weeks
Community Initiatives	
Community Hours	250
Community Evenings	1
Conscience Constructors Scheme	40
Newsletters	Quarterly
Local Business'	30% of the workforce from Wales
	15% from Swansea area
Local Labour	30% of the workforce from Wales
	15% from Swansea area

Social Aspects

► Qualifying the Workforce

- ILM,
- IOSH
- NEBOSH
- SMSTS
- SSSTS.

Additionally, CABAT are obliged to set up annual training plans which incorporate free health and safety training, asbestos awareness, facelift training, SUSA and toolbox talks.

► Community Initiatives

CABAT will help deliver various social actions that will help positively impact deprivation and meet the socio-economic needs of the SA1 area.

BREEAM Target

- ▶ Target: BREEAM “Excellent” rating (70 - 85%)
- ▶ Potential: BREEAM “Outstanding” rating (85+)

Meeting Challenges in a Changing World

- Reduced whole life cycle cost
- Reduces resource use,
- Improved health & safety,
- Improved project certainty,
- Adaptation to climate,
- Resilient and durable asset,
- Increased asset value,



Refer to BREEAM checklist illustrating achievable credits

Alex Morgan

Cladding Options

- ▶ Timber composite cladding - **£105/m²**
- ▶ Fibre cement weatherboarding - **£65/m²**
- ▶ Softwood timber cladding (painted or treated) - **£50/m²**
- ▶ Hardwood timber cladding - **£90/m²**
- ▶ Heat-treated timber cladding - **£80/m²**
- ▶ Tiles (concrete) - **£40/m²**
- ▶ Tiles (slate) - **£100/m²**
- ▶ Natural stone - **100/m²**
- ▶ Artificial stone - **£70/m²**
- ▶ Metal - **£50/m²**
- ▶ PVCu cladding - **£50/m²**
- ▶ Brick - **£60/m²**
- ▶ Brick slips - **£50-60/m²**
- ▶ Rendering - **£60/m²**
- ▶ Masonry paint (three coats) - **£15/m²**

Recommendations

Timber cladding

- ▶ Life expectancy - 50 years
- ▶ Maintenance Low frequency due to increased dimensional stability as coatings do not stretch and shrink
- ▶ Certification - FSC, PEFC certified and cradle-to cradle gold standard
- ▶ Recyclability Can be reused or used as a biofuel to produce heat and power
- ▶ Costings - £75/m²
- ▶ Durable



Recommendations

Composite

- ▶ Made from a unique combination of recycled wood and plastic, our highly developed and unique composition combines the traditional appearance of wood with the durability of an engineered composite.
- ▶ Life expectancy - 25 year
- ▶ No need to paint, seal or treat the cladding
- ▶ Simple installation using standard tools
- ▶ Rot, splinter and warp resistance
- ▶ Contemporary and traditional design options
- ▶ Costings - £105/m²



The Internet of Things in Smart Commercial Buildings

Energy efficiency

- ▶ Electrical management
- ▶ Energy metering
- ▶ Energy management
- ▶ Energy storage
- ▶ Water management
- ▶ Smart parking

Fire Safety & Security

- ▶ Fire detection & extinguishing
- ▶ Emergency lighting
- ▶ Door entry/access control
- ▶ Intrusion detection
- ▶ CCTV

Building control

- ▶ Smart B.M.S
- ▶ Predictive maintenance
- ▶ Asset management
- ▶ Human-sensor networks
- ▶ MVHR
- ▶ Natural ventilation
- ▶ Lighting control

Smart Technology - IOT - Digital assistance

Wayfinding

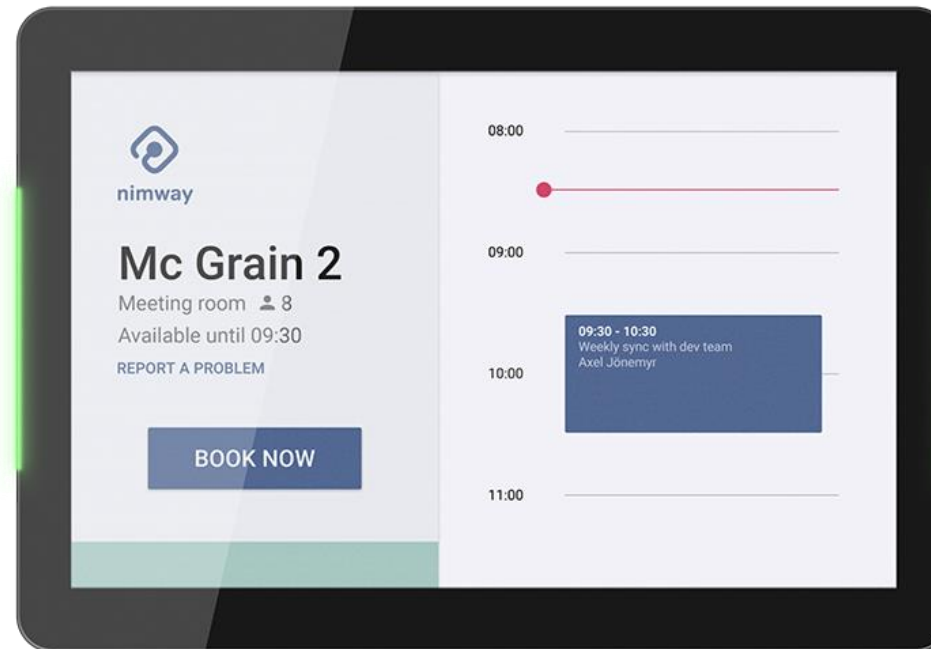
- ▶ Wayfinding navigates you around the office in a simple and intuitive way.
- ▶ In the [mobile app](#) and on any [digital floorplan](#) you can easily see where you are, and where you need to go for your next meeting.
- ▶ Walking up to a [digital floorplan](#), you will automatically get personalised navigation instructions for your next meeting, without needing to pick up the phone from your pocket.



Smart Technology - IOT - Digital assistance

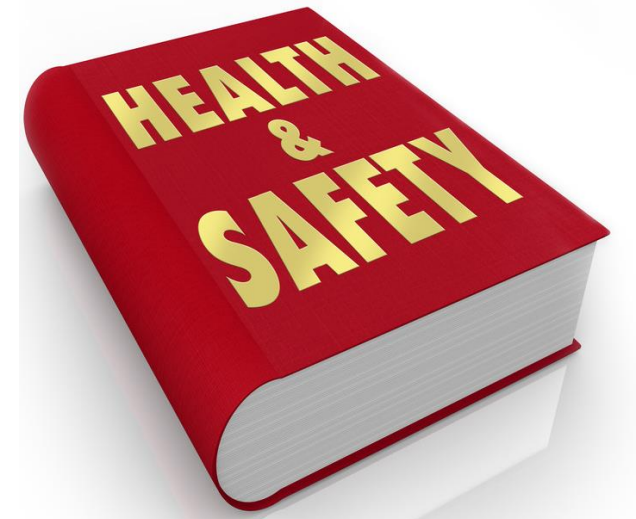
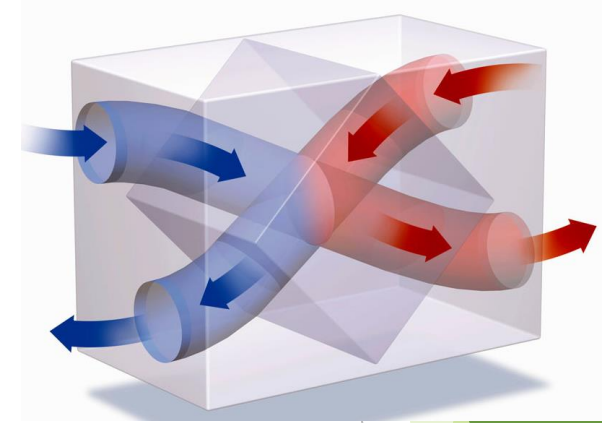
Room Booking

- ▶ Room panels fitted outside meeting rooms make it easy to book a room. Our quick and intuitive interface shows today's schedule, meeting room name and room type. You can also book a room in our mobile app.
- ▶ The room panels have LED lights that indicate occupancy and can be seen from a distance.



Specifications

- ▶ Health & Safety
- ▶ Fire Strategy Plan
- ▶ Ground Works
- ▶ SIP's
- ▶ MVHR





ARCHITECTURAL DESIGN

TRACY KING FdSc

AREA ANALYSIS

- ▶ BROWNFIELD SITE
- ▶ LARGE INVESTMENT BY UWTSO
- ▶ LARGE UNUSED AREAS
- ▶ POTENTIAL CONSTRUCTION ISSUES DUE TO SCAFFOLDING IN ADVERSE WEATHER.



Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

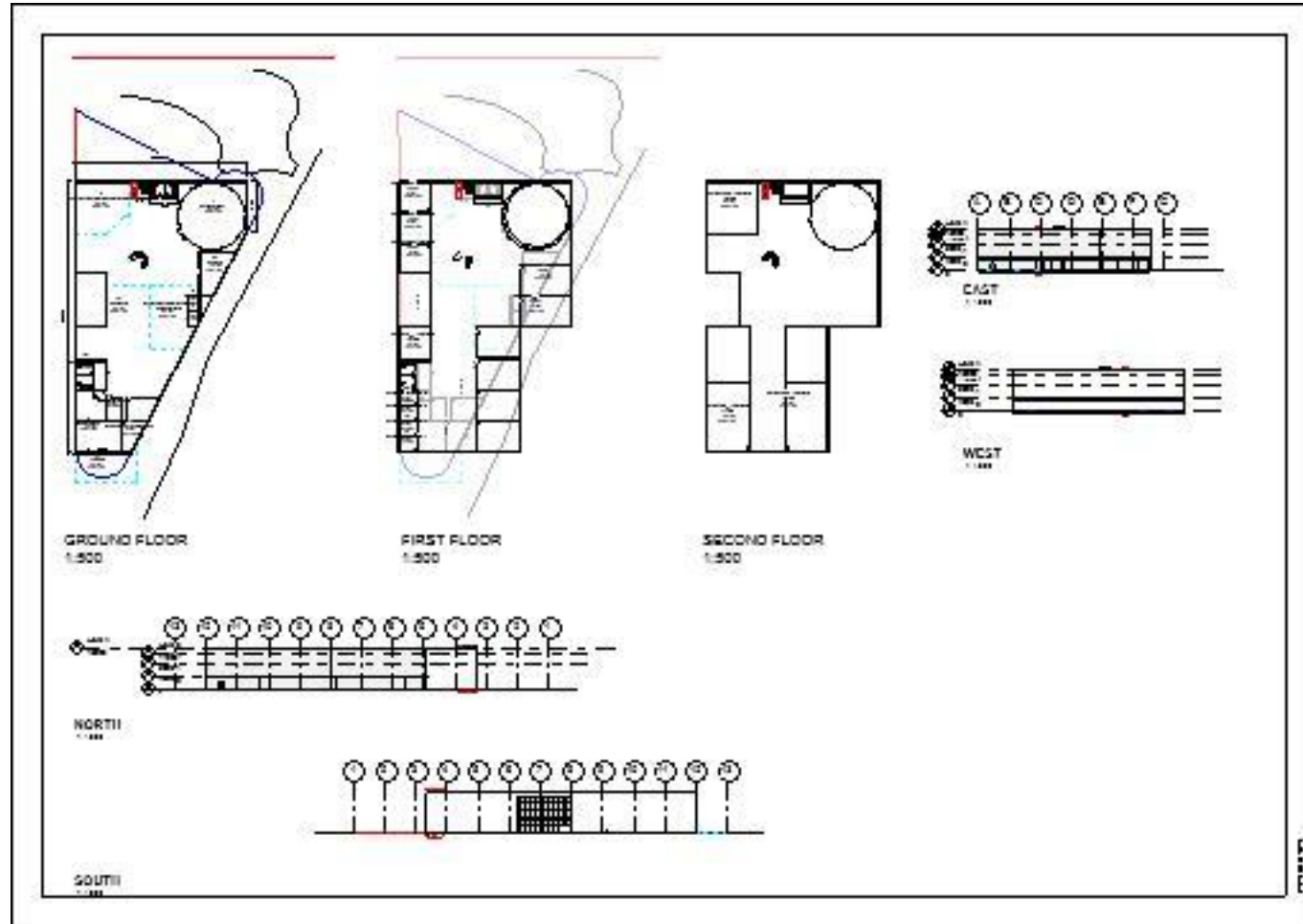


CONTINUING THEME

- ▶ SWANSEA WAREHOUSE RED BRICK BUILDINGS
- ▶ MODERN FEEL
- ▶ CONTRACT AGAINST THE NEWER STYLED BUILDINGS.
- ▶ STRONG SHAPE TO WITHSTAND WATERFRONT WEATHER.



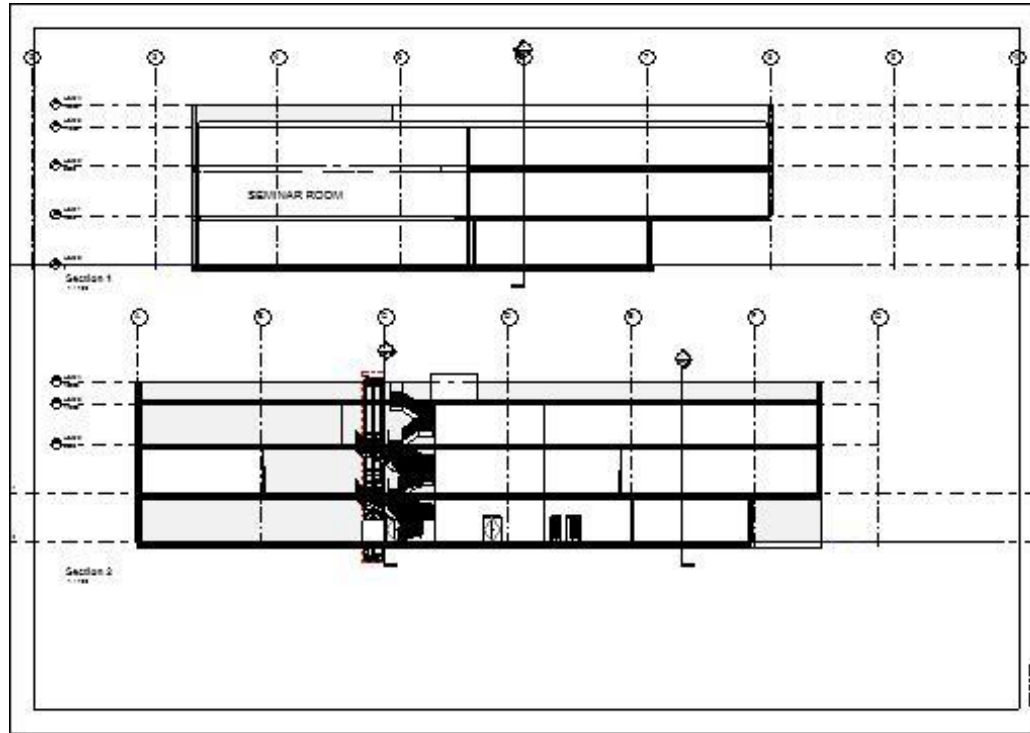
DESIGN



- STRONG SHAPE
- OVERHANG WALK WAY
- 3 STOREY SEMINAR ROOM
- LIGHT AIRY CIRCULATION SPACE

SECTIONS

- 3 STOREY SEMINAR ROOM
- EMERGENCY STAIR/ LIFT SHAFT
- WINDOWLESS NORTH ELEVATION





SUSTAINABILITY

- ▶ WHOLISTOCALLY SUSTAINABLE IN USE
- ▶ CONSIDERATELY SUSTAINABLE IN BUILD
- ▶ RECYCLED MATERIALS
- ▶ GREENER MATERIALS



UNIVERSITY/LIFE BALANCE

- ▶ CRECHE
- ▶ FIRST AID ROOM
- ▶ COMFORTABLE STUDY SPACE
- ▶ STUDENT KITCHEN
- ▶ SHOWERS
- ▶ GAMES ROOM



The background features abstract, overlapping green geometric shapes, primarily triangles and polygons, in various shades of green, creating a modern and dynamic visual effect.

Site Investigation Cerys Cole

Proposed Development

The proposed development is a universal learning/lecture hall building comprising of 10 classrooms for 30 students, 4 lecture theatres for 80 students and one lecture theatre for 300 people. Considerations for acoustics and possibility for renting out spaces for conferences and seminars outside term times are essential.

Criteria also includes:-

- Entrance hall

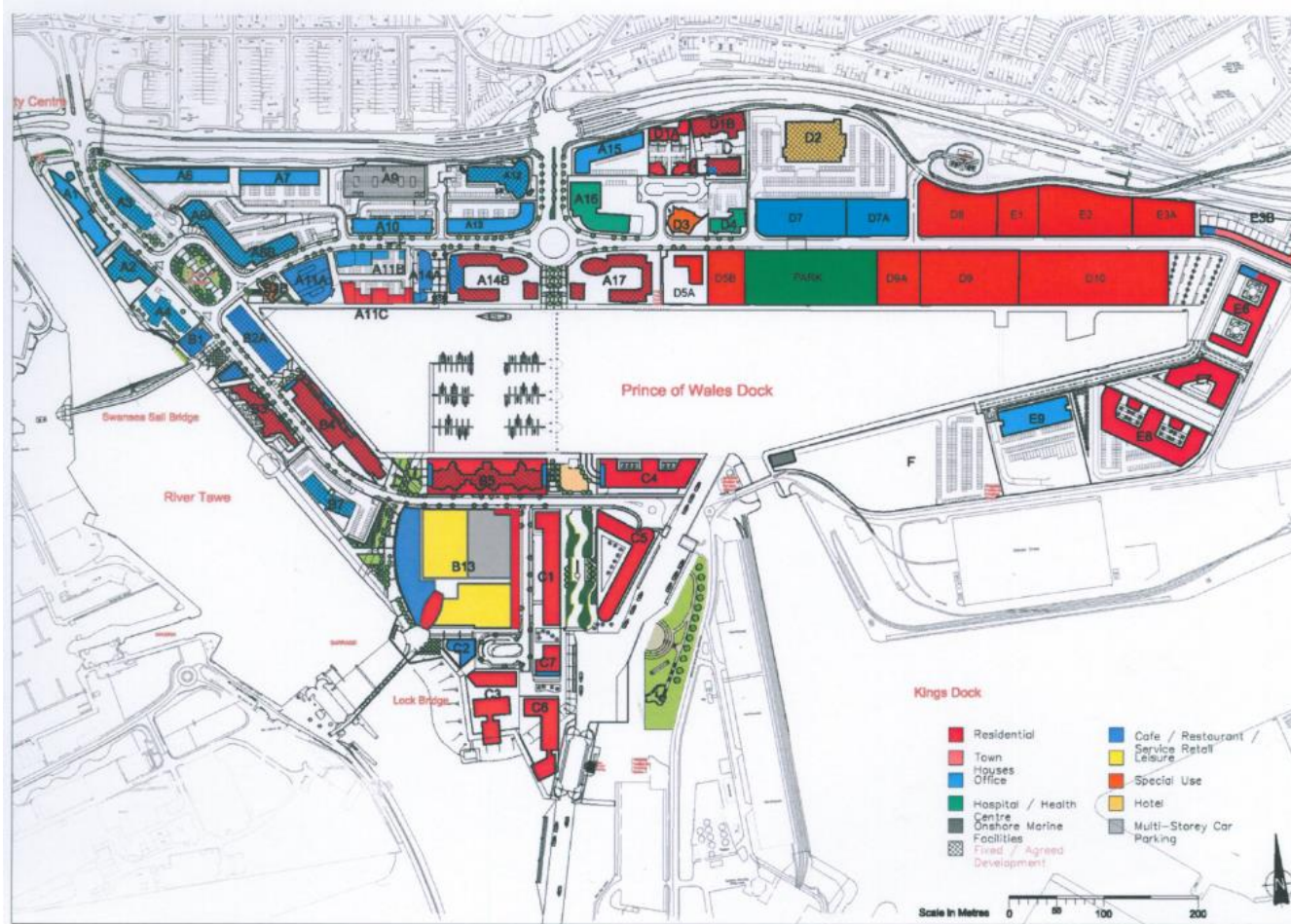
- Reception

- Toilets

- Storage space

- Faculty

- Central open meeting areas.



A map of SA1 defining all developments and the proposed site for development is illustrated as C5.

Site Description

The site for development is a brownfield site but has been prepared for redevelopment and is currently an unsurfaced gravel area.

The total area of the proposed site is still 12,025m²

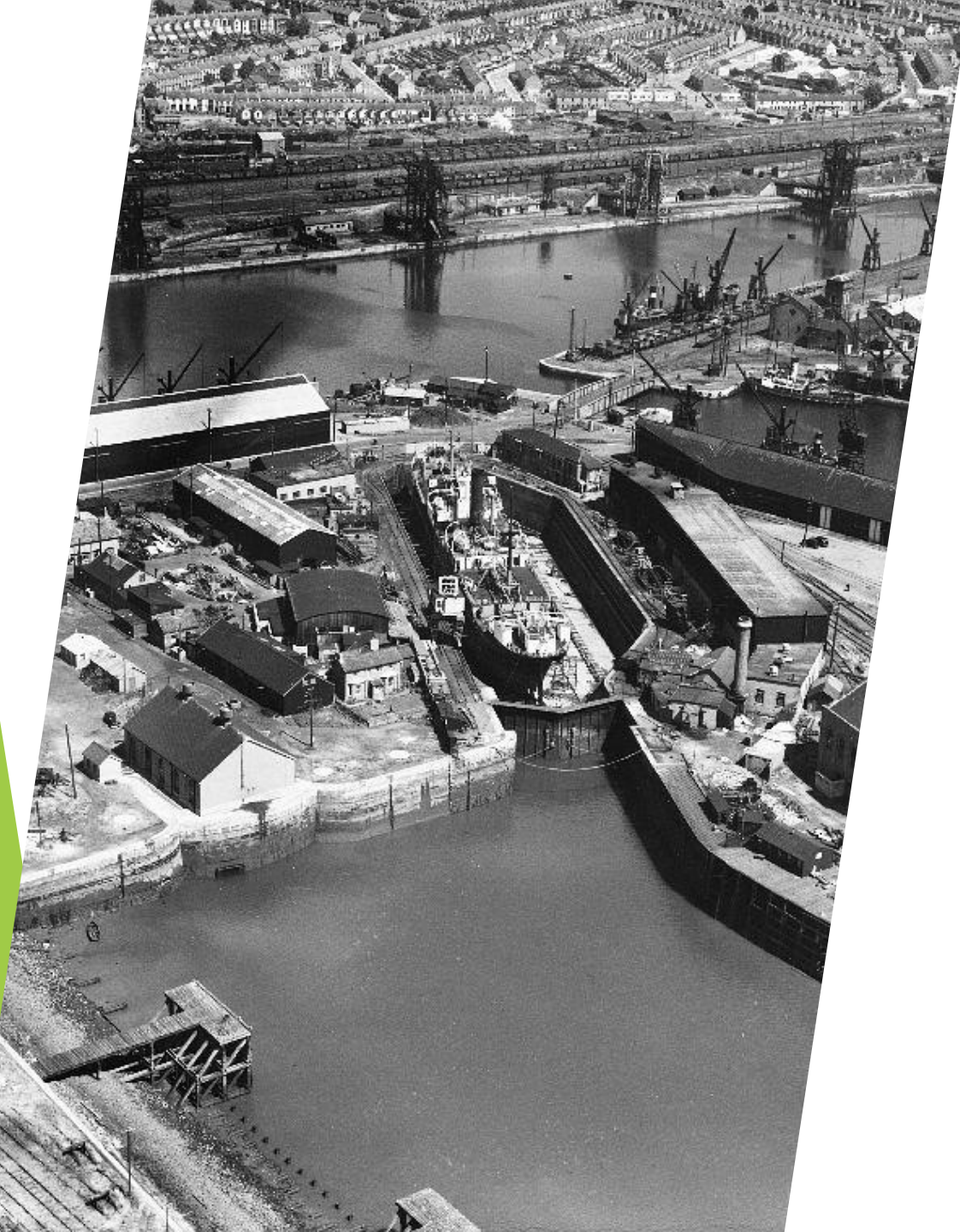
Site co-ordinates from osmaps.ordnancesurvey.co.uk

OS Grid Ref: SS 66881 92613

Latitude: 51° 36' 59" N

Longitude: 3° 55' 26" W

The surrounding land is designated for redevelopment, comprising residential apartments and commercial units including a university campus, hotels and restaurants.



Site History

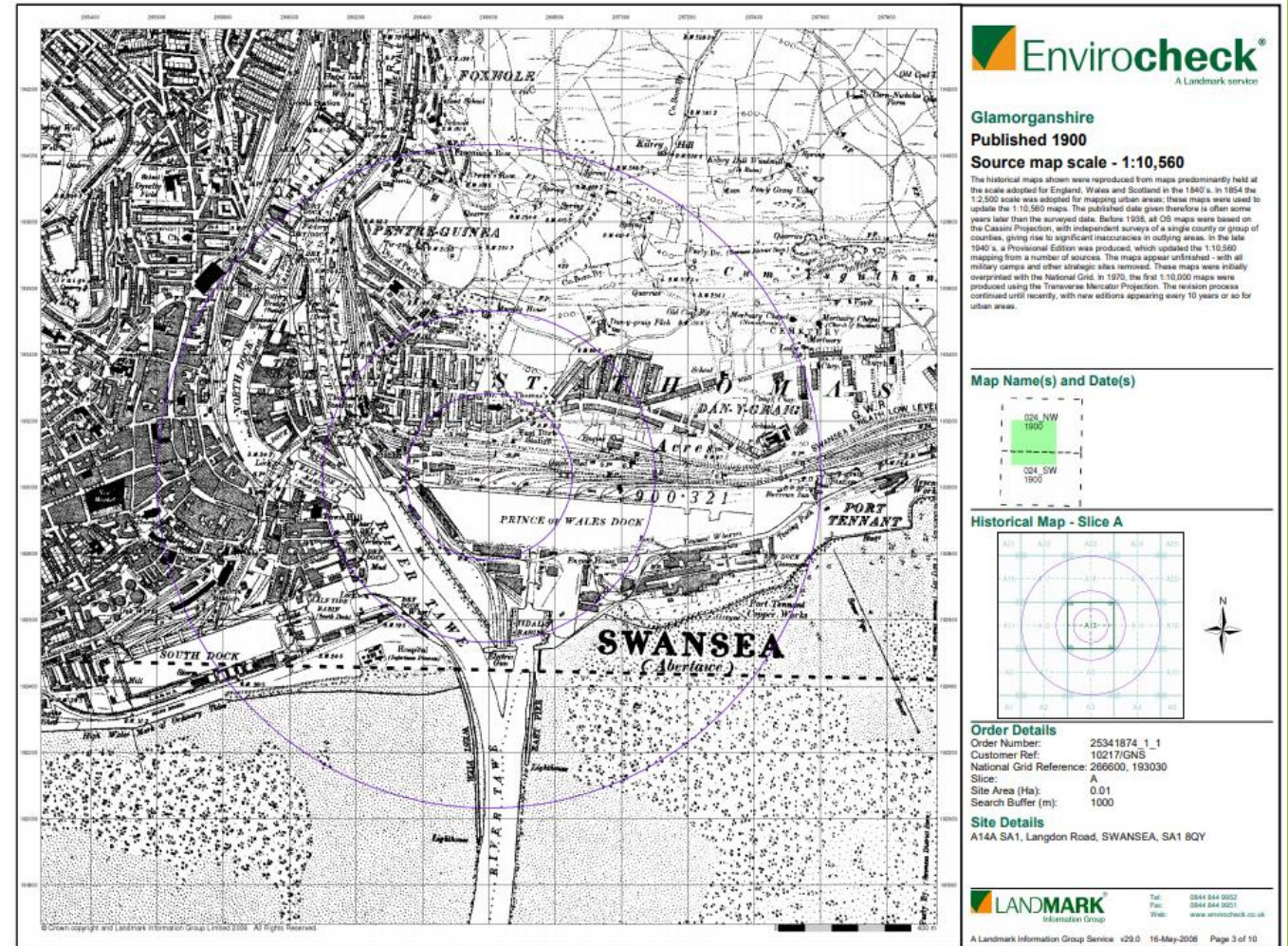
- ▶ The site previously had a high industrial output of copper, zinc, iron and tinplate combined with developments in shipping and Swansea's harbour needed to be expanded.
- ▶ The Swansea Harbour Trust (SHT) commissioned the construction of the **Prince of Wales Dock**. Opened in 1881 by the Prince and Princess of Wales it was completed in 1882 and expanded in 1898. The North Quay frontage was let to the Great Western Railway, Neath and Brecon Railway and the Rhondda and Swansea Bay Railway, which linked the Dulais Valley and Rhondda Valley coalfields directly with the docks.

Site History - 1900

Earliest recorded map dated 1884 - southern half of the site numerous railway lines and engine sheds, the northern half and the land further to the north occupied by rough pasture.

South of the site is a channel feeding into Fabian Bay. By 1900 the site and surrounding area had significantly been redeveloped as part of the Prince of Wales Dock which was built within the area of Fabian Bay, to the south of the site.

The 1900 map shows the site to be covered entirely by railway sidings servicing the Prince of Wales Dock.

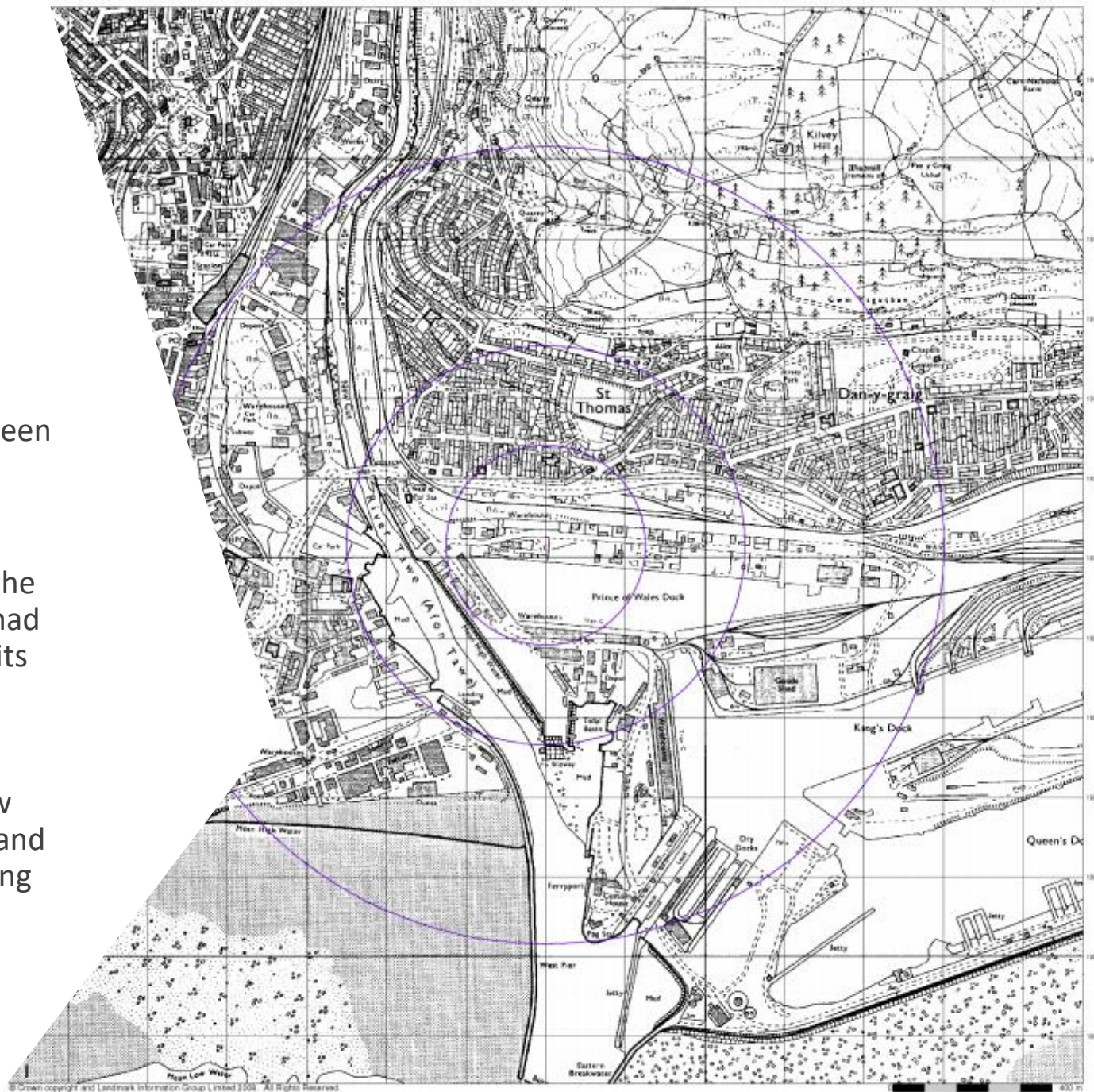


Site History - 1921 to 1979

► The 1921 map shows no significant changes just numerous other railway sidings, storage depots and a hoist had been constructed to the south of the site.

► No changes on site until 1979. Where the railway sidings, hoist and storage sheds had been removed, and several industrial units constructed on the southern half of the plots.

Maps in 1989, 1999 and 2008 maps show no significant change on site since 1979 and little change to the immediate surrounding area.



Ordnance Survey
Published 1979

Source map scale -

The historical maps shown were reproduced at the scale adopted for England, Wales and Northern Ireland. The 1:25,000 scale was adopted for mapping update the 1:10,560 maps. The publication years later than the surveyed date. Before the Cassini Projection, with independent countries, giving rise to significant inaccuracies. In 1940's, a Provisional Edition was produced from a number of sources. The military camps and other strategic sites overprinted with the National Grid. In 1950 produced using the Transverse Mercator continued until recently, with new editions in urban areas.

Map Name(s) and Date



Historical Map - Slice



Order Details

Order Number: 2534
Customer Ref: 1021
National Grid Reference: 2666
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 1000

Site Details

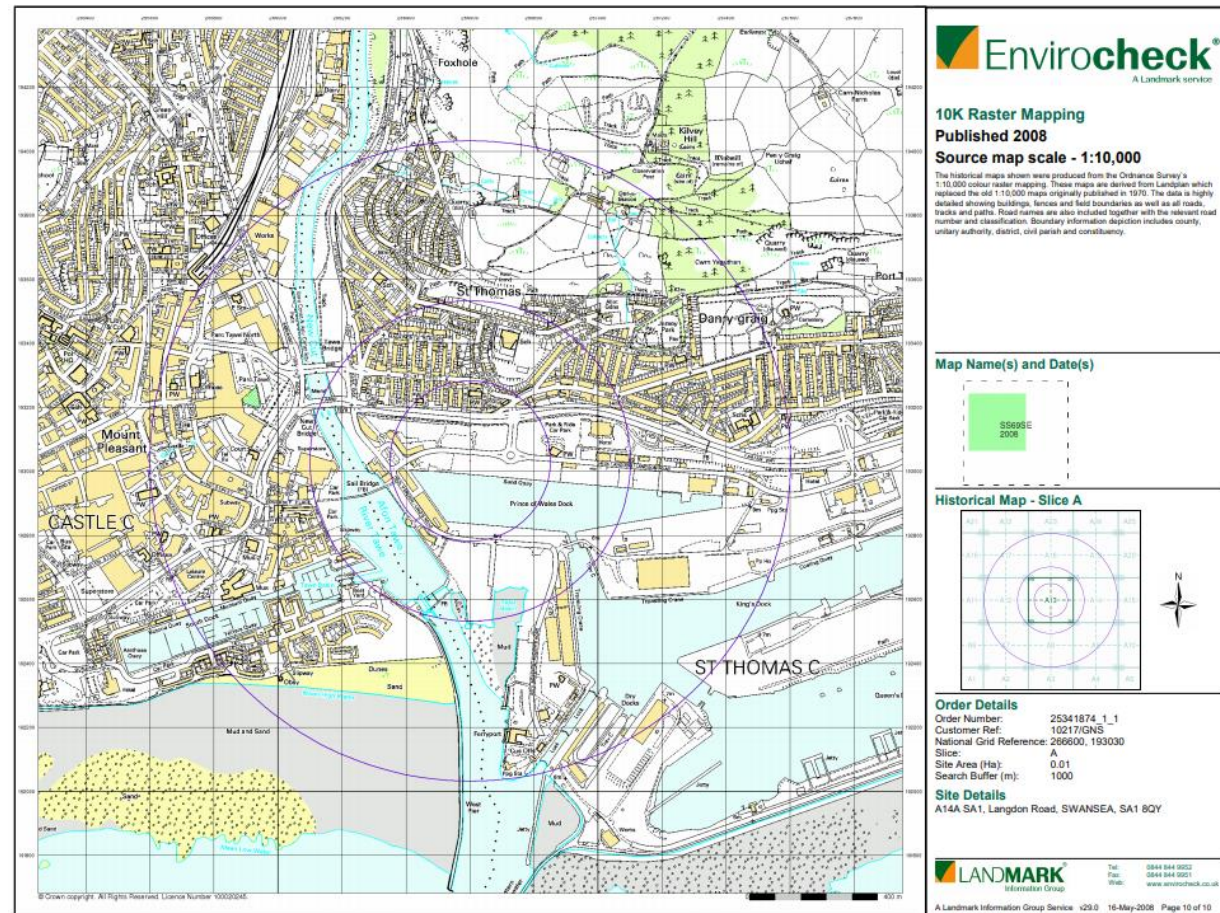
A14A SA1, Langdon Road, SW

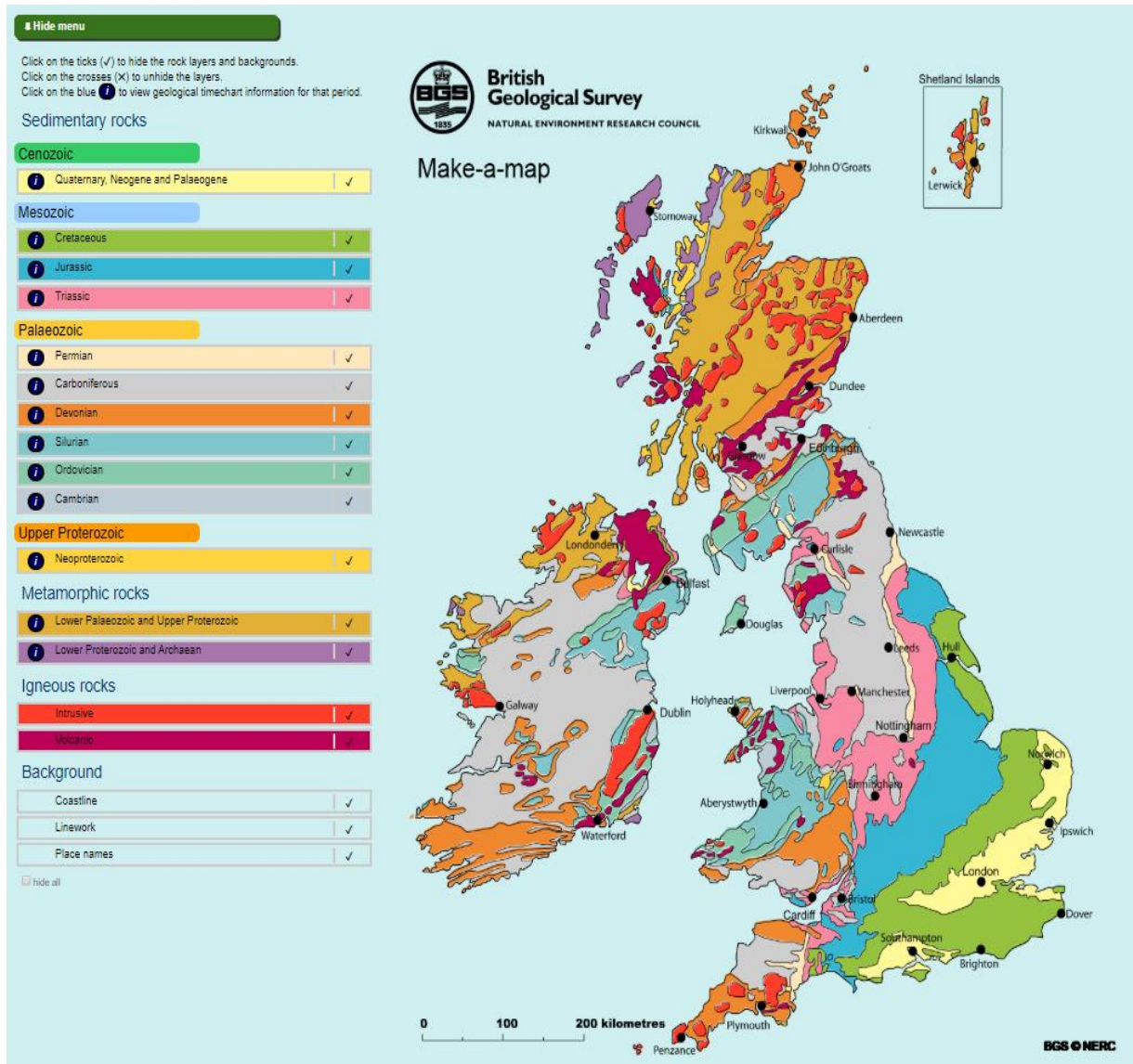


A Landmark Information Group Service

Site History - 2008 onwards

Since 2008 the site has been cleared of structures and prepared for redevelopment.





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 of the
 data are likely
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 seams.

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 ly north south
 generally follows

d approximately
 n approximately
 entation.

Foundations

- ▶ The geology across the site typically comprise clayey sandy gravels and cobbles.
- ▶ With a basic development proposal, it is based on current knowledge that suitably reinforced concrete shallow strip type foundations on re-engineered ground would be a suitable approach to foundations for this development.
- ▶ The ground below the load bearing areas should be improved by excavation. Any soft silts, clays and peat within the made ground and superficial soils are to be removed and replaced with granular fill materials laid and compacted to a consistent level. The excavated materials will require screening to achieve the required grading and then re-compaction in controlled layers.
- ▶ Earthworks should be undertaken to a minimum depth of 1.0m below underside of foundation level in the area outside the footprint of the proposed building. Reduced formations should be subject to proof rolling. Any soft spots encountered during proof rolling should be excavated and replaced with compacted structural fill materials.

Foundations Continued

- ▶ If structure is regarded as heavily loaded or possibly sensitive to settlement then the use of piled foundations may be necessary. Driven pre-cast concrete or cast in-situ augured/driven piles are the most appropriate foundation solution for the ground conditions.
- ▶ The piles would be end bearing socketed into the medium dense to dense sand and gravel with frequent cobbles at depths of between 13-15m.
- ▶ Lengths will depend on pile capacity required and pile installation techniques adopted.
- ▶ The use of piles is subject to any vibration constraints needed to protect site infrastructure, adjacent buildings and any sewers.
- ▶ Piles need to be designed to ignore load contribution from any fill and weaker clay strata.. Pile diameters of 450mm to 750mm could be adopted with varying sockets into the sands, gravels and cobbles or underlying bedrock strata, depending on capacity required. Safe working loads in the range of 300-600kN should be achievable for piles of this length.

Excavation Works

- ▶ Most excavations should be possible with normal soil excavating machinery. Various pneumatic breaker attachments, or similar tools will be useful if needed for any buried obstructions or dense made ground materials could be encountered.
- ▶ Deep excavations will require sheet piled supports driven to such depth as to limit water pressure hazards on the stability of the excavations and structures. Shallow excavations within the made ground should not encounter significant groundwater inflows.
- ▶ However, if any groundwater seepages/inflows or rainfall infiltrations are encountered it should be possible to deal with them using conventional pumping techniques.

Foundations Continued

- ▶ Allowances should be made for monitoring and dealing with ground induced vibrations from the piling works.
- ▶ Augured piles should be used where unacceptable levels of ground vibration are anticipated. A specialist piling contractor should be consulted regarding the detailed pile design, safe working load and contamination transmission risk assessments may require additional boreholes to confirm deeper ground conditions.
- ▶ Allowances should be made for encountering natural (suspected boulders) or man-made obstructions at the proposed pile locations and for a suitable period of pile testing.
- ▶ Ground slabs should be of suspended construction.

Driven precast concrete pile

ADVANTAGES

- ▶ Quality of pile can be inspected before it is placed in the ground
- ▶ Construction is not affected by ground water
- ▶ Can be driven in longer lengths
- ▶ Most appropriate in soft and unobstructed soils
- ▶ No removed soil to dispose of

DISADVANTAGES

- ▶ Can be damaged during driving
- ▶ Pile can be displaced if it hits obstruction
- ▶ Actual length of pile is known only when proved on site
- ▶ Relatively large rig required
- ▶ Noise and vibration – although technology is constantly being improved
- ▶ Driving force may determine pile properties
- ▶ Displacement of soil may damage surrounding structures

Driven Cast In-situ

ADVANTAGES

- ▶ Length can be readily varied to suit actual ground conditions encountered
- ▶ Can be driven in very long lengths
- ▶ Driven with a closed end and therefore groundwater is excluded from hole

DISADVANTAGES

- ▶ Can be damaged during driving
- ▶ Relatively large rig
- ▶ Noise and vibration
- ▶ Driving force may determine pile properties
- ▶ Displacement of soil may damage surrounding structures
- ▶ Concrete cannot be inspected after casting
- ▶ Large diameters cannot be used

Augured

ADVANTAGES

- ▶ Soil removed can be inspected
- ▶ The ground is continuously supported by the auger
- ▶ Relatively quiet
- ▶ Low vibration
- ▶ Suitable for most soil types (excluding boulders)
- ▶ Can be installed with limited headroom
- ▶ The continuous helical displacement technique reduces volume of removed soil and increased soil strength adjacent to pile shaft

DISADVANTAGES

- ▶ Maximum 1200mm pile diameter
- ▶ Concrete cannot be inspected after pouring
- ▶ Maximum pile length around 30meters
- ▶ Limited length of reinforcement cage
- ▶ Removed soil required disposal
- ▶ Efficiency is dependant on regular supply of concrete
- ▶ Auger may be impeded by relatively stiff soils

Further investigations

RADON - Envirocheck report indicates that no radon protective measures are required on site

Mining - Coal Mining Report will be obtained from The Coal Authority

Hydrology, Hydrogeology and flooding - The River Tawe flows near the site. Envirocheck indicates that there is a groundwater abstraction for hydroelectric power at the River Tawe Barrage and another abstraction for the National Waterfront Museum near South Dock.

Landfill sites - Envirocheck suggests that there are no current landfill sites within 500m of the site and no historic landfill sites

Potential contamination – previous and future

Other environmental issues

Bethan Stroud

Cost Comparison Steel v Concrete

Case Study : Christ the King Secondary School

The building's key features are:

- Three storeys, with no basement levels
- Typical clear spans of 9m x 9m
- 591m² sports hall (with glulam frame)
- 770 m² activity area and atrium
- Plant at roof level

- School is not as big as the auditorium unit (economies of scale would benefit)

Method	Concrete Planks	Insitu concrete slab	Steel Frame
Frame & upper floors	292	252	265
Cost per m2	£3189/m2	£3158/m2	£3132/m2

Rainwater Harvesting

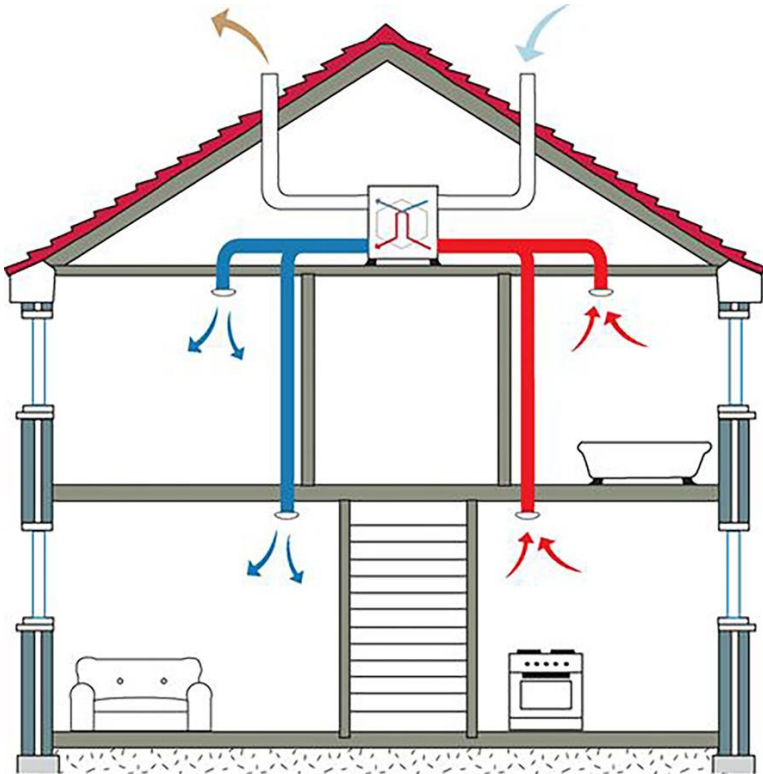
- ▶ What are the key issues effecting system?
- ▶ Average number of flushes per person per day is 4.42 with an average of 5 litres per flush.
- ▶ Inclusion of drought protection
- ▶ This will all determine tank size
- ▶ An approximate cost of a 19500L tank would be £6000 (no installation)



The Renewable Energy Hub

MVHR System

- ▶ Medium/Large unit £9000
- ▶ AHU commercial costs approx. £25000 depending on option
- ▶ We must have user and load information to calculate a more accurate cost



BPC Ventilation

Solar

- ▶ Most efficient collector is the solar
- ▶ Panelling could be used to save money
- ▶ Rule of thumb = 1kw / £1000
- ▶ Cost study at Ty Trevithick cost £24400 to install in 2016. - diagram available



Solar Panel Issues

- ▶ The size will also depend on location
- ▶ Over sizing will not benefit
- ▶ Damaging the Glycol fluid in the system
- ▶ Small system will also not create a payback worth spending the money

BoQ

- ▶ Completed design to create BoQ
- ▶ Take-offs required to complete measurements
- ▶ Materials required on the project
- ▶ Variations or additional works can change the initial budgeted cost
- ▶ There is no budget on this scheme



UWTSD Glyndŵr Development

Living Wall Life Cycle Cost Analysis

CABAT Consultancy LTD is committed to promoting sustainable development through its policies, strategies and services, thus achieving best value for money in the widest sense. The aim is to build stronger communities, reduce social exclusion, poverty and encourage the development of the local economy.

As such, every aspect of our construction undergoes a life cycle cost analysis. This type of assessment is used to calculate the socio-economic impact made by a product throughout its entire life. Taking into consideration all phases of the process: from the supply of the raw materials, manufacturing, transport, construction, use and end of life (**see Figure 1**).

The Modular Living Wall System (MLWS) will be attached to prefabricated structurally Insulated Panels (SIP's) through retrofitted steel cladding rails. MLWS's are a great way of the Client achieving enough credits for the building to achieve 'BREEAM Excellent' benchmark which demonstrates sustainability performance during planning, design, construction and building operation. Helping to lower running costs, maximise returns through market value and attract and retain tenants with desirable places to live and work

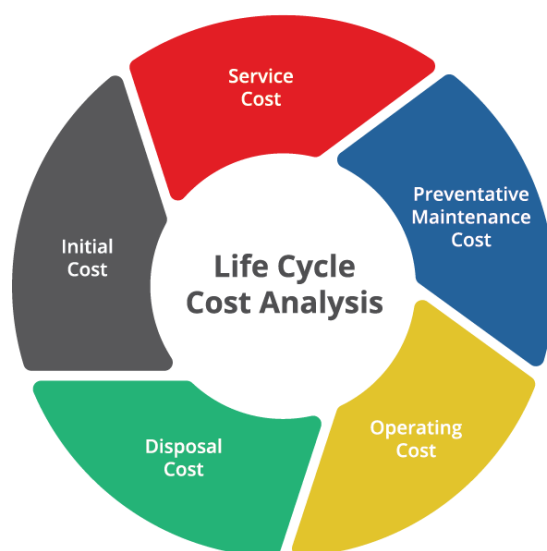


Figure 1: Life cycle cost analysis loop.

Section 1 – Initial Cost

The initial cost for the proposed 100m² Modular Living Wall (MLW) can be calculated through determining the cost of each component of the wall section in addition to the installation costs. A summary of these estimations can be found on **Table 1**.

Table 1: Initial cost estimation summary.

Component	Material	Service Life (Years)	Amount (m ²)	Cost (unit/m ²)	Total Cost (£)
Internal finish	Twin-layer Plasterboard	50.00	100	5.13	205.2
SIP's	Oriented strand board (OSB)	50.00	100		
	Polyurethane core	50.00	100		
	Vapour barrier	50.00	100		
Air cavity	Air (50mm)	-	100	-	-
External masonry	Red clay brick	-	100	2.86	286
MLWS	Cladding rails	-	2500	8	20,000
	Structural bolts	-	-	2,500	2,500
	MLW pannel	25.00	100	200	20,000
Vegetation	H.Helix (flora)	10.00	4500	0.5	2,500
	Irrigation rig	7.00	-	15,000	15,000

The total installation costs of the system amount to £65,000 (650/m²) inclusive of £5,000 installation fees.

Section 2 – Preventive Maintenance Cost

A typical 20 x 20-inch MLW panel includes 45 cells. Each cell holds a plant, so there are 45 plants in each panel. General maintenance duties for the flora include weeding, seeding and pruning. Additionally, general upkeep of the irrigation system is compulsory.

Such maintenance services are tendered out in a maintenance contract where costs can range from £500 - £1,000 per quarterly visit. Appropriate non-intrusive flora for the site of the development are displayed in **Figure 2**.

Figure 2: Proposed flora intended for the UWTSD Glyndŵr building.



Section 3 – Operating Cost

To operate a MLWS only a clean water supply and plant nutrients are required. The irrigation system draws water from the mains, amalgamates with plant nutrients and disperses these fluids evenly through risers across the wall. Approximately, 1L of water is consumed per m² of wall daily – that is a average consumption of 100L/day. Assuming the cost per/L of water is £0.01p, the daily operating cost of the MLW £1 and £365 annually.

Section 4 – Disposal Cost

Disposal costs for all the MLW scrutinised were obtained from product forms and information provided by contractors, therefor the disposal cost of a MLWS this size can be firmly set at £5,000. The disposal costs include the greening systems disposal (removal of plants and structures, transport to landfill, and landfill taxes), and the cladding renewal.

Section 5 – Added Benefits

There is an endless list of benefits regarding the implementation of MLWS's, benefits are mainly related to the socio-economic characteristics of the buildings function or the area in which it is situated. Listed are some of those benefits:

Social

- Climate change (CO2 reduction)
- Air quality improvement (NO2, pm10 & SO2 reduction);
- Flora & fauna (increased biodiversity);
- Urban heat island effect (air temperature reduction);
- Aesthetics (increase of area value).

Economic

- Construction and maintenance (increased cladding durability);
- Energy saving (additional insulation and air conditioning);
- Real estate (increase of property value);
- Incentives and support (tax reduction).

Section 6 – Conclusion

A summary of the total costs and benefits associated with the proposed 100m² are defined below in **Figure 2**.

This proposed vertical greening system is expected to have high installation costs for the pre-vegetated panels and maintenance costs for the whole system (panels to be replaced, plant species, irrigation system). Due to these costs within the life cycle, after the initial costs for the installation, the annual benefits overtake the annual costs (for maintenance) of a tens of pounds, value which is insufficient to pay back the incurred costs.

Table 2: Costs and benefits data input.

Cost/benefit	Time frame	Year	Value (£/year)
Cost - initial	One time	1 st	65,000
Cost - maintenance	Annual	1 st – 50 th	2,000 – 4,000
Cost - operational	Annual	1 st – 50 th	365
Cost - disposal	One time	50 th	5,000
Benefit - heating	Annual	1 st – 50 th	2,000 (Variable)
Benefit – A/C	Annual	1 st – 50 th	1,900 (Variable)
Benefit – property value	One time	1 st – 50 th	20,000

The MLWS analysed in this study cannot be considered economically sustainable due to high installation and maintenance costs. Although, the socio-economic benefits of vertical greening systems may be seen to make this investment worthwhile. This inference is encapsulated in **Figures 3 & 4**.

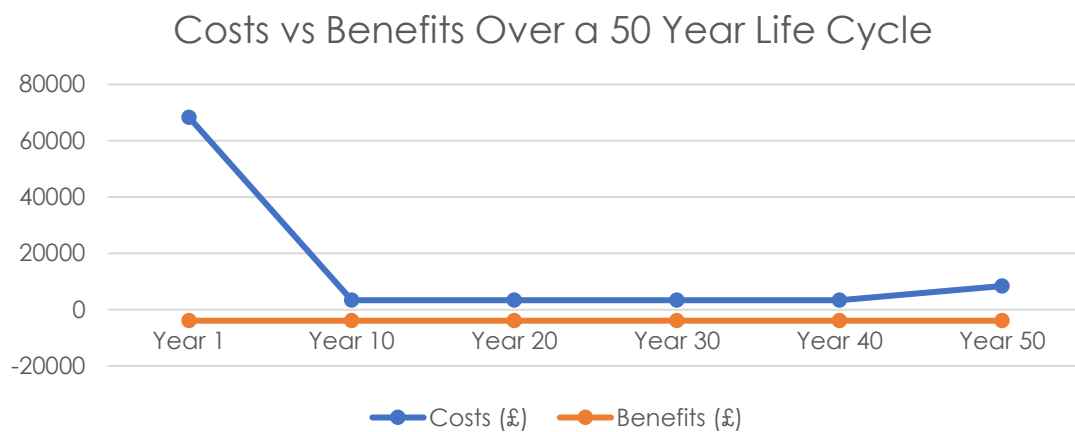


Figure 3: The costs of the MLWS outweigh the cost benefits at all stages of the life cycle.

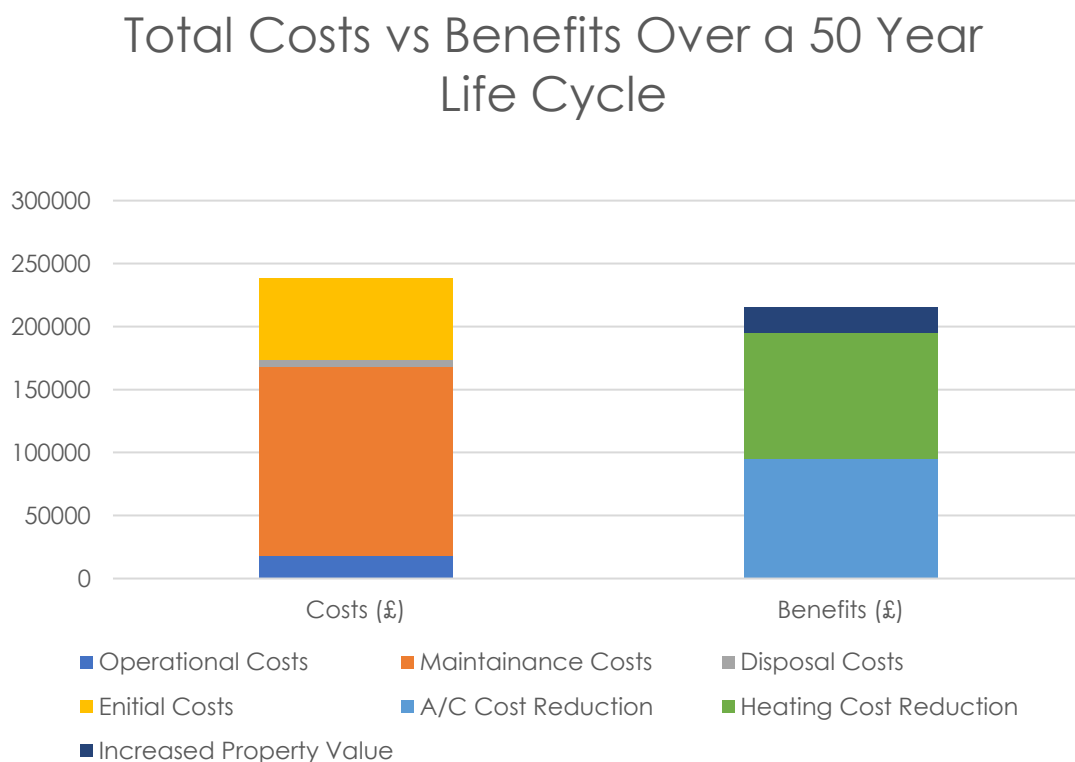


Figure 4: Visual indication of the total difference between the MLW costs, cost benefits and how they weigh.

In conclusion, after analysing the above data sets the total outstanding cost over a full 50 life cycle of the UWTSD Glyndŵr Building is £23,250. The client must decide if this is a fair price for the aesthetic, biodiversity and health & wellbeing benefits the MLWS provides.



CABAT Consultancy LTD

Constructing Excellence Everyday

CABAT Consultancy UWTSD Glyndŵr/Gruffydd/Dylan Thomas Building Project

Location: I.Q Library

Date: 23/10/2019

Attendees: Adam Meyrick, Alex Morgan, Bethan Stroud,
Tracey King, Cerys Cole

Time: 09:00 – 11:00

Topic 1: Client Brief (30 Minutes)

- a) Establishment of client budget
- b) Highlight key project considerations (BREEAM, Welsh Language Scheme, Community Benefits Scheme etc...)
- c) Contract type

Topic 2: Design (60 Minutes)

- a) Consider integrated sustainable technologies
- b) Investigate foundation design options
- c) Evaluate structure shape and internal assemblies
- d) Consideration of acoustic conformity

Topic 3: Environment (30 Minutes)

- a) Highlight main considerations (nearby structures, wildlife, water courses etc...)
- b) Highlight implications of construction activities on the environment
- c) Make recommendations for their remediation

Adjournment

Adam Meyrick adjourned the meeting at: 10:52

Minutes submitted by: Adam Meyrick

Minutes approved by:

Notes and Action Items



CABAT Consultancy LTD

Constructing Excellence Everyday

CABAT Consultancy UWTSD Glyndŵr/Gruffydd/Dylan Thomas Building Project

Location: I.Q Library

Date: 06/11/2019

Attendees: Adam Meyrick, Alex Morgan, Bethan Stroud,
Tracey King, Cerys Cole

Time: 12:00 – 13:00

Topic 1: Design (60 Minutes)

- a) Conformation of 3 integrated sustainable technologies
- b) Initiate steps for foundation design
- c) Agree structure shape and internal assemblies
- d) Conclude acoustic conformity

Adjournment

Adam Meyrick adjourned the meeting at: 13:07

Minutes submitted by: Adam Meyrick

Minutes approved by:

Notes and Action Items



CABAT Consultancy LTD

Constructing Excellence Everyday

CABAT Consultancy UWTSD Glyndŵr/Gruffydd/Dylan Thomas Building Project

Location: I.Q Library

Date: 27/11/2019

Attendees: Adam Meyrick, Alex Morgan, Bethan Stroud,
Tracey King, Cerys Cole

Time: 09:00 – 10:30

Topic 1: Materials Selection (30 Minutes)

- d) Assess cladding options
- e) Consider design of nearby structures
- f) Contemplate business case and cost of each material
- g) Consider energy efficiency and availability of materials

Topic 2: Design (60 Minutes)

- h) Evaluate frame types
- i) Calculate loading
- j) Evaluate roof options
- k) Consider SUDS and drainage options

Adjournment

Adam Meyrick adjourned the meeting at: 10:23

Minutes submitted by: Adam Meyrick

Minutes approved by:

Notes and Action Items



CABAT Consultancy LTD

Constructing Excellence Everyday

CABAT Consultancy UWTSD Glyndŵr/Gruffydd/Dylan Thomas Building Project

Location: I.Q Library

Date: 11/12/2019

Attendees: Adam Meyrick, Alex Morgan, Bethan Stroud,
Tracey King, Cerys Cole

Time: 11:30 – 13:00

Topic 1: Materials Selection (30 Minutes)

- l) Decide cladding options
- m) Pitch report upon the costs / cost benefits of each material selection
- n) Begin to evaluate envelope components

Topic 2: Design (60 Minutes)

- o) Conclude frame type in accordance to loading
- p) Decide upon roof design
- q) Agree drainage and SUDS technology

Adjournment

Adam Meyrick adjourned the meeting at: 13:05

Minutes submitted by: Adam Meyrick

Minutes approved by:

Notes and Action Items



CABAT Consultancy LTD

Constructing Excellence Everyday

CABAT Consultancy UWTSD Glyndŵr/Gruffydd/Dylan Thomas Building Project

Location: I.Q Library

Date: 08/01/2020

Attendees: Adam Meyrick, Alex Morgan, Bethan Stroud,
Tracey King, Cerys Cole

Time: 09:00 – 11:00

Topic 1: Logistics and Site Planning (30 Minutes)

- r) Discuss access to the facility
- s) Review site set-up in consideration of space and nearby residents
- t) Discuss sequencing of works

Topic 2: Design (60 Minutes)

- u) Discuss M&E Systems
- v) Ponder internal finishes

Topic 3: External (30 Minutes)

- w) Initiate external landscape design
- x) Communicate road, footpath and carpark construction to the local authority
- y) Discuss biodiversity and the enhancement of health and wellbeing to the surrounding area

Adjournment

Adam Meyrick adjourned the meeting at: 11:32

Minutes submitted by: Adam Meyrick

Minutes approved by:

Notes and Action Items



CABAT Consultancy LTD

Constructing Excellence Everyday

CABAT Consultancy UWTSD Glyndŵr/Gruffydd/Dylan Thomas Building Project

Location: I.Q Library

Date: 05/02/2020

Attendees: Adam Meyrick, Alex Morgan, Bethan Stroud,
Tracey King, Cerys Cole

Time: 09:00 – 12:00

Topic 1: Logistics and Site Planning (30 Minutes)

- z) Confirm access to the facility
- aa) Confirm site set-up
- bb) Confirm construction program

Topic 2: Design (60 Minutes)

- cc) Conclude M&E Technology
- dd) Decide internal finishes

30 MINUTE BREAK

Topic 3: Externals (30 Minutes)

- ee) Finalize soft landscape design
- ff) Receive permits for footpath and roadworks
- gg) Conclude the enhancement of biodiversity and wellbeing works to be completed

Topic 4: Testing & Commissioning (30 Minutes)

- a) Discuss soft landings
- b) Confirm snag & clean and M&E commissioning periods
- c) Select BREEAM and SAP contractor
- d) Finalize terminal float

Adjournment

Adam Meyrick adjourned the meeting at: 12:16

Minutes submitted by: Adam Meyrick

Minutes approved by:

Notes and Action Items



UWTSD Glyndŵr Development Site Set-up Narrative

The UWTSD Glyndŵr Development is anticipated to last longer than 30 days and involve more than 500 person days of construction work, therefore the submission of the F10 to the Health & Safety Executive (HSE) is required. HSE stipulates that given the magnitude of the development and the quantity of employees on site, CABAT must supply the following provisions within the site set-up set out on **Table 1**.

Table 1: Essential components of the site set-up and the justification for their provision.	
Component	Provision
Rest Facilities	Facilities should be available for taking breaks and meal breaks. The facilities should provide shelter from the wind and rain and be heated, as necessary. The rest facilities should have: ▪ Tables and chairs. ▪ A kettle or urn for boiling water. ▪ A means of heating food (e.g. a gas or electrical heating ring, or microwave oven).
Toilets	The HSE also recommends a ratio of 1 toilet to 7 persons where portable toilets are emptied once a week. Given the maximum number of laborers on site at peak time is 35, there is the necessity for 5 toilet cubicles.
Drinking Water	A supply of drinking water should be readily available. Where possible, it should be supplied direct from the mains.
Washing Facilities	On all sites, provide basins large enough to allow people to wash their faces, hands and forearms. All basins should have a supply of clean hot and cold, or warm, running water. If mains water is not available, water supplied from a tank may be used.
Changing Rooms	Every site should have arrangements for securely storing personal clothing not worn on site and for protective clothing needed for site work. Men and women should be able to change separately.
First Aid equipment and Areas	The Health and Safety (First Aid) Regulations 1981 requires Kier to provide adequate and appropriate equipment, facilities and personnel to enable first aid to be given to employees if they are injured or become ill at work. The minimum provision for all sites is: ▪ A first aid box with enough equipment to cope with the number of workers on site. ▪ An appointed person to take charge of first-aid arrangements. ▪ Information telling workers the name of the appointed person or first aider and where to find them.

	The number of qualified first aiders required depends on the risk of injury on site. As a guide: <table> <tr> <th>Numbers employed at any location</th><th>Number of first aid personnel</th></tr> <tr> <td>Fewer than five</td><td>At least one appointed person</td></tr> <tr> <td>5 to 50</td><td>At least one first aider</td></tr> <tr> <td>More than 50</td><td>One additional first aider for every 50 employed</td></tr> </table>	Numbers employed at any location	Number of first aid personnel	Fewer than five	At least one appointed person	5 to 50	At least one first aider	More than 50	One additional first aider for every 50 employed
Numbers employed at any location	Number of first aid personnel								
Fewer than five	At least one appointed person								
5 to 50	At least one first aider								
More than 50	One additional first aider for every 50 employed								
Waste Management	Designate storage areas for plant, materials, waste, flammable substances (e.g. foam plastics) and hazardous substances (e.g. pesticides). Flammable materials will usually need to be stored away from other materials and protected from accidental ignition. Do not store materials where they obstruct access routes or where they could interfere with emergency escape, e.g. do not store flammable materials under staircases or near to doors or fire exits								
Site Boundaries	Construction work should be fenced off and suitably signed. This will protect people (especially children) from site dangers and the site from vandalism and theft.								
Site Access	There should be safe access onto and around the site for people and vehicles. Kier should also plan how vehicles will be kept clear of pedestrians, especially at site entrances where it may be necessary to provide doors or gates to achieve this segregation. Doors that open onto traffic routes may need viewing panels or windows. The plan should include how vehicles can be kept clear of pedestrians at vehicle loading/unloading areas, parking and manoeuvring places and areas where drivers' vision may be obstructed.								
Source: <i>Health and safety in construction, HSE, (2006).</i>									

Essential to the success of this project is the evolving configuration of the site set-up. CABAT have aligned each configuration against the completion of key milestones and change of project scope in order to maintain the public satisfaction with construction activity and moreover to comply with the Construction (Design & Management) Regulations 2015 to keep everyone on site and in the locality safe. Five major site alterations occur across the longevity of this project, of which, each are sequentially presented and described in the following segments.

Setup 1: Site Establishment (17/08/20) to (09/09/20)

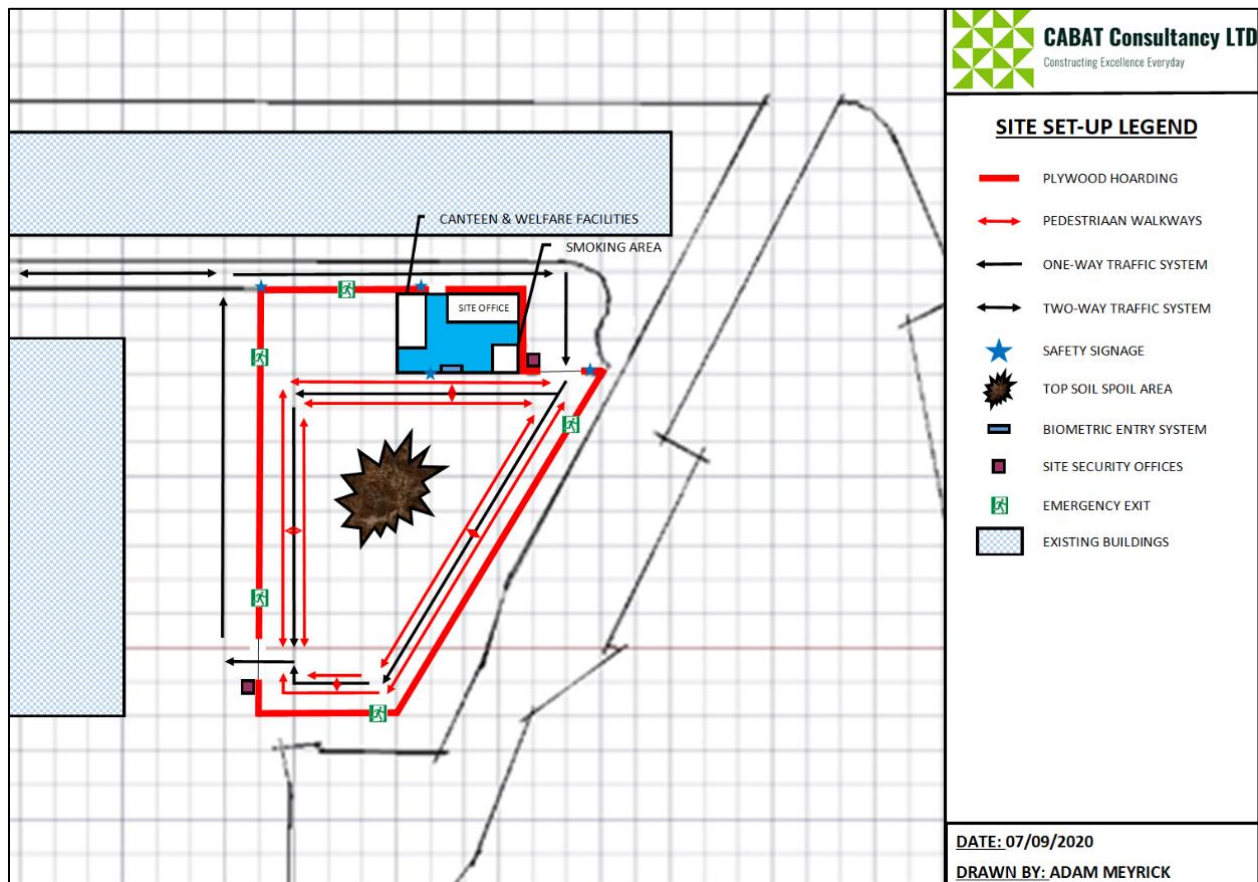


Figure 1: Site set-up 1.

There are many intricacies of this site set-up, necessitated by the site's proximity to the SA1 historical dockland and adjacent residential high-rise structures. The site is bordered by 2m-high plywood hoarding to discourage trespassers, this hoarding encapsulates three main access and egress points to the site, one for pedestrian access to site office safe areas and two for the one-way flow of site vehicle traffic. This high-timber hoarding also serves the purpose of attenuating noise from construction activities, minimizing the noise impacts upon the residential assets to the North of the site. Several emergency exit locations can also be identified, which will be communicated to all workers upon site induction. Fixated upon the site hoarding there will be safety signage spaced repeatedly (**Figure 1**), as well as within site safe areas, as illustrated on **Figure 2**. The site safe area comprises canteen & welfare facilities for workers, site offices, induction & training rooms and a smoking shelter. Furthermore, within the site, traffic flows will also be dictated through signage, as illustrated on **Figure 3**.



Fig.2: Safety Signage (HSE).



Fig. 3: Safety Signage (HSE).



Fig.4: Diversion Signage (HSE).

At both vehicle access and egress locations to the site, site security offices are implemented to control traffic flow, check permits and licences and for general security of the site. Worker access to the site is dictated through a biometric entry system, where each workers CSCS card and permit to work are tethered to an online database to permit entry. An area at the centre of the site has been designated for site clearance and excavation spoil.

Setup 2: Substructure (09/09/20) to (18/11/2020)

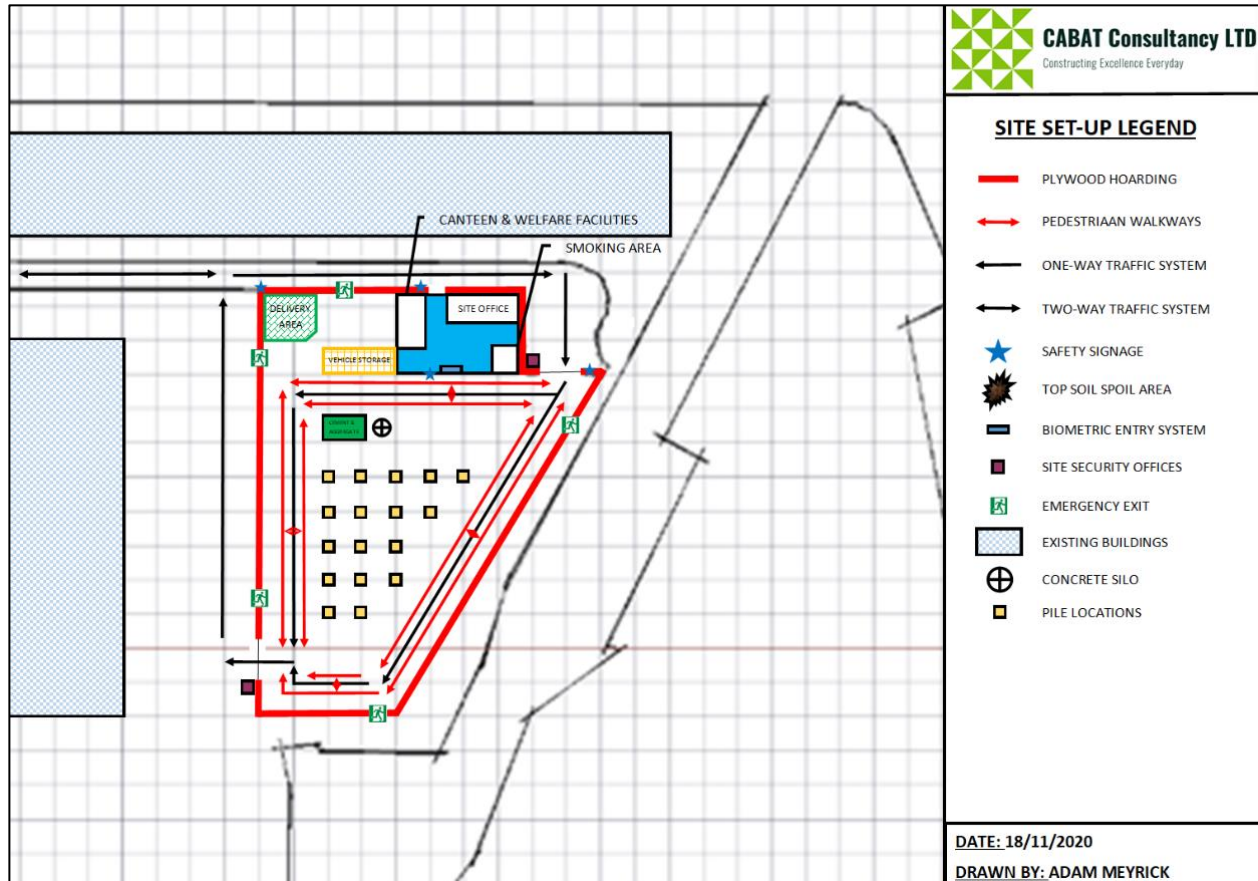
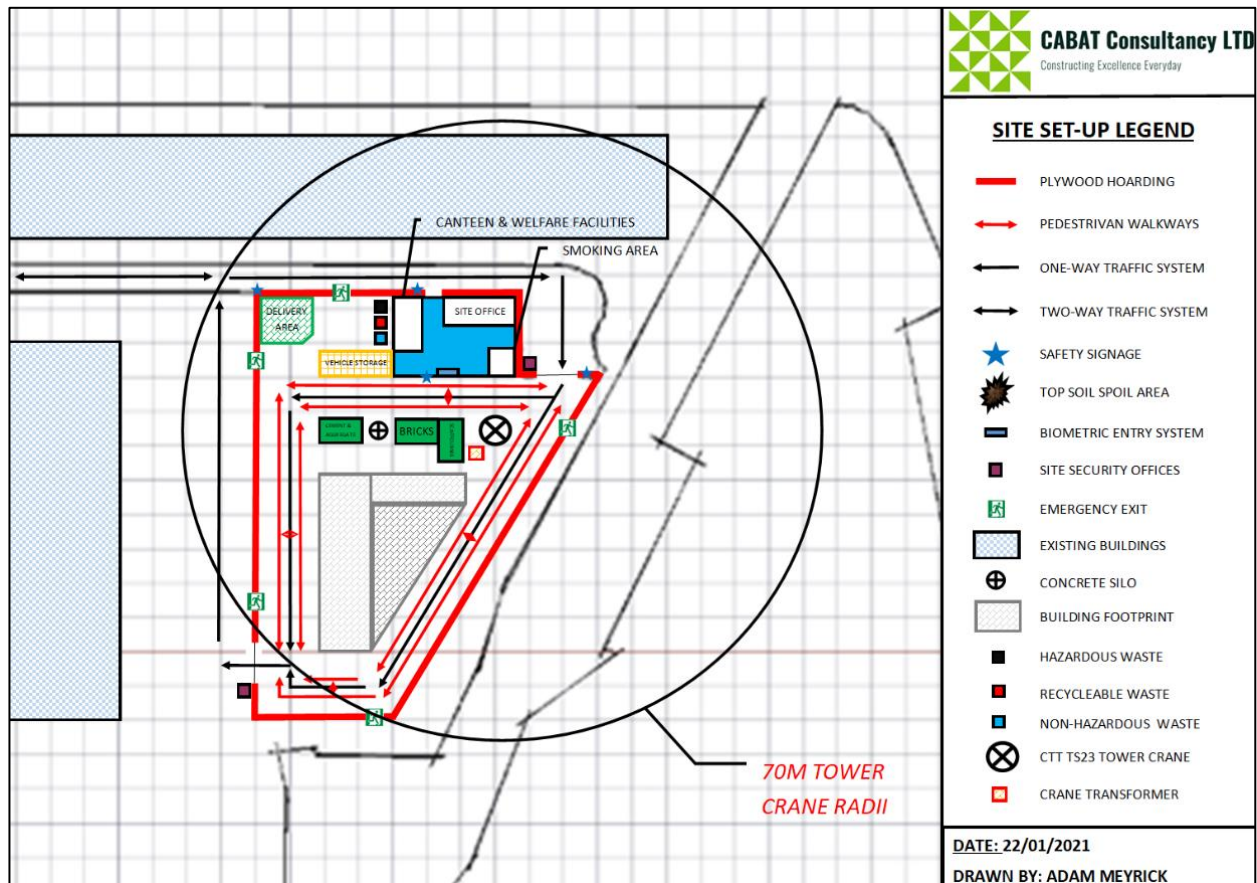
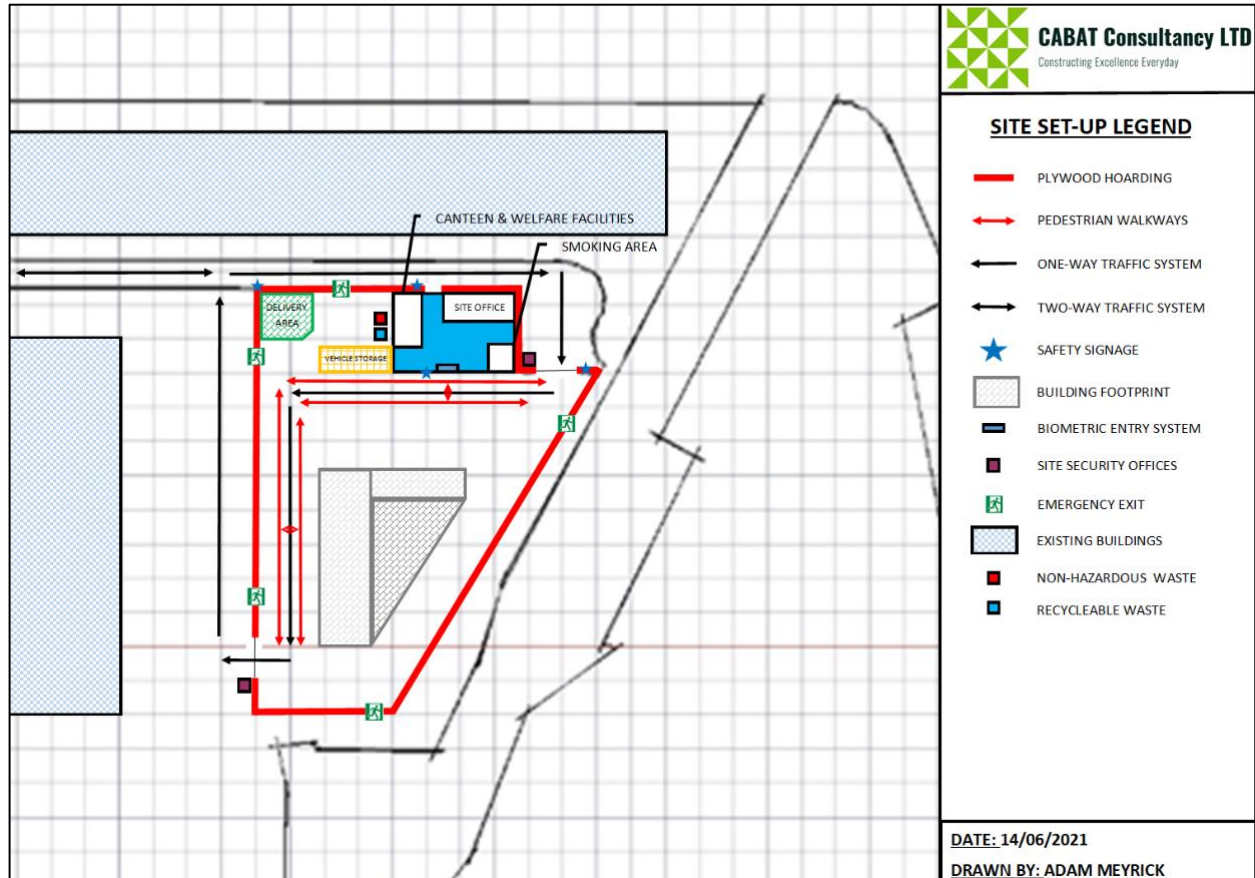


Figure 5: Site set-up 2.

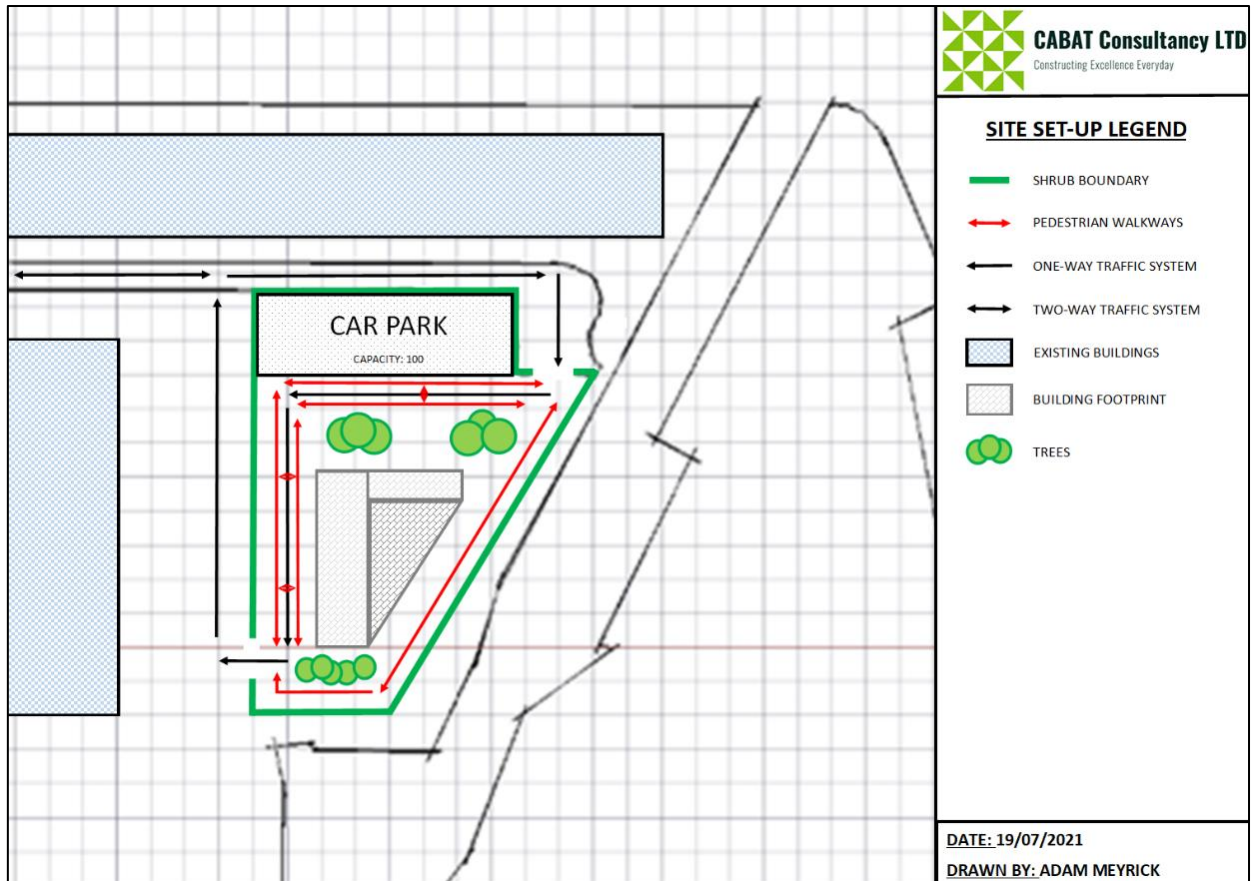
Traffic flows, access/egress and site safe areas remain unchanged at this stage. Pedestrian routes have been segregated and diverted away from the site to allow nearby assets to continue functioning, with the greater goal of keeping the public safe. The addition of a designated delivery area in the North-West corner of the site is accompanied by a vehicle's storage area, necessary for a large site. Access to these two are served efficiently by the traffic system, and their proximity to the building footprint is desirable. Shown on this set-up is the pile locations, beginning to show the building footprint. To complete the changes, a cement & aggregate storage area has been instigated, adjacent to a concrete silo, crucial concreting works in the substructure.

Setup 3: Superstructure (09/11/20) to (21/01/21)**Figure 6: Site set-up 3.**

Traffic flows, access/egress and site safe areas remain unchanged at this stage. Set-up 3 reflects the complexities of a sensitive site. The footprint of the structure can now be clearly seen encapsulated within the site traffic management system. The addition of, hazardous, recyclable and non-hazardous waste areas has also been established. It is essential that the hazardous waste is controlled and kept away from all others. Additional storage areas for bricks and scaffold accompany the pre-existing bricks & cement facility. To complete the changes, the implementation of an CTT TS23 tower crane with an 70m radii with oversailing prevention technology has been installed in the North-East of the site, supplemented by a transformer electrical power supply.

Setup 4: Envelope, Internals and Externals (18/01/21) to (14/06/21)**Figure 7: Site set-up 4.**

There is a lot of change following the completion of the superstructure. To start, the removal of transport movement systems has begun, beginning with the North-East to South-West flow. This is a direct result of the removal of the cement & aggregate, bricks and scaffolding storage area once serving the road. Additionally, the concrete silo, tower crane and electrical transformer have been eradicated respectively, allowing soft landscaping of said areas to begin. To conclude these changes, the hazardous waste storage area and its contents has been removed and taken for lawful disposal.

Site set-up 5: Testing & Commissioning (16/06/21) to (19/07/21)**Figure 8:** Site set-up 5.

The delivery and vehicle storage areas have been removed as well as the non-hazardous and recyclable waste zones. The site safe area and all its internals has also been removed by a vehicle crane for re-use. These areas have then undergone cut n' turn procedures to be tarmacked, forming the 100-capacity carpark for the facility. The site traffic flow system remains but has been tarmacked, forming the main vehicle route around the facility. Following the removal of the site security offices, the former access and egress points remain, as well as the one-way system. The plywood site boundary has also been replaced by a planted shrub boundary, to complete the flora, trees have also been planted in both the North and South Elevations to promote biodiversity and occupant well-being.



UWTSD Glyndŵr Development Social Aspects Assessment

CABAT Consultancy LTD is committed to promoting sustainable development through its policies, strategies and services, thus achieving best value for money in the widest sense. The aim is to build stronger communities, reduce social exclusion, poverty and encourage the development of the local economy.

Section 1 - Target Recruitment and Training (TR&T)

As part of CABAT's commitment to the community, 5 Key performance indicators (KPI's) have been enstated to deliver opportunities and a better quality of life for all involved with the project.

- **KPI Work Experience Placements**

This target describes work experience attendance on National Skills Academy for Construction (NSAFC) projects for students from Schools, Colleges and Universities who undertake a work-experience placement. This KPI is aimed at providing students with the opportunity to carry out tasks agreed by the education provider and the employer enabling the learner to gain a meaningful insight into the construction sector.

- **KP2 Work Experience (Not in Education)**

This target describes work experience attendance on National Skills Academy for Construction (NSAFC) projects for persons who are not enrolled in a course of education/study and who undertake a work-experience. This can include individuals from organisations such as Princes Trust, Probation Service, Job Centre Plus, Women into Construction, Armed Forces re-settlement programmes, Workways+, Shaw Trust, Third Sector organisations or local community organisations.

- **KP3 Jobs Created (New Entrants)**

This target describes the creation of new and sustainable job opportunities for new entrants into the sector and as a result of the project are required on the project site by CABAT or subcontractor. These could be: a) Apprentices, b) Persons previously unemployed or c) Graduates.

Activity	SEWSCAP Requirement
Person Weeks	416
Previously Unemployed Weeks	200
Jobs Created (NEETS/Undemployed)	8
Training Weeks	16 Trainee Weeks
Apprentice Weeks	120 Weeks
Graduate Weeks	40 Weeks
Work Experience Weeks	32 Weeks
Community Initiatives	
Community Hours	250
Community Evenings	1
Conscience Constructors Scheme	40
Newsletters	Quarterly
Local Business'	30% of the workforce from Wales
	15% from Swansea area
Local Labour	30% of the workforce from Wales
	15% from Swansea area

Table 1: Shows the person weeks, community initiatives and local labour targets CABAT will reach in accordance with SEWSCAP framework.

Principles of including a NSaFC community benefits scheme include:

- Seeking local partners,
- Feeds into Future Generations Act,
- Access to local training,
- Supply chain sustainability,
- Green and sustainable sourcing
- Committed to ethical employment,
- Promoting wellbeing of young & vulnerable.

The South East & Mid Wales Collaborative Construction (SEWSCAP) Framework's mission is to achieve best value arrangements for South & Mid Wales through competitive procurement, whilst driving regeneration, continuous improvement and best practice. As such, minimum prerequisites have to be achieved on CABAT's Glyndŵr development, these are presented in **Table 1**.

As one of the South Wales' leading constructors, it is our intention that approximately 52 person weeks per £million invested of work is given to newly employed, graduates, work experience placements and persons not in education, employment or training under 24 (NEET's) on this project. The main sources of this labour have been highlighted in **Table 2**.

Table 2: SA1 Primary sources of labour.

Institution	Contact
 Prifysgol Cymru Y Drindod Dewi Sant University of Wales Trinity Saint David	Name: Email: Tel:
 Swansea University Prifysgol Abertawe	Name: Email: Tel:
 Gower College Swansea Coleg Gŵyr Abertawe	Name: Email: Tel:
	Name: Email: Tel:
 Gyrfa Cymru Careers Wales	Name: Email: Tel:

- KP4 Construction Careers Information

CABAT regularly visit employment workshops and perform science, technology, engineering, and mathematics (STEM) school engagement interactions to increase awareness of the opportunities available within the industry, what it is like to work in Construction and how to get into the sector. These activities are formally structured and are agreed by the Project Manager Adam Meyrick and the participating organisation.

- KP5 Qualifying the Workforce

This target relates to CABAT giving training to its directly employed work force as well as making educational resources available to its subcontractors. Qualifications can include vocational awards/diplomas, apprenticeship completions, professional qualifications, leadership and management courses including ILM, health and safety, (including IOSH, NEBOSH, SMSTS & SSSTS). Additionally, CABAT are obliged to set up annual training plans which incorporate free health and safety training, asbestos awareness, facelift training, SUSAs and toolbox talks.

Section 2 - Supply Chain Opportunities

As part of CABAT's membership to the 21st Century Schools and Education Programme; A legislative long term investment for schools, colleges and universities to develop them as hubs for learning, this project is required to have a minimum of:

- 30% of workforce will live within the "SA" postcode,

- 60% of workforce from Wales,
- 2 community newsletters sent out to residents per project,
- 2 types of materials produced in Wales; e.g. Welsh steel, slate incorporated into the structure,
- 80% of supply chain costs spent in Wales,
- 85% of construction waste diverted from landfill,
- Fair payment system (FPS) payment within 21 days.

To achieve these milestones CABAT will procure most of the aforementioned labour through the Government's "sell2wales" website. The website gives opportunity for Welsh subcontractors to gain public sector work.

Section 3 – Community Initiatives

CABAT will help deliver various social advances that will help impact deprivation and meet the socio-economic needs of the SA1 area. The proposed site is situated approximately 500m South-East from the Waterfront Community Church (WCC) which is a voluntary organisation aimed at organising community activities, hardship relief (food and clothe banks) and raising funds for disaster and famine relief abroad. Throughout the project CABAT employees will assist WCC by taking part in fundraising events and by donating food and clothes to the community.



Image 1: Waterfront Community Church (Meyrick, 2019).

As part of the construction industries movement to achieve further gender equality, CABAT will frequently hold women in construction talks to Saint Thomas Primary School which will be conveyed by members of the in-house team. Saint Thomas Primary School will also be given the opportunity to decorate the site hoarding with artwork, to give the area a positive impression of the

construction site. Furthermore, one afternoon every 6 weeks, 4 members of the in-house team will perform litterpicking patrols around the area of Kings Dock to help clear rubbish potentially harmful to the local area. Signage in and around the site will be provided bilingually in both English and Welsh, additionally educational resources will also be provided in this manner.



Image 2: Saint Thomas Primary School (*Saint Thomas Community, 2018*).

CABAT regularly undertakes audits upon its supply chain to help eradicate labour abuses and to report evidence of modern slavery. All of CABAT's in-house team are mental health first aiders who are trained to recognise the signs and symptoms of common mental health issues and to effectively guide that person towards correct support. The Well-being of Future Generations (Wales) Act 2015 motivates CABAT in all of its construction developments from inception to completion. To ensure CABAT are working towards the same purpose, place seven well-being goals help drive us, these are illustrated on **Image 3**.

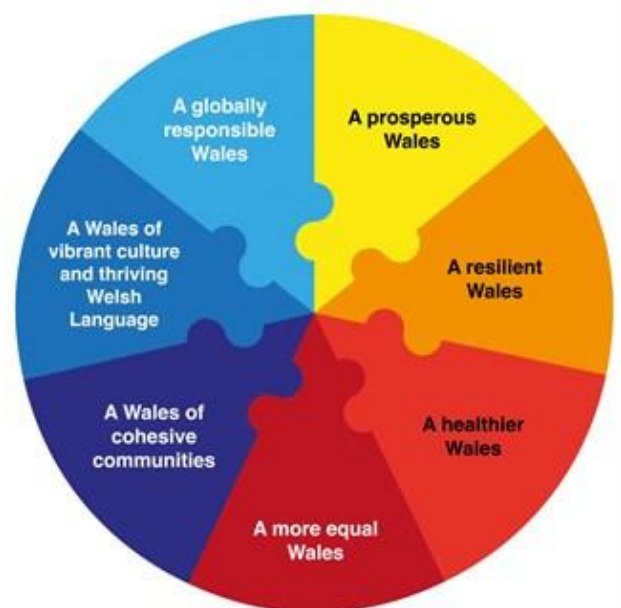


Image 3: 7 Well-being goals under the Well-being of Future Generations (Wales) Act 2015 (*Welsh Government, 2015*).

Prior to the commencement of the development, including any demolition and site clearance works, a Construction Method Statement (CMS) by CABAT Building Surveyor, Alex Morgan. Detailing all necessary pollution prevention measures for the construction phase of the development will be submitted and approved in writing by the Local Planning Authority. The approved statement shall be adhered to throughout the construction period and shall provide for:

1. The parking of vehicles of site operatives and visitors;
2. Loading and unloading of plant and materials;
3. Storage of plant and materials used in constructing the development;
4. Erection and maintenance of security hoardings;
5. Wheel washing facilities;
6. Measures to control the emissions of dust, dirt and noise during demolition and construction;
7. A scheme for recycling / and disposal of waste resulting from demolition and construction works;
8. The hours of work during the construction phase of the development including the traffic delivery movements into and out of the site.

These measures shall be incorporated in order to prevent pollution of the environment, protect the residential amenities of the area, to secure the satisfactory development of the site and to minimise traffic impacts on the surrounding highway network.