UWE Estates Design Specification

UWE Bristol | University of the West of England

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1.1 Chapter 1 Introduction

The Design Specification sets out Minimum Standards that must be applied.

The Design Specification explains the overarching principles, functional requirements and technical standards for our buildings and infrastructure. It is not intended to stifle innovation or technical advances.

The Design Specification is based on past UWE experiences and UWE's goals and ambitions. It does not absolve external design consultants of their legal or contractual responsibilities under health and safety legislation, statutory requirements nor design/professional duties, liabilities, and indemnities. Designers must consult the Lessons Learnt folders from previous projects.

The Design Specification is divided into Chapters, each dealing with a separate aspect of design.

1 Introduction
UWE's expectations of how the design process will be managed, including drawing standards, UWE's approach to BIM, technical assurance, management of derogations etc.

2 NOT USED
3 UWE Strategies
Core UWE strategies relating to equality and diversity, sustainability etc. and their impact on design.

4 Space Standards
An overview of space requirements for different functional areas within UWE.

5 Fabric, Structure, Acoustic
Detailed requirements relating to the structure and fabric of buildings. There is also a section on catering design.

6 Mechanical Engineering
Detailed requirements informing the selection and design of mechanical plant and installations.

7 Electrical Engineering
Detailed requirements informing the selection and design of electrical systems, including Fire, Escape, and Security systems.

8 IT and Audio-Visual Infrastructure
Cabling design and requirements

9 Landscaping, Biodiversity and Public Realm
This covers the external areas, including landscaping, roads, parking and other aspects civil engineering, planting schemes etc.

10 NOT USED
11 NOT USED

12 Controls Standards
This covers all aspects relating to BMS and controls design, specification, and installation.

1.2 Design Specification Compliance Checklist and Derogations

UWE recognise that there may be times when different design objectives may appear to be in competition. The project team must openly discuss these as and when they arise, but always using UWE's values and priorities to inform those conversations.
Derogations will be allowed if there is a specific and direct advantage to UWE. Derogations from any standard, in relation to health & safety or fire safety, must have a written risk mitigation statement to explain why and how the risk is mitigated, who agreed these departures and the actions required by UWE once the building / area is occupied and managed.

All Derogations shall be recorded in the Design Specification Derogation Spreadsheet and must be approved by Senior Estates management.

Economic advantage shall be evaluated using whole life cycle cost models to ensure value for money. UWE will allocate a technical assurance function to certain projects who will review/comment on design proposals.

The Design Team shall complete the Design Specification Compliance Checklist spreadsheet. This shall be continually reviewed by the Project Manager throughout the works to account for variations and changes. All derogations to any section of any Chapter of the Design Specification shall be itemised on the spreadsheet as a Derogation and must be authorised by relevant UWE Estates staff.

1.3 Value for Money

All designs must support UWE to achieve a strong and confident financial position. Designs must represent good value for money. Do not confuse low cost with 'value for money' or expensive with good quality.
Ensure that projects align with UWE strategies which will help to prevent later changes to the project scope.
Rationalise stock, spares, or cleaning and maintenance regimes through greater standardisation by adhering to this Design Specification.
The whole life cycle cost must be embodied into design considerations, including all operational costs as well as carbon impact.

Value Engineering is not a cost reduction exercise. The intention is to find alternative and better value solutions to deliver the same or improved outcomes for the end user, rather than undermining functional requirements or performance of a structure in the pursuit of cost savings.

Value Engineering must be based upon sound WLCC evaluations. For example, if a plant purchase is likely to save money throughout its life expectancy, but have a substantial impact upon the capital budget then this must be considered in any capital decision. An evaluation of performance, maintainability, spares holdings, etc. must be included in order to establish the consequences of any trade off in the purchasing decision.

1.4 Consulting and Stakeholders

Project Managers and Designers must engage in consultation with a range of stakeholders in a timely manner, and throughout the project at every stage. Project Managers and Designers must consult the Lessons Learnt folders from previous projects.
The stakeholders inform design and project planning by explaining requirements, sharing expertise or consulting with their own stakeholders. Do not assume knowledge of how spaces will be used or expect one stakeholder to have all the answers.
Schools and Colleges can establish student user groups to help develop briefs and assess proposed designs.
Cleaning services can test the 'cleanability' of proposed products and advice on the impact to cleaning regimes and costs.
Central Examination and Time Tabling Service can report on space utilisation and model the space requirements or impacts of a proposed project.

1.5 Project Governance

Sustainability assessments will be undertaken from the earliest project stages to mitigate environmental risk and align to UWE's 2030 net zero ambition. Whole lifecycle approach will be applied.
All projects from their inception must determine and communicate i) what standard is being utilised, ii) the level targeted and iii) how it will be assessed. The UWE Project Board will determine the desired approach. The responsibility for adequate assessment is with the project.

Passivhaus or EnerPHit must be targeted for all new builds and major refurbishments (use the decision tree in Chapter 3). Projects that fall outside of the new build or major refurb category must use the net zero trigger points checklist to determine if any other action must be taken to reduce carbon emissions within the scope of each project.

All projects with an impact on the external landscape or public realm must be designed and delivered to the Building with Nature standard.

1.6 Construction (Design & Management) Regulations 2015 (CDM)

UWE recognises its Client duties under CDM2015, and where applicable as Principal Designer and/or Designer.
All Principal Designers and Designers must evidence their competence in the roles to which they are appointed.
All Designers must compile a written Design Risk Assessment and share these with the Principal Designer.

1.7 Building Services Spatial Fit

There must be very early design considerations for ensuring sufficient spatial fit for building services. This will affect building principles such as riser sizes, storey heights, ceiling void depths and distribution routes. To validate services ceiling zones, plant rooms and risers, the designer must ensure that pinch points and spatial consideration is tested for all rooms, routes and risers. This should include pinch point and typical void modelling for all areas to ensure sufficient spatial fit. If a design progresses without undertaking the necessary due diligence to confirm void spaces, then there could be a high risk of spatial fit, compliance, access and maintenance issues.

The Building Services must be organised, generally with drainage ductwork at the top, then life safety services. Pipework is generally organised in the middle, with electrical services at the bottom.

- Separation of Building Services must incorporate sufficient distance between HV, LV and ELV to eliminate EMC and EMF interference.
- To ensure passive fire stopping compliance it is imperative that designers allow spatial provision for services that pass through a fire rated structure during early stages of the design. Any services penetrations through fire rated walls and floors must be spatially planned in accordance with an approved and tested manufacturers fire stopping detail.
- Separation of Building Services must allow for fire compartmentation cladding around services, insulation thicknesses, reduction of heat transfer, whilst permitting access for maintenance.

- Spare capacity and zones for future services provisions should be agreed with the Client early in the design process to ensure adequate spatial provision is provided. Void modelling should account for any future services' zones.

1.8 Access and Maintenance Strategy

An Access and Maintenance Strategy (including plant replacements) must be provided on all projects (unless agreed otherwise). An outline Access and Maintenance Strategy must be produced during RIBA Stages 2 & 3 consisting of descriptive text and supporting drawings to show the provision for safe and practical maintenance and replacement. It must address the following as a minimum:

1. The assets which require maintenance / require access to them.
2. The maintenance those assets require / reasons to access them.
3. The frequency of these maintenance activities / likelihood of reactive access requirement.
4. How long these activities might take.
5. Expected design life of the assets i.e. how long before access is required for replacement

A detailed Access and Maintenance Strategy must be developed during RIBA stage 4. Before the project proceeds on site, the documents must be reviewed by the Principal Designer, UWE Operations & Maintenance team, and staff responsible for Technical Assurance.
The document forms part of the Health and Safety File.

Escape routes within plant rooms/areas must be well defined. Where determined by the fire strategy, there shall be a second means of escape provided.
Where plant is roof mounted (other than on concrete plinths), a clearance of 450mm must be maintained below any item of plant, pipework or ductwork running on or across roof finishes to enable roof maintenance to be carried out without the need to remove or raise services.
UWE has several areas where access is restricted due to hazardous processes e.g. laboratories. Isolation valves, control panels, etc. must be located outside of these areas so that easy maintenance can be undertaken, and, in an emergency, supplies can be shut off without exposing workers to risk.

The first year of maintenance of some items of large plant (e.g. lift, boiler, chiller) will be the responsibility of the Principal Contractor. This will be clarified in contract documents. The intention is to encourage project teams to carefully consider 'maintainability' at design stage and, in the pre-tender stage, to identify maintenance responsibilities.

1.9 Lessons Learned

Lessons learned from previous projects include, but are not limited to:

1) Constructing upstands on roofs that require louvres and damper blades to be removed to give access to motors and actuators. With the blades removed, a 5 storey, unguarded fall is created. Hatches would have enabled the actuators to be accessed from a position of safety on the roof.
2) Designers specifying end of line products as a cost saving exercise, meaning that spare parts are no longer produced and the plant is obsolete on the day it is installed.
3) Risers which employees could or need to enter but which lack a load bearing floor
4) No, or inadequate fire stopping provision. No, or inadequate fire stopping labelling and details.
5) Mechanical installations (or elements thereof such as pump heads) lacking details of weights, lifting points etc. leading to delays and complications during replacement/removal

6) Handover documentation has historically not detailed the management strategy if plant/equipment removal/replacement requires the use of cranes, lifting beams, sacrificial panels etc. or other activity that pose operational difficulties or a significant risk to contractors or UWE staff, students or assets.
7) Constructing canopies on the side of existing buildings, preventing access for window/gutter cleaning and with no alternative strategy being considered.
8) Plantroom thresholds which render it difficult or impossible to use wheeled, mechanical lifting aids to transport plant and equipment.
9) Ensure that tenders span the Pre-Tender Estimate to prevent automatic choice of lowest tender.

1.10 Designing for Business Continuity

UWE does not want long down times of assets due to inappropriate product selection or subsequent delays in repairing/replacing them. Whole Life Cycle Cost (WLCC) analysis highlights potential risks inherent in design/asset selection. This Design Specification has a process for assessing derogations, and the UWE Technical Authority can challenge designs/selections based on the risks that they present. Design and project risk registers must be used to highlight risks to the resilience of the new or refurbished structure / area.

Specific actions to increase resiliency are:

- The Design Specification details designs, makes & models, features etc. that must be used. This may be because they offer certainty of supply, certainty about durability and reliability, consolidation of spares holdings, etc.
- The life expectancy/reliability of critical plant (i.e. plant and equipment that would render a building unusable if it failed) must not be a victim of value engineering.
- Build redundancy into critical systems (e.g. back up boilers).
- Avoid single points of failure.
- Manual override systems are generally more resilient than complex solutions.
- Utilities, IT and communication cabling must enter a building at diverse points.
- Avoid products/systems with a single source of supply or long lead times, especially when they are critical assets. Critical assets will need UWE to hold spares.
- If critical assets require highly specialist skills or equipment to maintain:
    - Ensure there is more than one company who can reasonably maintain the asset in case one ceases trading, and to prove best value for money.
    - Ensure there is satisfactory 24/7/365 response, including a suitable response time
    - Choose alternative equipment
    - Upskill the UWE term contractor to enable them to carry out the task themselves

Designers must think beyond the immediate boundaries of their own design. Designers must consider what else could be affected if a building or asset fails; what critical services might be delivered from that building that may need to be relocated; Risks may ultimately be escalated to UWE Executive Operational Risk Registers.

1.11 Asset Management at UWE

All assets must be logged, and if required barcoded, for management within the University's CAFM system (Archibus). This system is used for many purposes, but not least to plan all proactive and reactive maintenance activities.
It is essential that any works are accompanied by accurate information about all new, removed, relocated, or updated assets. This is regardless of the size of the works.

1.12 Whole Life Cycle Costs

Approximately 20% of WLC costs are capital expenditure in procuring or refurbishing a building or infrastructure. The remaining 80% of costs are from running, managing, maintaining, and replacing assets. Great care must be taken to ensure that what is provided is suitable and fit-for-purpose for its' ongoing life. UWE believes that sustainable buildings and infrastructure will help to minimise operating costs as well as safeguarding the environment and promoting the well-being of staff and students. This is essential to achieve UWE's 2030 net zero carbon strategy.

WLCC is to be carried out in accordance with BS ISO 15686-5, using best practice as defined by BSRIA BG 67/2016 'A BSRIA Guide Life Cycle Costing' and the BCIS/BSI publication PD156865 'Standardized Method of Life Cycle Costing for Construction Procurement (SMLCC)': A supplement to BS ISO 15686-5 'Buildings & constructed assets - Service life planning' - Part 5: 'Life cycle costing'.

1.12.1 WLCC on Major Projects

To deliver UWE's commitment, all Major Capital Projects (projects with a construction value of £2.5m (exc. VAT) or more) will fully follow the Whole Life Cycle Cost process.

RIBA Stage 0/1: WLCC is to be used to provide a high-level economic prediction of the project's out-turn costs, to enable UWE to make informed investment decisions regarding whether the project is viable, sustainable and represents best value as part of a wider academic, sustainability and environment assessment.

RIBA Stage 2: WLCC is to be used as part of a strategic option appraisal process, to inform the selection of fundamental or cost significant elements, such as structure, envelope, services etc.

RIBA Stages 3/4: WLCC is to be used to appraise and select the detailed design options from a life cycle cost and performance perspective.
During the tendering process, life cycle costs are used to compare a bid's competitiveness and to test the project affordability.

RIBA Stage 7: Benchmark the actual operational cost as part of the Soft Landings principles. Post Occupancy Evaluations are to be undertaken to assess the actual building performance against the design performance.

1.12.2 WLCC on Minor Projects and Works

WLCC or LCC for projects and works under £2.5M exc. VAT is to be adopted proportionally to the value and nature of the specific scheme. Parameters are to be agreed and recorded at the earliest stage by the Project Manager.

1.13 Soft Landings

The ultimate goal of any construction project is, obviously, to deliver a functional facility that meets UWE's requirements. To achieve this, UWE needs to work collaboratively with internal and external stakeholders, designers and consultants to determine their functional and technical requirements, objectives and targets, which may go beyond those stipulated in this design Specification, and the information, training, support and aftercare that are needed to use/operate the building.

UWE Estates have Soft Landing Requirements which set out what needs to be done and when, to achieve these ambitions. UWE are committed to adopting Soft Landings philosophy on all major new build and refurbishment projects from concept to 18-months post-completion.

UWE project processes set out the information required at handover and also provides templates to enable project teams to identify and track the required documentation. This includes Health and Safety File information (including access and maintenance strategies), Fire Safety Information, and the Operation and Maintenance (O&M) manual.

Information must be supplied in specific electronic format, as explained in Project Execution Plan.

1.14 Post Occupancy Evaluation (POE)

UWE has a POE strategy which has been incorporated into the UWE project processes.
The Project Manager will, at the outset of the project, determine the precise approach that POE will take.
Projects with a construction value of less than £2.5M (exc. VAT) will take a more focussed or indicative approach to POE, usually as follows:
Stage 1: Contract Sum Analysis
Stage 2: Lessons Learned Report
Stage 3: Consultant / Contractor Performance Review.
These three stages will be carried out in the first six months after handover.

Full Post Occupancy Evaluation (POE) is usually required on any UWE project with a construction value of £2.5m (exc. VAT) or more. This will require a more in-depth investigative and diagnostic approach to the POE process, including all 3 stages as above plus
Stage 4: User Satisfaction Survey (12 months from handover
Stage 5: Building Performance Evaluation (18 months from handover)
Stage 6: Operational Costs Assessment (18 months from handover)

UWE will work with designers to ensure stakeholders requirements and expectations are clearly articulated and considered. By setting out project objectives, intended benefits and POE requirements at the outset, designers and consultants can allocate sufficient resources to ensure they can contribute meaningfully to a positive POE process.

1.15 BIM, Asset Capture, and Drawings.

UWE's approach to BIM, and specific information requirements, are detailed in "UWE Exchange Information Requirements (EIR)". All new buildings, or future refurbishments of buildings that have been modelled in BIM, must comply with this document.

The objectives of our information requirements are to:

- Maximise production efficiency by adopting a coordinated and consistent approach to working in BIM.
- Define the standards, settings and best practices that ensure delivery of high-quality data and uniform drawing output across an entire project.
- Ensure digital BIM files are structured correctly to enable efficient data sharing whilst working in a collaborative environment across multi-disciplinary teams.

To facilitate data exchange and collaboration, UWE require designers to share information using the Revizto collaboration package.

Even where projects fall outside BIM, the team must still comply with our asset capture procedures "UWE Asset Information Requirements (AIR)". This ensures our assets are appropriately recorded. This underpins our maintenance regime and is vitally important. Without it, we could fail to comply with statutory obligations to maintain assets or assets could fail leading to disruption and risks. Unless we know what we need to maintain we cannot adequately resource our maintenance operations.

1.16 Temporary Works Design

Temporary works are defined in BS 5975 as any solution that enables permanent works to be accessed and/or built. It covers everything from excavations to scaffolding, piling mats, propping and site hoarding.

The Health and Safety Executive has also produced their own guidance, SIM 02/2010/04, which complements the British Standard.

For the avoidance of any doubt:

- Temporary works must be designed. Temporary works can also be of 'standard' design such as but not limited to, Heras fencing erected as per manufacturers design standard, or scaffold as per TG20.
- Temporary works must be delivered under full compliance to CDM2015 Regulations.
- UWE will sometimes provide constraints, specifications and considerations for temporary works designers. A number of these requirements can be found in the UWE Contractor's Safety Pack, specifically:
    - Hoarding and site protection. Hoarding is to follow industry best practice guide Hoardings – A guide to good practice TWf2012:01.
    - Requirements for temporary footpaths
    - Public protection measures to be incorporated into scaffold design.
- Please note that designers are required to review and consider the UWE Contractor's Safety Pack. It is the responsibility of the designer to ensure the design is structurally sound, depending on location, ground and environmental/weather conditions etc.
- Contract documents, pre-construction information and Employer's requirements may further inform temporary works design
- In line with BS 5975 and SIM 02/2010/04, the Principal Contractor (PC) must have a temporary works co-ordinator who will oversee design and management of temporary works. On smaller projects with simple temporary works, those responsibilities may be discharged by the site manager or another member of the site team. Temporary works co-ordination will never be the responsibility of UWE.
- The PC must set out in their Construction Phase Plan (CPP) how they will manage temporary works. UWE will review those arrangements as part of their duty as client to ensure a CPP is in place and adequately manages significant risks.
- Temporary works must be checked. UWE does not have the capacity to provide a technical check of temporary works design.
- A number of temporary works operations are designated by UWE as high risk activities and requires a contractor to gain approval before commencing (under the approval to work system, explained in the Safety Pack). UWE staff will, at that stage, be involved in reviewing temporary works design. This is for the purposes of establishing that it has met UWE specifications (e.g.

whether site plans show that hoarding, signage and/or temporary footpaths will be positioned where agreed). This is not the technical check required by BS 5975 and SIM 02/2010/04.

3.1 Chapter 3 UWE Strategies

3.2 Strategy 2030

'Strategy 2030: Transforming Futures' sets out the UWE focus for 10 years. It evolves and develops as UWE continually reviews performance and adapts to a rapidly changing environment.

The Strategy document is available on the UWE website. The UWE Strategy 2030 commits to become carbon neutral by 2030. UWE has a responsibility, not only to meet this target, but also to demonstrate to our students, staff, and academics, that climate and ecological solutions are achievable and in fact desirable. It is vital that in developing our estate we contribute to the zero-carbon goal.

It is crucial that project teams understand the core values of UWE. They are the qualities that are most important to UWE.

- **Ambitious.** We are not afraid to shape, challenge and tackle the big issues, to take the initiative and pave the way.
- **Innovative.** We create new opportunities for the people who work and study with us. We embrace different ideas and pioneer new and sustainable ways of doing things.
- **Collaborative.** We have strong connections locally and globally. We help people and organisations be the best they can, building trust throughout your university community and beyond.
- **Enterprising.** We instil a thirst for new knowledge, its creation and application, empowering our students and staff to demonstrate a creative questioning approach, a 'can-do' confidence, and ability to navigate uncertainty.
- **Inclusive.** We make UWE Bristol a supportive and inspiring place to learn and work – somewhere where diversity of experience and perspective is encouraged, and learning and research is shared and accessible.

UWE has three areas of focus, which might be thought of as strategic objectives.

1 Our Purpose: Solving future challenges through outstanding learning, research and a culture of enterprise.
2 Our People: Creating opportunities to thrive and flourish.
3 Our Place: Creating an inspiring local and global gateway to the future.

The main area of focus for this Design Specification is Our Place. UWE aims to be a leading healthy and sustainable University, focusing on the development of healthy, safe, sustainable and inclusive campuses and spaces that showcase our personality, values and success and engage local communities.

3.3 Master Plan and 'Adjacencies'

UWE Board of Governors agree a Master Plan Strategy setting out the development of UWE. It is crucial that design teams understand the adjacencies and overall ambitions and designs for the area surrounding their project and how their own designs and specifications impact on and must align with the masterplan.

Designs are often developed for a specific context. UWE encourage design/project teams to think holistically and consider:

1. Proximity of a new building / refurbished space to existing buildings and other spaces. It is essential that there is an adequate separation distance so that fire in any building is unable to spread to another.
2. Wayfinding. All signage will need to be revised to include a new building and/or new access routes.
3. Infrastructure. All services, ducts, etc. must have sufficient capacity as well as space for future expansion. Consider linking into any district heating system.
4. Access and Maintenance Strategy. For example, vehicle routes, MEWP or cranes required, external cleaning, weight appropriate surfaces.
5. Historical damage/defects which would impact on buildings / areas if they are not dealt with at the same time.
6. The impact of the project while it is being undertaken. University life has to continue during the works.

3.4 Security Systems Strategy

Also Reference the Fire Strategy section Chapter 3.
Any new buildings or refurbishments which extend, amend or could impair security systems must be discussed with the Head of Operations and Security. Security must be considered holistically from the earliest stages of design.

The Security Strategy aims to ensure a balance is achieved between securing and safeguarding the campuses and the people using them, whilst maintaining open campuses which can be used flexibly and can meet differing user needs.

Where security systems are deployed they must be fit for purpose. Dysfunctional systems lead to a false sense of security and confusion in the event of an incident. Security systems used at UWE are:

- Programmable Access Control and Door Monitoring
- CCTV (with legally required signage)
- Intruder Detection Systems (IDS)
- Physical Locks
- 24/7 manned guarding presence on each campus.

Doors on escape routes and final exits that are fitted with security devices must satisfy the requirements of fire safety: It must be possible for any person to easily and immediately open them in an emergency. 30N is the maximum allowable force to open a door.
Designers must ensure containment for security systems is included and co-ordinated with the rest of the works.

The security strategy is a proportionate response, balancing the risks (including of acts of terrorism) against the desire to have open, accessible and inclusive campuses.

3.5 Sustainability

Climate change and ecological collapse are urgent existential challenges. Sustainable and Zero Carbon solutions are achievable and desirable. Designers are expected to find zero or negative carbon solutions to their works, and to apply stringent retrofit standards to the existing estate in order to avoid fossil fuel consumption.

UWE has an Environmental Policy, A Sustainability Strategy, and supporting action plans. Designers shall comply with these commitments and plans and will demonstrate how the design of the new and refurbished spaces will contribute to the achievement of UWE's sustainability goals.

Specific actions that the design team must make towards meeting UWE's Sustainability Plan:

Subject	Specific actions to be taken or considered by the design team
Campus Development	• Projects with a construction value of £2.5m (exc. VAT) or more: Project briefs may augment the requirements of this design Specification by defining specific sustainability/ energy standards to be met under certification schemes such as BREEAM or SKA. Pre-assessments must be carried out by accredited assessors at key stages of the design process together with a corresponding reconciliation of cost and value. • Target CO_2 emissions rate must exceed those set out in approved document L2A by a minimum of 5%. At the design stage the designers must model the in-use energy consumption including unregulated emissions. • UWE has a heat decarbonisation plan to achieve net zero carbon by 2030. This will require UWE to replace all heating systems that currently use gas. All projects that require a heating system must now plan to use technology that does not require gas.

Carbon Management	• New buildings must have an Energy Performance Certificate (EPC) in line with the Directive to be provided by the person carrying out the construction project.
	• Seek locally sourced materials and services to minimise transport impact.
	• Select products with low whole life carbon emissions.
	• Avoid over-specifying of materials and consider embedded carbon.
	• Agree a target Energy Performance rating for new buildings. The minimum is B.
	• CIBSE guide TM39 (Building energy metering) must be followed for new buildings and major refurbishments.
	• Refurbishment projects with a construction value of £2.5m (exc. VAT) or more must consider energy efficiency improvements to existing building fabric and systems (as detailed in the relevant chapters within this design Specification).
	• The University's Carbon Management Plan may initiate specific projects to reduce emissions.
	• Orienting and designing buildings to maximise natural light but minimise solar gain
	• High heat gain activities (PC labs, data centres etc) are located:
	  ○ Away from excessive solar gains (e.g. north facing façade)
	  ○ To maximise free cooling opportunities (e.g. with an external wall)

Renewable energy	The following renewable energy sources must be investigated at all opportunities (and could potentially drive fundamental decisions such as building orientation): • Solar thermal • Solar PV • CHP • Wind • Air source/ground source heat pumps • Biomass/Biofuel (under particular circumstances)
Waste & reuse of materials in construction	• UWE has a 95% recovery target for waste, a 70% material recycling target and a 10% reuse target. These targets shall be deemed to apply to projects on a case by case basis.

Subject	Specific actions to be taken or considered by the design team
	• Projects with a construction value over £300,000 exc. VAT must have a site waste management plan (SWMP) to predict waste streams and plan to prevent, reuse and recycle materials. UWE project management processes explain what is required. Circular economy principles should be used from the earliest projects stages in order to design out waste, specify high levels of secondary material use, and design for modularity, repairability and reuse. Note that SWMP are also essential for the effective planning/costing of the work (e.g. making sufficient space allowance for storage or plans for traffic movements). • Given the scale of work at UWE, we expect project teams to consider 'adjacencies' and co-ordinate their approach to waste management: Waste from one project could potentially be reused on another (e.g. inert demolition waste could be used as hard core for another project). • Designs should be based on the principles of the "circular economy" which is: "restorative and regenerative by design, and which aims to keep products, components and materials at their highest utility and value at all times". • Consider recyclability of materials and recycling pathways of high maintenance/short-life products (e.g. flooring). • Designers to avoid specifying, as far as reasonably practicable, toxic substances (which could contribute to an incident, or become hazardous waste in future).
Water	• UWE has a standard specification for fittings for WC refurbishments to aid water efficiency including WCs, taps, urinals and associated controls. • Include water conservation measures within the design. • Use of rainwater and grey-water harvesting must be investigated for new builds and major refurbishments. Where possible a gravity fed system must be specified. For refurbishments, if retrofitting an internal system is not viable, the collection of rainwater must be considered for grounds watering purposes. • Potential use of boreholes is being investigated at Frenchay.
Biodiversity	• Grounds design to comply with Chapter 9 of this design Specification to seek the best ecological options/opportunities. If the project will result in detriment or a change to the external soft landscape the University anticipates reinstatement or improvement of ecological features post-completion to enhance the overall estate in line with the Building with Nature standard, and applying the principle of Biodiversity net gain.
Climate Change adaptation	• Develop designs for operating under 2020 climatic conditions together with defined practical strategies for operating under 2050 conditions as set out in section 2.7 of this Specification. Particular attention should be paid to sustainably managing rainwater and avoiding overheating.

3.5.1 Net-Zero and Circular Economy

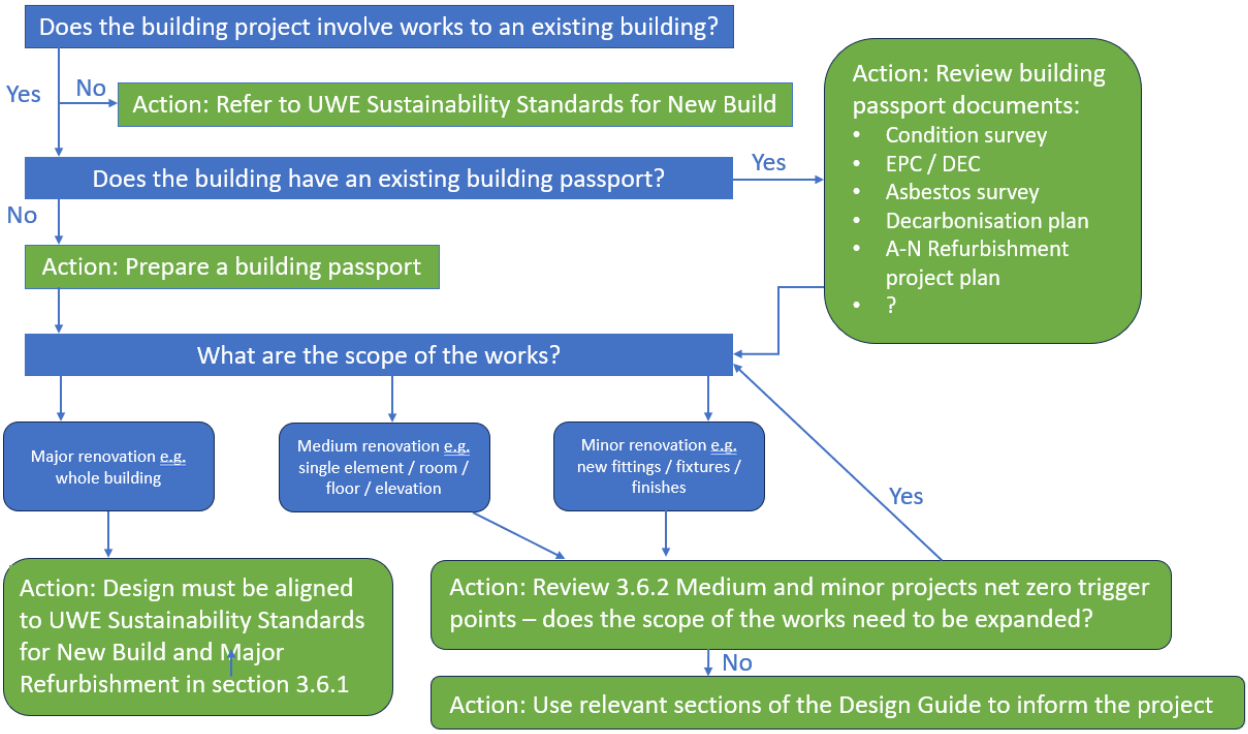
UWE's Strategy 2030 target for the University to be net zero in terms of its carbon emission means that carbon reduction is a fundamental part of all planning for works on both current and new buildings. To help determine exactly how this affects our projects and works the overarching targets are:

- All **new build and major refurbishment** projects will be:

- Fully aligned to UWE's decarbonisation plan
- Net zero

- All **medium and minor works** will follow the carbon and energy trigger points matrices.

The decision tree below gives guidance on how your project is classified and therefore the standards it will need to adhere to. It directs you to the more detailed specifications that need to be followed.



The Trigger Points Matrix Tool can be obtained from UWE Estates. It is to be used as a checklist for knock-on impacts of the project, materials to be used, and the potential lower carbon alternatives to these. The Tool may alert further works to be undertaken due to the net zero commitment. This may result in the project scope expanding, and the matrix above needing to be reapplied.

3.5.1.1 Sustainability Standards for New Builds or Major Refurbishment

Throughout design, UWE expects consideration of the following criteria:

Key appointments

To achieve the standards set out, the following key appointments are recommended to the design team:

- Certified Passivhaus Design/Consultant (CEPH)
- UK-based Passivhaus Certifier (to be appointed direct by UWE)
- MEP Consultant with capability in:
  - renewable energy systems design
  - energy modelling to CIBSE TM54.
  - dynamic thermal modelling
  - reviewing adaptability to climate change
  - understanding of IAQ and energy efficient systems for delivering it
- Architect with expertise in:

- the building design and strategy for Scope 3 emissions reduction
- the design of facades for natural ventilation

- Soft landings champion within the design team to lead the agenda
- Acoustician with relevant experience

To achieve the standards required by UWE for all major new build or refurbishment projects, reference the RIBA Stage checklist in Appendix 1. This guides all key milestones and decisions that will need to be taken at each stage.

Minimum Standards
These are the standards expected for all UWE new build and major refurbishment projects.

- Energy Performance

The scheme shall be certified a minimum of the ***Passivhaus Classic*** standard.
Key requirements include:

Standard	**New build: Passivhaus**	**Refurbishment: EnerPHit**
Primary energy demand	≤ 135 kWh/m^{2}/yr	≤ 135 kWh/m^{2}. yr + heat load factor
Primary Energy Renewable (PER)/ Energy Use Intensity (EUI)	≤ 60 kWh/m²/year	PER: ≤ 71 kWh/m²/year (Cool Temperate) PER: ≤ 65.5 kWh/m²/year (Warm Temperate)
Space heating demand	≤ 15 kWh/m²/yr	≤ 20, 25 or 30 kWh/m²/year (or circa 20-60 for component approach)
Space cooling demand	≤ 15 kWh/m2/yr	≤ 25 kWh/m2/yr
Specific cooling load	≤ 10 W/m^{2}	≤ 10 W/m^{2}
Airtightness	≤ 0.6 air changes/ hr @ n50	≤ 1.0 air changes/ hr @ n50
Summer overheating	Max 10% > 25°C	Max 10% > 25°C

Please refer to the Passivhaus building criteria document for full details of what is required (03_building_criteria_en.pdf (passiv.de)).

- Low and Zero Carbon Technology

Achieve **Passivhaus *Plus* or *Premium*** level
Carry out feasibility study for renewable and low carbon technologies including as a minimum;

- District heating
- Heat pumps
- Solar PV (including battery storage options)
- Waste Water Heat Recovery

- Carbon Emissions

Design achieves net zero carbon and delivered in practice within 3 years of operation.

Net Zero Carbon definition: "When the amount of carbon emissions associated with the building's operational energy on an annual basis is zero or negative. A net zero carbon building is highly

energy efficient and powered from on-site and/or off-site renewable energy sources, with any remaining carbon balance offset."1
1 https://www.ukgbc.org/wp-content/uploads/2019/04/Net-Zero-Carbon-Buildings-A-framework-definition.pdf

- Thermal Comfort

Summer Comfort
For buildings **without** comfort cooling:
Designs tested against CIBSE TM59/TM52, within overheating limits for the 2050 file. A PASS is expected and if not a pass, this must be formally approved by UWE.
For buildings **with** comfort cooling, spaces shall meet PMV in range +/-0.5 and PPD<10% as defined by BS EN ISO 7730.
Winter Comfort
Internal surface temperatures >17degC at design external winter temperature.
Avoidance of cold draughts: air supplied >15degC at height of 1.5m from floor.
All spaces within overheating/comfort limits when tested against future weather file (see below).

- Scope 3 Carbon

Use LCA OneClick assessment tool or similar tool to measure the embodied carbon of the project materials. Select appropriate alternatives to ensure a 30% reduction in overall carbon associated with embodied carbon.

- Indoor Air Quality

Building Bulletin 101 requirements, including:
- Daily average CO2levels of less than 1000ppm during the occupied period
- Maximum concentration should not exceed 1500ppm for more than 20 consecutive minutes per day

Indoor air quality (IAQ) is a complex subject with a wide range of variables, including occupancy levels, external air quality, air filtration, fresh air supply rates and pollutant sources within the building among other factors. The ESFA guideline BB101 contains wide-ranging guidance for IAQ, based on extensive research, and is a suitable single-source standard for IAQ. It contains standards and targets for a wide range of educational building usage types, which should be adhered to carefully to ensure good IAQ for University building occupants. While not a complete picture, CO2 levels in parts per million (PPM), is a suitable proxy for good air quality overall.

- Soft Landings
  - Use BISRIA soft landings guidance
  - Complete a full post occupancy evaluation.
- Acoustics:

For student accommodation:
- Approved Document Part E: Resistance to the Passage of Sound.
  - British Standard (BS) 8233:2014 Guidance on sound insulation and noise reduction for Buildings
  - BS 4142:2014 Methods for rating and assessing commercial and industrial sound

For other space types:
- Building Bulletin 93: Acoustic Design of Schools
- British Council for Offices Guide to Specification 2014
- British Standard (BS) 8233:2014 Guidance on sound insulation and noise reduction for buildings
- BS4142 Methods for rating and assessing commercial and inductrial sound.

- Refer to Design Specification Chapter 5

3.5.1.2 Net Zero Requirements by RIBA Stage

Ensuring works are aligned to RIBA Stages.
UWE's Sustainability Plan contain specific measures that impact on the design of new structures. Specific actions that the design team must make towards meeting these are set out below.

3.5.1.3 Other considerations informing product selection

UWE requires all designers to use A rated materials/products from the BRE Green Guide to Specification wherever reasonably practicable, and in addition to use materials in accordance with the RICS SKA HE assessment tool.

WASTE

- UWE has a 95% recovery target for waste, a 70% material recycling target and a minimum 10% reuse target. These targets shall be deemed to apply to all projects.
- Projects with a construction value over £300,000 exc. VAT must have a site waste management plan (SWMP) to predict waste streams and plan to prevent, reuse and recycle materials. UWE project management processes explain what is required. Circular economy principles should be used from the earliest projects stages to design out waste, specify high levels of secondary material use, and design for modularity, repairability and reuse.
  Note that SWMP are also essential for the effective planning/costing of the work (e.g. making sufficient space allowance for storage or plans for traffic movements). Sufficient planning time should be given to allow for reuse i.e. itemising what furniture will be removed and whether it can be reused internally at UWE.
- Given the scale of work at UWE, we expect project teams to consider adjacencies and co-ordinate their approach to waste management: Waste from one project could potentially be reused on another (e.g. inert demolition waste could be used as hard core for another project).
- Designs should be based on the principles of the "circular economy" which is: "restorative and regenerative by design, and which aims to keep products, components and materials at their highest utility and value at all times".
- Consider recyclability of materials and recycling pathways of high maintenance/short-life products (e.g. flooring).
- Designers to avoid specifying, as far as reasonably practicable, toxic substances (which could contribute to an incident, or become hazardous waste in future).

3.5.2 Climate Resilience

Climate resilience and adaptation impacts on all aspects of the design and all teams must consider:

1. Fabric Performance and whole building design
2. M&E specification
3. Surface water drainage
4. Water and Energy security
5. Ecosystem services
6. Plant replacement strategies
7. Whole life costing
8. Transport provision
   - Designed to maintain reasonable operation during adverse weather events; and,
   - Designed to minimise local air pollution on campus.

UWE has introduced new targets addressing Climate Change Adaptation, which are largely based on the Adaptation section of the AUDE Green Scorecard. In brief, the relevant targets, are:

9. **A3 - Flood risk - new projects:** For any new buildings or major refurbishments (projects with a construction value of £2.5m (exc. VAT) or more), at RIBA stage 2, to carry out an assessment of flood risk with an inclusion for climate change, to ensure all major changes to the estate are fully protected for 1 in 100-year events.
10. **A5 - Overheating - new projects:** For any new buildings or major refurbishments (projects with a construction value of £2.5m (exc. VAT) or more), at RIBA stage 2, to use future weather tapes, in assessing resilience of new buildings and refurbishments, and ensure buildings are designed to cope with temperatures expected during their first refurbishment cycle (~25yrs). The UWE Design Specification will be the mechanism to ensure this is adopted on all projects.

In all cases, the University are looking for a holistic approach to adapting to a changing climate and expect designers to use the following principles:

1. **Long term - Passive designs**: Designs that work *with and compliment* the environment rather than against it. For example, considering orientation of the building to minimise solar gains, avoiding onerous adaptation to building facades or relying on cooling plant.
2. **Robust designs**: Designing details and finishes that will be robust in adverse weather conditions (storms and gales, flooding, heavy snow etc.)
3. **Flexible designs:** Designs that allow room for additional plant, or adapting to alternative fuels etc.

These principles are not intended to add excessive capital costs onto projects, but rather allow for whole life designs to be considered.

3.5.3 Flood risk

Designs for new builds must produce a flood risk assessment making an allowance for climate change. Designers must use the Governments guidance "Flood risk assessments: climate change allowances" to produce the risk assessment. The Upper, Higher and Central allowances must be used for the time period '2050s' (2040 to 2069) to provide sensitivity analysis. The Guidance also provides parameters to help designers ascertain which scenario must be chosen for a particular type of project. The University sites are in different Flood Zones and therefore the scenario assessment must be considered on a project-by-project basis.

3.5.4 Overheating

Passive measures shall be prioritised to reduce or avoid the need for mechanical cooling.
In addition to any requirements under building regulations, projects must demonstrate that they are operable and comfortable under 2030 climatic conditions and, with the addition of defined practical strategies if necessary, under 2050+ conditions.
Thermal modelling must be presented to UWE to inform early design decisions related to orientation, fabric, and building servicing.

3.6 Fire Strategy

3.6.1 Fire Safety Standards

Buildings must be designed using BS 9999 (Code of practice for fire safety in the design, management and use of buildings) unless fire safety engineering using BS 7974 is needed.

The British Standard BS9999 and in particular Clause 35 on External fire spread and building separation must be followed. This applies to the standalone building, as well as the separation distances between adjacent buildings.

The University's Fire Safety Management Policy sets out the UWE strategic approach to fire safety, the basis being the reaffirmation of fire safety management belonging under the organisation and arrangements of the University's existing Health and Safety Policy. The UWE Bristol Fire Safety Management Policy is (available on the UWE Intranet or on request from the Project Manager) must be reviewed prior to detailed design to ensure that UWE's strategic approach to fire safety and overall assessment of fire risk is not compromised in any way.

The detailed arrangements for UWE fire safety management are set out in the University's suite of Fire Safety Standards. These Standards form the foundation of the University's Fire Safety Management System and outline the functional requirements of fire precautions on the UWE estate, including provision for people with disabilities, fire doors etc. There must be adherence to these Standards where appropriate when developing the Fire Strategy for new builds and refurbishments. These Standards are available on the UWE intranet and will be supplied by the Project Manager.

The Electrical engineering and IT infrastructure chapters of this design Specification provides more technical details regarding fire detection and alarm, emergency lighting etc.

Fire Stopping requirements are detailed in Design Specification Chapter 5.

3.6.2 Building Fire Strategies

At design stage for all new builds and larger projects, a **Fire Strategy** must be provided. The Fire Strategy is to be developed by a specialist Fire Consultant, the Architect, or a competent Building Contractor. UWE will appoint a Fire Safety Engineer where there has been no provision or to scrutinise the Strategy where there has.

The Fire Strategy must provide a clear set of measures encompassing fire precautions, management of fire safety and fire protection. It is essential in setting out the fundamental requirements to provide UWE with relevant information from which to develop and implement effective prevention and protection solutions and appropriate fire safety management.

The Fire Strategy must document the Fire **Evacuation Strategy** which should be incorporated at design stage. This should demonstrate how persons will evacuate, especially those with a disability. It must show all emergency exit routes, disabled refuges, and other information as relevant to fire evacuation procedures, for example the incorporation of any fireman's switches, cold smoke clearance devices, smoke vents, signalling to Security and/or BMS etc. It must also include the basics of what the smoke

ventilation system / cold smoke clearance system should do, including any signalling to Security and/or BMS.

Also reference UWE Fire Safety Standard FSS22 Persons Requiring Assistance During Emergency Evacuation.

The Fire Strategy must be available to UWE at RIBA Stage 2 and on receipt the Project Team, with the UWE appointed fire engineer and UWE Health and Safety Team (HST) will:

- Use the strategy to scrutinise the fire prevention and fire protection measures to identify and correct any significant management implications that may be costly, time, consuming and disruptive to the business of the University.
- Ensure the Strategy does not require fire safety systems and equipment that may be unnecessary or disproportionate to the risk to be controlled.
- Ensure fire safety measures are not introduced for the expediency of design, or construction, or for aesthetic reasons that may require UWE Bristol to implement expensive and time-consuming management controls, including PPM and onerous testing regimes.

A **Fire Safety Strategy template** is available in the UWE Fire Safety Management Policy and can be provided by the Project Manager.

3.6.3 Fire Safety Engineer

The UWE Project Manager will ensure appointment of a qualified Fire Safety Engineer to ensure that a project:

- complies with the published guidance (i.e. Approved Document B or BS 9999), and/or
- meets the functional objectives of Schedule 1 of the Building Regulations through the development of an alternative fire safety engineering approach.

The Fire Safety Engineer will be retained through the statutory consultation process to help the design team reduce project risks and to ensure that communications and discussions with the Building Control body and Fire Authority progress as smoothly as possible.
After this point in the design process – normally RIBA Plan of Work 2013, Stage 3 (Plan of Word 2007, Stage E) – the services of the Fire Safety Engineer may no longer be required for the project.
The appointment of a Fire Safety Engineer will be through a ‘contract for services’ with an appointed consultant. This service is developed in association with the Head of Health and Safety to agree the work requirements and activities of the Fire Safety Engineer. The service is operationally managed by UWE Estates.

3.6.4 Building Safety Act and the Golden Thread

As UWE design, build and refurbish its buildings and incumbent in the Fire Strategy there

must also be reference and adherence, as necessary to the Building Safety Act (BSA) (2022) which contains regulatory reform and regulations to mitigate the risk of certain high-risk buildings, most of which are residential. As building owner and manager UWE must demonstrate that fire safety is being considered at every stage of a building's construction and/refurbishment. Occupier safety risk considerations must be brought to the earliest stage of the planning process. Fire safety considerations must continue throughout the construction and occupation of a building, not just at its inception.

The BSA introduces the concept of a **'Golden Thread'** of record keeping which must be available to relevant parties – residents, emergency services etc. So, the complete and relevant records are available to everyone no matter at what stage they enter the building's history. The information not only comes from those who have constructed it, but also those who manufactured the components used. **For all new builds and refurbishment UWE requires the implementation of the Golden Thread regardless of whether the build is required to be registered with the Regulator.**

The **'Golden Thread'** of information must be started from concept, and applies through design, construction, occupation, refurbishment and ongoing maintenance and management of the building. The **'Golden Thread'** requires record keeping which will be available to relevant parties – residents, emergency services etc. The complete and relevant records must be available to everyone no matter at what stage they enter the building's history. The information not only comes from those who have constructed it, but also those who manufactured the components used.

THE GOLDEN THREAD:

- Ensure an early engagement with Fire Safety specialists, manufacturers and specialist installers. Consider Fire Strategy, fire or smoke doors, fire or smoke dampers and louvres, fire stopping, and service penetration (in particular the additional space required between services to implement compliant penetration fire stopping products).
- Review the Fire Strategy documents and plans in conjunction with Architects, M&E Specifications, and the UWE H&ST.
- Identify all service types passing through the compartment floor, ceiling or wall including any dampers, louvres, and insulation products. Establish sufficient space required to install, compliantly support, and firestop all services.
- Follow a defined design process for penetration of seals.
- Only select firestopping products which are third party certified.
- Only select one firestopping manufacturer throughout the project.
- Obtain copies of third party certification from the manufacturers.
- Ensure the installers of all service penetration seals are third party certified.
- Implement a structured inspection plan to include photographic evidence as the work proceeds.
- Document and file everything for easy reference.

The Project Team will:

- Use the strategy to scrutinise the fire prevention and fire protection measures to identify and correct any significant management implications that may be costly, time, consuming and disruptive to the business of the University.
- Ensure the Strategy does not require fire safety systems and equipment that may be unnecessary or disproportionate to the risk to be controlled.

- Ensure fire safety measures are not introduced for the expediency of design, or construction, or for aesthetic reasons that may require UWE Bristol to implement expensive and time-consuming management controls, including PPM and onerous testing regimes.
- Include provision of fire extinguishers and fire blankets within the overall fire protection design. UWE H&ST will advise on the selection, positioning, and provision of all fire extinguishers and fire blankets.
- Seek advice from a competent person appointed by the Health and Safety Team to review the fire strategy to:
    - identify the strengths and weaknesses
    - confirm that all necessary controls have been satisfactorily addressed and
    - ensure the control measures detailed in the strategy are both proportionate to the risk.

3.6.4.1 Regulation 38 of the Building Regulations & Fire Safety Information

All new builds and major refurbishment work must comply with the Building Regulations and in particular that the requirement of Regulation 38 is fully met. Regulation 38 requires:
"The person carrying out the work shall give fire safety information to the responsible person not later than the date of completion of the work, or the date of occupation… whichever is earlier."*
The information will accurately record the physical fire safety precautions in place, and so enable risks to the relevant persons in the building to be understood in a way that allows them to be appropriately addressed.
This information is critical to the safety of people in and around UWE Bristol premises and essential in ensuring the premises can be operated and managed correctly. The information will also enable UWE to conduct a suitable and sufficient fire risk assessment (FRA) for the premises.

The contractor is responsible for handing over the correct information to the UWE Project Manager. A copy of this information will then be handed over by the Project Manager to the UWE Bristol Head of Health and Safety for the Fire Risk Assessment to be completed.

Designers must provide Fire Safety Information if they are erecting, extending or changing the use of a building. Fire Safety Information relates to the design and construction of the building or extension, and the services, fittings and equipment provided in or in connection with the building or extension which will assist the responsible person to operate and maintain the building or extension with reasonable safety.

UWE undertakes numerous projects which alter existing fire protection systems but which do not represent an extension or change of use.

A building cannot be accepted if fire protection systems are not operational and if required fire safety information is missing.

3.6.5 Consultation with UWE Health and Safety Team

The UWE Health and Safety Team is a key stakeholder. The UWE Health and Safety Team must be notified of projects at RIBA stage 1 to ensure that obligations under CDM 2015 are met. UWE is also the 'Responsible Person' under the Regulatory Reform (Fire Safety Order) 2005 and must have an active role in assessing the impact that the project will have on existing fire safety arrangements during construction and after handover.

Consultation with the UWE Health and Safety Team must commence at the equivalent of

RIBA stage 2 (Concept Design), in line with the development of the Fire Strategy and engagement of the Fire Safety Engineer. Critical decisions will be reached during this stage about architectural, building services and structural engineering and Fire Safety must be an integral consideration.

Consultation should also take place with other stakeholders for example Colleges, Schools, Professional Services, Hospitality & Security etc. about the use, occupants and occupancy numbers, fire loads, etc.

3.6.6 Design responsibilities for fire safety during construction

Designers have a role to play in reducing fire risks during the construction phase. The Joint Code on Fire Prevention in Construction Sites provides guidance to designers and places a number of requirements on them. The code generally applies on projects over £2.5m but it can also apply to lower value but high-risk contracts. The code states that "the design should be assessed to ensure that fire risk and potential for damage have been fully considered to keep to a minimum during construction and use." The lead designer must ensure this is done.

On all projects, regardless of value, UWE requires that designers consider the following items which are copied verbatim from the joint code:

- The use of non-combustible and non-flammable materials to reduce fire loads
- Materials and methods that avoid the need for hot work on site
- Design details that prevent the passage of smoke and flames up through a building during the construction phase
- Design of access routes to enable the contractors to construct buildings in such a manner as to retain safe evacuation routes during the construction phase
- Design for fire fighting/alarm systems to allow early use – possibly on a partial use basis.
- Noticeboards fitted on walls of fire exit routes may, by the nature of their material and the displayed material, be the fuel of a fire outbreak and cause its spread to risk safe escape of building's occupants. Reference the UWE Fire Safety Standard FSS14 with regard the fitting of noticeboards. Noticeboards must not be fitted in staircases, landings and lobbies.

HSE guidance HSG168 (Fire Safety in Construction), highlights the need for effective communication between dutyholders. This ensures, for example, fire compartment walls are identified and designs/programmes allow for temporary fire-stopping. The Principal Designer plays a key role in collating and distributing this information and reviewing design risk information. The UWE Health and Safety Team reviews the Principal Contractor's plan for managing fire risks, which is part of the Construction Phase Plan.

Where refurbishment impacts directly any existing fire arrangements for occupied buildings there must be, as part of the pre-construction phase the development of the dynamic fire risk assessment as set out in the Fire Safety Standard FSS20 *Revision of Fire Protection Arrangements* by the Principal Contractor with the Project Manager to ensure appropriate management arrangements are implemented throughout the programme of construction.

3.6.7 Third Party Accreditation

All projects and works will utilise third-party certification schemes for fire protection products and related services as an effective means of assuring that the items are fit for purpose, of good quality,

reliability and safety, and as a means of demonstrating that UWE has complied with relevant legislation.
UWE will use UKAS Accredited Third Party Certificated providers. This ensures the provider is working to the latest appropriate standards and best practice for the specific service they deliver and that annual checks have been made to verify necessary competencies and management systems to ensure that the provider can do what they say.

3.7 Accessibility and Inclusivity

UWE is committed to providing an environment that is welcoming, accessible and inclusive for all. The UWE Equality Diversity and Inclusivity Team (EDI) produce UWE's Single Equality Scheme which includes an action on embedding inclusive design principles to new buildings, internal and external spaces at all campuses. The quality of UWE experience must be equal for all users and delivered to a high standard.

Refurbishment Projects should be used to improve accessibility or inclusivity. The Design Team must reference the current Access Audits, to identify the actions required.

- The design and layout must be flexible enough to reasonably adapt to future changes.
- Designs must include Emergency Refuge Spaces as identified in the Fire Strategy. Consider evacuation lifts, visual and audible fire alarms, hearing assistance systems, etc.
- There should be the ability to adjust lighting, acoustics and internal climate wherever reasonable and when compatible with other commitments, such as sustainability.
- Specify a consistent approach to the provision of access equipment across UWE. This benefits everyone with regard familiarity with equipment and locations, as well as simplifies repair and replacement.
- The UWE EDI team must be consulted.
- Provide fixtures and fittings that require minimal physical effort to operate. 30N is the maximum allowable force to open a door. Ensure fixtures and fittings are in a practical location (e.g. a door open device must be adjacent to the door that it operates). Note that UWE wish to minimise the number of automated doors to an absolute minimum, and only install hold-open devices where necessary
- A mix of seating and furniture options are to be provided. Different types of seating, rise-and-fall adaptable desks to accommodate different height wheelchairs or support those who may want to remain standing or can't sit for long periods, persons of variety of heights, etc.
- Provision for assistance animals in addition to people shall be considered, along with dog rest areas with grass and water bowls etc for guide dogs or emotional support dogs.

All the principles set out here are equally applicable to student accommodation. To ensure accommodation is accessible:

- A suitable number of rooms should be accessible or can be readily remodelled as accessible accommodation. This should represent around 5% of the bedrooms but will be influenced by the Equality Impact Analysis. These will only be provided at ground floor level.
- These rooms are to be large enough to accommodate assistive equipment and personal assistants and have level access ensuite shower rooms.
- Shared use wheelchair accessible kitchens will be required in these flats.
- Residents will be able to manage the temperature of their own rooms.
- Accessible bedrooms and ensuite ceilings are to be capable of supporting a tracked hoist, with pre-fitted fused spur power point at high level. These may be retrofitted at a future date. The consequential structural requirements must be included in the initial design and build.

- Provision of Emergency Refuge Spaces (see Chapter 5).

3.8 Welfare Facilities

Welfare facilities can be the most challenging and emotive issues facing design teams. Adequate welfare facilities support several other UWE strategies such as health and wellbeing, equality, diversity & inclusivity, sports and sustainability (e.g. showers close to bike shelters to promote cycling and support our strategies on wellbeing and reducing car usage). Utilising single stall, gender-neutral toilets with disability friendly space benefits everybody.
A 'like-for-like' approach to refurbishment of welfare facilities is not acceptable because standards and expectations have changed, and re-configuring existing welfare facilities may need significant alterations.

- Urinal traps must be exposed to facilitate cleaning.
- The provision of toilet lids should be suitably assessed. The assessment must consider maintenance costs and impacts due to potential breakage or vandalism, whilst considering the health and safety benefits of preventing aerosol generation and contamination during flushing with no lids.
- All Cubicles require coat/clothes hooks. In Accessible facilities these must be installed at the correct Doc M height.
- Shower facilities and changing rooms are to be included wherever practicable. Clothes storage, drying facilities, and/or ventilation may be required depending on location and usage.
- All showers everywhere must have retaining brackets fitted to ensure nobody can leave the showerhead touching the cubicle floor. However, the retaining brackets must be able to be removed by Maintenance operatives to be able to remove, replace, and descale the showerheads and hoses.
- Adjacencies must be considered e.g. If there are no shower facilities within reasonable walking distance of a new building.
- Consideration to using greywater for toilet flushing.
- Sensors for flushing toilets, Sensor taps, hand driers, etc. minimise water usage and enhance hygiene.
- Ambulant, and/or Accessible WCs to have lever or easy press taps and locks easily operable with a single, closed fist. Jeflock Accessible toilet locks fully meets this requirement.
- Sanitary Bins are to be provided in toilet facilities. Space for the bins to be located must therefore be incorporated into the design.
- Ensure a selection of left- and right-hand transfer Accessible toilets.
- Liaise with Faith and Spirituality as to the provision of Washing facilities or any other requirements to support specific faiths.
- Establish if a larger Hygiene Room/Changing Places WC with dual transfer, variable height changing bench, level access shower and tracked ceiling hoist is needed. Location will depend on where demand is likely to be greatest, ensuring easy access.
- Wheelchair accessible en-suites in residential accommodation to have fused spur power points pre-fitted to accommodate future tracked ceiling hoists and automatic wash and dry shower toilets.
- UWE buildings are to have a suitable mix of gendered, and gender-neutral facilities.

3.9 Wellbeing

It is believed around 90% of our lives are spent in buildings and these environments significantly impact our health and wellbeing, and ultimately our productivity and performance. Even modest

increases in performance and productivity, reduced turnover, or absenteeism etc. through "human-centred design" can lead to significant benefits for all.
Aspects of wellbeing such as light, air quality, and temperature are equally as important as connection to nature and a sense of ownership.

Multi-function, wellbeing spaces can be used for quiet reflection or prayer; Wellbeing activities (e.g. yoga, meditation, or physiotherapy exercises); First aid provision; New and expectant parents, including breastfeeding and location where mothers can express and store milk; Diabetics can self-inject; etc. They must be colour neutral, image free, and the equivalent size of a one-person office. Multi-function, wellbeing spaces may require secure storage, a 'sharps bin', doors with locks so that people will not be disturbed, engaged / vacant signage, etc.

Design teams must think broadly about wellbeing, for example, but not limited to facilities that:

- Promote healthier forms of travel
- Create a sense of community by providing communal and social spaces/experiences
- Promote wellbeing through proximity to nature via biophilic design principles.
- Give access to spaces that allow private reflection and solitude. Multi-function wellbeing spaces can help to meet this ambition.
- Offer space for artwork that can promote discussion and reflection
- Promote inclusion and do not create barriers to access.
- Access to fitness and sports facilities.
- Meet religious beliefs.

3.10 Religion and Belief

UWE has more students living on site leading to increased demands but also different patterns of demand. The legal landscape is also developing, and the Counterterrorism and Security Act 2015 places an explicit legal duty on UWE as a Specified Authority, to prevent people being drawn into terrorism. UWE Religion and Belief Strategy is key to how UWE meet that duty.

Consultation must take place with the UWE Coordinating Chaplain in the Faith and Spirituality Team. Where specific facilities are needed, such as a faith room or ritual washing facilities, the design team will be advised.
Faith spaces should be designed to cater for a multitude of faiths.

3.11 Printer Allocation Policy

There needs to be adequate provision for printing, in line with the UWE Printer Allocation Policy. The Allocation Policy ensures that multi-function devices are only supplied and installed where necessary. UWE Printing and Stationery must be consulted as soon as designs are drafted for printers that may need to be moved/removed/replaced or added.
Printers are to be installed in open access areas, and within offices.

Storage space for paper and other consumables will be required.
Space will be required to maintain and repair the machine.
Consideration must be given to providing sound-deadening screens in certain areas to avoid disturbing occupiers of the room.
Extract ventilation must be considered to remove the emissions from the printers.
Printers being introduced as part of a project must be purchased out of project funds. There is no central budget for new provision.

Printers must not be installed into fire escape routes, nor corridors which people will need to use in an emergency, nor anywhere the printer would reduce the available width below 1200mm.

3.12 Sports

The UWE Sports Facility Strategy aims to create a distinctive selling point for UWE Bristol that will genuinely contribute to the delivery of the Health & Wellbeing commitments in the 2030 Strategy.

Designers must consult with the Centre for Sport on projects affecting or expanding sports facilities. Creative uses of relatively small internal or external spaces can help deliver the Sports Vision. Consideration must be made to:

- Provide poverty-proof opportunities for engagement in positive experiences and offer distraction from less desirable activities.
- Create an environment that reduces social isolation and supports UWE community engagement by removing cost and location barriers to participation.
- Opportunities for supporting people to make healthy living choices rather than the traditional signposting.

3.13 Transport

Also reference Design Specification Chapter 9 which addresses hard- and soft-landscaping.

- The Transport Strategy works in a hierarchy, with pedestrians, cyclists and disabled users at the top, followed by public transport users and then private motorcycles and cars.
- There must be spatial separation of transport infrastructure, with central areas of campuses primarily designed for pedestrians, and parking peripheral to the site.
- Electric vehicle charging stations are to be provided.
- Signage for main pedestrian and cycle routes through and within campus are to be provided.
- Cycle facilities in new builds shall have adequate sheltered and secure cycle parking, lockers and showers, including facilities for disabled persons who may use a hand-powered cycle or three-wheel bicycle, and/or require wheelchair storage.
- The design team must work closely with the Local Authority to ensure that all requirements for the site-specific transport strategy, traffic assessment and environmental impact assessment are met.
- Any designs must be discussed with the UWE Travel and Access Team.

3.14 Signage and Wayfinding

Effective wayfinding reduces confusion or anxiety, creates an inclusive environment, and reinforces the UWE brand, through providing a consistent theme and provides critical information that supports a range of other strategies such as fire and wellbeing.
UWE has a "UWE Signage Design Guidelines" which is the master guide with regards signage and wayfinding.
The signage strategy consists of physical internal and external signs and wayfinding totems, electronic signage, and wayfinding apps and online mapping tools.

Where changes are being made to the layout of a building, the wayfinding signs must be traced back to determine all of the signs that need to be updated. The project budget and programme must allow for these amendments.

Certain signs require power, data, and/or controls e.g. for lighting and remote change of the display.
Electronic display screens and signs should be considered at key locations, particularly at entry points and near receptions/information points. Projects must allow for power and data supplies. Power management must be considered, with the ability to programme equipment to switch off when buildings / areas are not in use.

There is a requirement for mapping tools which can be used on mobile devices. UWE has a web-based mapping tool that allows users to navigate using step-by-step directions and to select preferences or certain criteria such as accessible routes only. Another feature of the wayfinding app is that users can search for specific facilities which may not otherwise be signpost on physical signage e.g. specific room numbers.
All signage and wayfinding shall show Accessible routes, and the location of accessible and gender-neutral WCs, faith or wellbeing spaces.
Symbols to toilets and welfare spaces shall be raised and tactile.
All Signage is to be of a matte finish.
All physical maps are to be marked with a 'you are here' identifier.

4.1 Chapter 4 Space Standards

The UWE Space Standards provide high level modelling when calculating space needs.

Consultants and contractors should engage with UWE Space Management early in any project to ensure that works delivered align with the UWE Space Standards.

The standards are not prescriptive and other factors and specific operational requirements will be considered.
These standards may change as ways of working and learning evolve.

Examples of UWE Space Standards, to be discussed with the Space Management Team:

	Space min m^2 / person
Teaching and Specialist Spaces	Allocation based on specific requirement. Consult the UWE Space Management Team on the latest standards.
Social Spaces	
Restaurants / Cafés – dining areas	0.2
Restaurants / Cafés – kitchens	0.17
Communal areas – students	0.7
Communal areas – staff	0.19
Office Spaces	
Single Office with Meeting Space	12 – 15
Single Office	6.5
Shared / Open Plan Office	6.5
Meeting Area in Open Plan	2.5
Meeting Room	2.5
Additional Administrative Space	**(Space min m^2 up to 3,000 students)**
Student facing administrative space	50 (+10 m^2/extra 1,000 students)

4.2 Room Numbering

UWE Space Management are responsible for all room numbering based on the UWE Room Numbering Policy, which must be strictly adhered to.

Under no circumstances should contractors, clients or staff assign room numbers without approved proposals through UWE Space Management regardless of the scope or size of the project.

4.3 Space Design Requirements

There are several space requirements which must be provided as part of any designs:

- Space for cleaning – please engage with the Cleaning Services Team.
- Space for waste disposal - please engage with the Waste & Resources Team.
- Space for IT infrastructure – please engage with the ITS Team.
- Functional Requirements, such as but not limited to:
    - Cleaners Rooms
    - Storage, as well as areas for waste
    - Welfare requirements – for staff or students – toilets (including accessible and gender neutral), kitchenettes, showers, etc.
    - Emergency refuge spaces
    - Fire and evacuation space subject to the Fire Strategy.
    - Plant rooms
    - Server rooms / Comms rooms
- Furniture
    - Fire Retardant Certification for all furniture must be provided.
    - Furniture needs to be inclusive; adaptable to individuals' needs; consider different working heights.
    - No pallet chairs.
    - Furniture needs to support mains and USB power points, with sufficient available power.
    - Furniture needs to comply with circular economy principles, with 10% reuse targeted per project.
    - Maximum occupancy numbers are dictated by Fire Regulations and limited by ventilation supplies.

4.4 Space Types

This Design Specification is not exhaustive. Consultants and contractors must engage with stakeholders and the Space Management Team early in any project to discuss considerations.

4.4.1 Lecture Theatres / Teaching Rooms / Meetings & Event Spaces

- These may require fixed tiered seating and/or mobile furniture. They could be agile rooms with movable furniture to suit different teaching styles.

- Power and data points should be provided to an appropriate level for the space type.
- Ventilation rates must meet the maximum occupancy numbers based on the Fire Evacuation Strategy.
- Teaching walls, on which images are projected, should be painted 00NN 16/000 – Grey. This accentuates the screen and benefits students with certain cognitive or visual impairments who might struggle if faced with a large, white wall.
- Sufficient provision of building services and IT infrastructure for AV equipment and video capture technology etc. will need careful consideration, to prevent overheating/cooling, or areas which could be inadequately serviced. Safe access must be available to service high level projectors, etc.
- A tablet should be provided to each bookable space to show room bookings.
- Refer to Chapter 8 for full Technology requirements.

4.4.2 Offices and receptions

- Office space to support agile / hybrid working. These may be individual or open plan and include storage provision and ancillary spaces to suit a range of working activities.
- Private office and interview rooms will require higher standards of acoustic insulation.
- The use of blinds, frosting etc. should be considered if visual privacy is also required.
- Reception desks must be to UWE corporate brand and be accessible to both sides. Receptions should be light and welcoming with soft seating provided.

4.4.3 Specialist/ Research/ Teaching Laboratories & Workshops

Special purpose space which does not typically lend itself to other uses, although some laboratories or workshops may allow for dual/multi-purpose use. These spaces need determining early as they may have structural, mechanical, electrical, drainage, ventilation and/or containment, and door interlock implications over and above more standard spaces.

The Design Team must ensure that:
- All stakeholders are consulted (including UWE Estates).
- Seek advice from the UWE Health and Safety Team on requirements for Biological Laboratories and Radiation Protection Areas.
- Principles of accessibility and inclusivity are included in design e.g. providing some work surfaces of different/adjustable heights etc.

General Laboratories should be flexible and adaptable for use by other Schools, wherever possible.

4.4.4 Welfare Areas

Tea points, staff kitchenettes and staff common rooms should be informal areas which may or may not be in the immediate vicinity of staff offices. These should be shared between one or more School, College or service wherever possible.

Toilets and shower areas will be designed to be sufficient for building occupancy levels and be situated compliant with the current legislation, best practice, etc.

Quiet rooms, multi-use spaces for rest and recovery, faith rooms, and areas for quiet contemplation should be designed in wherever possible. Wherever possible, these shall be accessible to more than

the College / School in which they are situated. These should have vacant/in-use signs on doors. The décor should be conducive to relaxation and designed for multiple uses.

4.4.5 Student Accommodation

Many students live on campus and their accommodation has a significant impact on the student experience. Accommodation may consist of ensuite flats with shared kitchen, town houses, and studio flats.
UWE is committed to inclusivity, so a range of options must be incorporated to make on-site living an affordable and/or accessible proposition to students. Appropriate numbers of fully accessible flats and rooms must be provided that can be readily retrofitted with assistive devices. Regardless of whether the flats are designed to be accessible, it is important that communal areas are accessible as students may receive visitors with accessibility needs.

Fire safety is a critical consideration and must be designed from the outset. Automatic fire detection to L1 must be fitted in all UWE accommodation.
Only induction hobs are to be provided due to fire risk. Hob fire safety controls must be installed, as per UWE Electrical Design Engineer guidance.

4.5 Space for Cleaning

Designs must provide adequate facilities for cleaning. The housekeeping team will determine the Cleaning Strategy based on the proposed structure (including surface finishes etc.) and activities within it.
Specific items of equipment and associated storage may be needed:

- Requirement for a cleaning cupboard on each floor. Standard cleaning cupboard to be approx. 2m x 1.5m. To be lockable and vermin-proof.
- A hard, impermeable floor surface. Level floor with no up-stands.
- Sufficient storage space
- Adequate ventilation & temperature control (to aid drying and preserve correct chemical temperatures)
- Adequate lighting
- A Belfast sluice sink
- Hot and cold-water supply, drainage.
- Racked shelving: Acids and Alkalis must be shelved separately, and COSHH information and Safety Data Sheets also have to be stored.
- Hanging racks for mops
- Appropriate storage facilities for hazardous substances (and to contain spills)
- Potentially, space for a washer-drier and/or buffing machine. Washing machine plumbing (for cleaning mop heads, depending on the size of the building)
- Electrical sockets and charging points for cleaning equipment.

External cleaning (glazing, guttering) or other challenging cleaning operations (e.g. high-level cleaning within an atrium) must be addressed in the access and maintenance strategy.

4.6 Space for Waste Disposal

Internal waste and recycling bins must be accessible for staff and student use, and display signage to make clear which materials can be placed in each bin.

The standard bins in academic areas are Leafiled Environmental Envirobin Minis for General Waste (black body, white lid), Paper (black body, blue lid) and Plastic and Cans (black body, red lid).

In staff kitchens and student canteen areas food waste bins or caddies must be provided, along with clear signage for how to use them e.g. no compostable packaging in food bins.

Other bins including glass bins, confidential waste consoles, battery bins and vape bins should be provided where needed – depending on the use of the space.

All bins are procured by the Waste & Resources Manager in the UWE Sustainability Team and will be recharged to the project.

External bins and waste disposal requirements are outlined in Chapter 9.

5.1 Chapter 5 Fabric, Structural & Acoustic

To provide flexible space, Designers should anticipate future changes in use and internal layout but not at the expense of appearance, acoustics, thermal capacity, or stability. The requirement for flexible spaces will obviously influence the structural form, and lead to the use of non-load bearing internal walls where practicable.

There will need to be ample accessible service routes to accommodate future alterations or expansion of services as technology and teaching techniques evolve. Raised floors and/or generous supply of floor ducts is to be included with all projects to avoid trailing leads and to assist with future alterations and flexibility of room layout.

5.2 Furniture and furnishings

The Designer must liaise with the College / Client initially, in the selection of furniture and furnishings. The package may be removed in all or part from the Works Contract for the Client to manage separately. All furniture and furnishings must be specified to be fire retardant and fully compliant with the Furniture and Furnishings (Fire) (Safety) Regulations.

There should be a choice of seat, bench, and desk / workstation heights, with and without arms or backrests and visually contrasted from room finishes. Sink fittings are to be operable by someone with reduced manual dexterity.

Tables, desks, and seating to be movable and designed to enable disabled users to sit with colleagues, particularly in canteen/refectory areas and common rooms. Some seating should be more enclosed, providing more privacy or a quieter area.

Furniture in offices should provide more conformity. UWE preference is 1200mm x 800mm straight desks with under-desk pedestals or lockers. At least 1 sit/stand desk should be added per rank of 6 desks for more accessibility. For buying options and the preferred Supplier List, contact the Furniture Category Lead at purchasing@uwe.ac.uk

Appendix 1C of the UWE Bristol Circular Economy Plan lays out clear sustainability standards for furniture that should be considered for all new build and refurbishment projects. Where possible, the Higher Education sector Sustainable Furniture Framework should be used to identify suppliers that adhere to these principles. Before purchasing new furniture:

- Can the existing furniture be used, or refurbished?
- Can the furniture requirements be met from current UWE supplies? Contact reuse.furniture@uwe.ac.uk to find out.
- Can refurbished furniture be purchased? Contact sustainability@uwe.ac.uk for current suppliers.
- Ask the supplier about leasing options, rather than purchasing.

If suitable furniture cannot be sourced via any of these routes the following criteria should be applied to purchases of new furniture:

- Has high secondary material content (provide% by weight) of recycled, refurbished and reused wood, metal, plastics and textiles.
- Is modular and has long production runs to ensure that individual items or components can be replaced.
- Is designed to aid disassembly - to facilitate reuse, refurbishment, repair and ultimately recycling, either in part or in whole.
- Has readily available spare parts to facilitate refurbishments and repair.
- Is consistent with furniture used elsewhere in UWE to increase reusability.
- Only contains certified sustainable timber i.e. FSC or PEFC
- Is delivered in returnable packaging systems i.e. for multiple use (all associated supply packaging to be removed by the supplier for reuse by themselves)
- Minimises hazardous chemicals used in the manufacture of items.

When procuring new furniture, a 'whole life' approach should be taken, factoring in use and end-of-use costs to the decision process. Supplier take back of end-of-use and legacy items should also be considered as part of the procurement process.

5.3 Emergency Refuge Spaces

- Emergency Refuge Spaces are to be provided on every storey (except ones consisting only of plant rooms; and except those providing direct access to a final exit) of each protected stairway providing an exit from that storey.
- Refuges should enable direct access to the stair. Refuge should be provided on each final exit leading onto a flight of external stairs.
- Minimum size 900mm x 1400mm. Door width no less than 850mm.
- Accessible to anyone with limited mobility and/or in a wheelchair.
- The Refuge must not reduce the width of the escape route or obstruct the flow of people escaping.
- Refuge Communications, reference Chapter 7 for full voice communication requirements.

- Refuge Communications should be able to identify the presence of someone, and communicate with a control room operator, via appropriately situated outstations. Any number of communication devices must be able to be used at any time in the event of more than 1 person at different refuges.
- Communication systems must be readily operated by, and comprehensible to any person. There must be instructions, and the instructions must be correct.
- Communication panels should be green, or otherwise indicated by a green sign.
- Blue mandatory sign (circle) worded 'Refuge - Keep Clear'.
- Directional Signage to the refuge is clearly visible from all directions. Illuminated signs are required in public areas, high footfall areas, etc.
- Refuge must be enclosed within a fire-resistant construction.
- Refuge must be directly accessed by a flat, safe route.
- Approach routes to the Refuge must have auto-doors so each Refuge can be accessed by anyone. Activation of the fire alarm must not affect the ability of anyone to be able to operate the auto-doors.
- Communication located in an escape route free from obstacles, wall-mounted at 900mm to 1.2m above the floor in an easily accessible, well illuminated, and conspicuous position free from obstruction.
- Cables used for EVC systems need to have "enhanced" fire performance (cables with standard fire resistance performance in a refuge communication system may be acceptable where the system is intended for use only in disabled refuges and not for fire-fighting or similar purposes by the fire and rescue service and where such cables would be capable of operating correctly during the period specified by the evacuation strategy for the building.)
- Refuge Spaces at Lift Lobbies: if it has been determined that the refuge spaces are not available as required by EN81-20:2014, then UWE would expect a Design Specification derogation against 2.2 of the EHSRs of Lifts Directive 2014/33/EU to be sought from BEIS, UWE Estates Management, and UWE H&S Team

5.4 Structural details

Open plan areas shall be designed with the capacity to accommodate additional partition walls which may be required in the future and that office space may change to larger open-plan rooms etc. UWE requires a large grid and as large as possible finished floor to finished ceiling height commensurate with a reasonable cost.

Floors should be designed so that filing cabinets can be positioned mid span, away from external walls. Maximum load signage must be fitted where required, to ensure maximum loads are not exceeded.

The structural capacity of roofs should allow to add reasonably foreseeable additional plant without subsequent structural work.
Details on the fabric of the building in respect of fire-retardant specification, fire safety and fire spread, must all be reviewed by the UWE H&S Team in advance.
Due to the risk of fire, a risk evaluation within the design risk register is required for any proposed timber framed structures on UWE sites.

5.5 Circulation Principles

5.5.1 Building Entrances

- See Section on external doors, below.
- Entry control communication units are to be visual as well as audible and shall be accessed from both a standing and seated position.
- Avoid separate entrances for disabled users.
- Do not install revolving doors.
- Doors must not have 'weather bars' since they create a barrier to wheelchairs and can be a trip hazard.

5.5.2 Steps and stairs

- Upstands shall be used on the side edges of steps where there are gaps between the step and the wall.
- Steps to have handrails on both sides.
- The contrast strip shall be on the nosing of the step. Top and Bottom Steps to be different contrasts.
- Stair risers shall be solid (no open staircases).
- Glass must not be used for the tread or riser of stairs.

5.5.3 Horizontal circulation

- Consider chamfering or angling corners to facilitate wheelchair user turning and to enable deaf or hard of hearing users to see others approaching.
- Corridor doors will be fitted with hold open devices in preference to power assisted opening devices. 30N is the maximum allowable force to open a door.
- Do not use digital keypads; UWE requires swipe card access.

5.5.4 Vertical circulation

- For short rises and ease of maintenance, ramps shall be installed wherever possible, and not lifts.
- Install passenger lifts larger than the minimum 1100mm x 1400mm in Part M wherever possible.
- Fold-down stair climber platform lifts are not recommended as they can obstruct the clear width of stairs and compromise means of escape.
- Freestanding enclosed vertical platform lifts must conform to Part M 1100mm x 1400mm minimum size, with power assisted doors. The lift must be able to take the load imposed by motorised mobility aids.
- Enclosed platform lift controls to have single press button operation, so that users are not required to keep continuous pressure on the button for the full extent of travel.
- All lifts should be operable independently without requiring staff assistance.
- It is important that push button devices are positioned in close and sensible proximity to the door they operate, such that nobody is expected to dash from the button to the door.

5.6 Sustainable Material Selection

Designers shall take account of the sustainability impact of the materials selected. A life cycle perspective shall be taken regarding the choice of material, i.e. from cradle-to-cradle which includes considering disposal as well as the end-of-life reuse and recycling of the material.

To support our sustainability commitments, UWE requires designers to follow the principles below:

- Consider the source of materials – locally sourced generally being preferable.
- Consider the reputational risks associated with extraction activities.
- Consider the embodied carbon of materials selected and opt for the lowest carbon options. Embodied carbon is included in the UWE-wide net zero carbon commitment.
- Minimise waste on and off site – monitored, measured, reported to Sustainability Team.
- Plan for the reuse of materials produced as part of the construction phase.
- Make use of reused or recycled content in construction materials, fixtures, and fittings.
- Use materials with ease of repair, maintenance, and end-of-life dismantling in mind.
- Minimise the use of toxic and/or polluting materials in the design.
- Be able to report environmental impact, recycled content and embodied carbon of materials.
- Materials supply to comply with all applicable legislation throughout its supply chain.

Materials should be sourced/produced under internationally acceptable environmental, social, and ethical guidelines and standards (for example, FSC for timber). This includes sacrificial materials such as hoarding.

Designers are expected to use A rated materials/products from the BRE Green Guide to Specification wherever reasonably practicable.

UWE advocates the use of high-density polyethylene (HDPE) over PVC, apart from in the case of underground ducts.

UWE needs all materials to be robust to the wear and tear of a university. UWE Campuses are exposed sites and masonry must have good resistance to moisture, frost and not be susceptible to staining.

The cost and risks of maintenance and cleaning must be considered. Pre-finished materials are preferred to materials which require painting or other ongoing cyclical maintenance activities.

Apart from aesthetic reasons, materials selected for the external fabric should not be prone to premature fading when continually exposed to the elements (timber and copper are obvious exceptions). Materials should be resistant to premature degrading because of exposure, such as certain render finishes. Likewise, all exposed elements should be easily cleanable.

5.7 Building fabric and envelope

Fire stopping and compartmentation must be an integral consideration of the design and installed as early as possible. The Fire Strategy, Fire Compartmentation Drawings, and details of all Fire

Stopping installations must be provided in the O&M Manual on handover. UWE have standardised upon certified approved fire stopping projects as supplied only by Quelfire or Rockwool.

The performance at all junctions and intersections must be maintained. All openings within the envelope are to be compatible visually and technically with the external walls.

Guidance on the use of insulation materials is given in the LPC Design Guide for the Fire Protection of Buildings.

Consideration must be assigned to design out future pest control problems, regarding vermin as well as pigeons, etc. Projects and Contracts over £2.5M should employ a specialist Pest Control Consultant.
At Concept Design stage (RIBA Stage 2) consideration is to be given to the possibility of birds roosting/perching/nesting on flat ledges, cills, openings etc and the consequential impact on cleaning and maintenance, and the health and safety impact from faeces, feathers, parasites etc. Steps are to be taken to eliminate flat ledges, cills, openings etc or provide anti-bird measures at Developed Design stage (RIBA Stage 3). Such anti-bird measures must be easily accessed for maintenance and cleaning i.e. not require MEWP, scaffolding etc.

5.7.1 External Envelope

The materials selected for the envelope must be robust, readily available, and preferably obtainable locally with a minimum life span of 60 years and not subject to early surface deterioration. This is especially relevant when selecting a facing brick. Plastic coated products are to be avoided unless the durability of the coating has been proven and is protected by a sound warranty.

The British Standard BS9999 and Clause 35 on External fire spread and building separation must be followed. This applies to the standalone building, as well as the separation distances between adjacent buildings.

5.7.2 Roofs & Roof Access

The roof structure must be designed and installed in accordance with calculated wind loadings and exposure conditions. Weather tightness, high insulation and vapour control performance will be maintained across all roofs, including interfaces with external walls.

Wherever possible, designs should prevent the need for access onto roofs. If routine access is required to a roof a fixed means of access **must** be provided. UWE's preference is that access should be via a stairway (e.g. extension of the stair core) rather than ladder. Level, stable routes should be provided over roofs (e.g. a walkway of suitable construction fitted on to a profiled roof system).

Locks shall only be operable by Estates key suite 1513 or UWE Swipe Card access control.

Permanent fixed guarding is the preferred edge protection. The installation must be a KeeGuard system, or equal approved. Rail Safe systems are not to be installed.

All new handrails must be installed using the manufacturer's components and specifications, and must comply with BS13700:2021 permanent counterweighted guardrail systems. Every proposed quotation and final installation will require a site-specific wind speed calculation conforming to wind loading criteria in accordance with BS EN 1991-1-4 plus Amendments. All guardrail installations must be designed for specific wind speed calculation in relation to the location, height of building and exposure level. All suppliers and/or manufacturers will have to provide calculations to comply with this requirement.

Fall restraint equipment can be specified. Fall arrest equipment is not to be used.

A detailed risk evaluation is required in the following circumstances:

- If access is to be via a ladder rather than stairs.
- If a fall restraint system is required. If so, the installation must be a Latchways system, or equal approved, and positioned so that it requires the use of a 1500mm lanyard. It must be compliant with Part L. It must be accompanied by a calculation package. Design life must be not less than 25 years. All components should be stainless steel and installers must be approved by the system supplier.
- If access to the roof is via a trapdoor/ opening roof light.

Roof drainage is to be designed in accordance with BS 12056-3.

5.7.3 Roof lights

Roofs which are partially or entirely glazed should be designed to prevent breakages or a fall.

UWE will never commission or accept a walk-on glazed roof. While accepting they are technically feasible, UWE will not allow them.

Upstands, non-fragile surfaces and, where necessary, handrails should be used to prevent people inadvertently walking or falling onto (and falling through) glazed roofing. Signage and demarcation of designated routes may be used to supplement the preceding measures.

Designs should minimise the need to clean gutters and rainwater goods and glazing to roofs. The access and maintenance strategy should explain how this will be done.

Designers must consider maintenance access to control gear and operators for roof lights or vents. As explained in the Chapter 2, these should be accessible from a place of safety (e.g. on a protected roof, with no risk of falls). The access & maintenance strategy (described in Chapter 2) must explain how glazing panels will be replaced in the event of breakage.

When replacing slate roofs or installing a new slate roof, subject to Listed Building Consent and general Planning conditions, consideration should be given to the use of artificial products with high levels of recycled content. This may be specifically relevant to the Glenside campus.

5.7.4 Windows

Windows are to be prefinished with no need for subsequent cyclical maintenance such as painting/staining or sealing. UPVC window systems must be avoided.

The design of the windows should permit cleaning of the external glass to be undertaken from within the room if possible, or by pole fed systems externally. The window cleaning methodology is to be included in the access and maintenance strategy.

In mechanically ventilated buildings, opening windows are to be restricted to 150mm max. In naturally ventilated buildings windows this shall be 300mm max. If there will be vulnerable users (e.g. a nursery), the opening must be 100mm max. Ironmongery to be robust, suitable for institutional use and subsequently available for the recommended life of the window.

Silicone is only to be used as a secondary form of sealant, not the primary form of weatherproofing.

It should be possible to reach and operate the control of openable windows, skylights, or ventilators in a safe manner (i.e. people are not at risk of falling). Where this is not possible due to an obstacle or excess height, tele-flex or similar control gear is to be provided. Where there is a danger of falling from height, tamper-proof devices should be provided to prevent the windows opening too far.

No window, skylight or ventilator shall be positioned in a location that is likely to expose any person to a risk to their health or safety when opened. Open windows, skylight or ventilators should not project into an area where persons are likely to collide with them. The bottom edge of opening windows should normally be at least 800mm above floor level unless there is a barrier to prevent falls.

Manifestation, preferably in etched glass, to be used wherever there is a risk of collision of persons or where modesty may be compromised. For example, floor-to-ceiling external windows or glass balconies could potentially pose a threat to the dignity of someone wearing a skirt or shorts.

The function of the room is to be considered at the design stage to facilitate the appropriate level of privacy. Permanent obscured glazing should be used rather that retrofitted films.

Daylight glare to be controllable by blinds.
Solar gain should be minimised using external fittings in preference to internal.

5.7.4.1 Large, glazed panels

Glazed panels should be sized to allow replacement to be undertaken using simple manual handling techniques with simple mechanical lifting aids. The need for the use of cranes, even 'spider' mini cranes, to replace panels should be avoided wherever possible. If a designer believes (on balancing the competing design considerations) large panels are the best design solution, it must be discussed with the Principal Designer and recorded in the 'design risk register'. The access and maintenance strategy should also detail how this operation would be carried out.

5.7.5 External Doors

Robust external doors will be provided to all entrances and means of escape locations. Additional doors will be required to plant rooms and refuse areas. Typically, main entrances will be double doors, fully glazed, automated (operated by sensors and push button controls) and have level access wherever possible. Buttons must be near the doors.
Entrance doors should have lobbies to prevent wind/draughts, suitable for predicted pedestrian traffic, and designed accordingly to function in high flow periods.

Sliding Doors are to be avoided. Swing Doors are to be installed.

Doors on a maintenance route must be wide and high enough to accommodate any necessary mobile plant which has been considered necessary for subsequent maintenance activities.

Physical door locks are not permitted on any emergency escape routes nor exits. Break glass tubes are not permitted. Maglocks should be installed for security.
Access control (card reader system) to be fitted to enable doors to be secured as and when needed, such as out of hours. Doors are to be allocated to an access control Tier: Tier 2 – Magnetic Lock; Tier 1 – Physical Lock; Tier 0 – No Lock. There are numerous criteria which would place a door into a specific Tier and therefore Estates, Security, and H&S Teams must all be consulted. Chapter 3 explains the UWE Security Strategy. Chapter 7 explains automated doors and Chapter 8 explains the IT infrastructure. On automated doors, if there is a fire alarm or electrical failure, exit from the building must be possible by pushing through doors. However, without power nor access, entering the building is not possible if there are no door handles fitted externally to the doors.
Fittings and ironmongery are to be of a high quality, robust stainless steel. Lock cylinders to be euro-profile on UWE Kaba master Suite, with thumb-turns fitted to the non-secure side off all lockable internal doors.

PVCU external doors must be avoided. Where doors are fully glazed, the door is to have a mid-rail to resist twisting and reduce subsequent re-glazing costs. The rail at the door head is to have a minimum depth of 150mm.

Doors must not have weather bars as they create a barrier to wheelchairs, trolleys etc. and can be a trip hazard.

The factory applied colour to steel or aluminium doors is to be resistant to fading, this particularly applies to the UWE red.

5.7.6 External Finishes

Full details of the specification of all external materials must be provided from a fire safety perspective.

5.7.6.1 Cladding

Cladding to be lightweight with high thermal performance, good aesthetic appearance and fire resistance. The chosen finish should mitigate solar gain and consideration should be given to the careful use of colours.

The cladding system is to be integral with the glazing system with a minimum 40-year lifespan. The system is to be suitable for exposed conditions with stainless steel fixings.

Silicone is only to be used as a secondary, and never the primary, form of sealant.

To facilitate construction and replacement, cladding panels must be in unit sizes to allow easy handling using readily available plant/equipment and trade skills. The need for a crane during subsequent replacement of any parts should be avoided wherever possible. If a designer believes (on balancing the competing design considerations) large panels are the best design solution, it must be discussed with the Principal Designer and recorded in the 'design risk register'. The methodology must be included in the access and maintenance strategy within the health and safety file.

The design of the system should consider independent removal of individual panels to allow for maintenance and replacement of damage and insertion of additional openings for new windows etc., or to allow working access for future refurbishments of upper floors.

If may be foreseeable that during the life of the building, high level access will be required on the external façade of a clad building. An access and maintenance strategy and design risk evaluation (contained within the 'design risk register') shall confirm what access is required and what access equipment is to be used.

If timber cladding is to be used, designers must consider the flammability of the cladding, proximity of adjacent buildings and ensure designs and specifications limit the risk or extent of loss due to fire. BS9999 offers further information about the management of the fire risk posed by timber cladding.

5.7.6.2 Curtain Walling

Curtain walling to be of good aesthetic appearance with passive measures to reduce solar gain if necessary (such as brise soleil, overhangs) and specialist glazing. Transoms and mullions to give clear sight lines and be integral to system used.

The design should comply with the recommendations of the Centre for Window and Cladding Technology (CWCT) 'Standard for systemised building envelopes.' with regard to:

- Internal and external environment
- Air permeability
- Thermal performance
- Access and safety
- Design life

5.7.6.3 Render

Render to be to current British Standards and be fully bonded to substrate with a good appearance and colours to be sympathetic to surroundings. The render is to be self-coloured. The surface is not to attract dirt and debris and is to be easily cleanable with low pressure water.

Detailing of adjacent cills, capping, flashings etc., to prevent moisture penetration. Roof overhangs to be of sufficient dimensions to avoid "drip" staining.

Where external wall insulation is to be utilised the protective render is to be self-coloured, sufficiently robust to resist light impact damage and when damage has occurred, easily repaired without the need for specialist equipment or expertise. In the long term, the system should allow over painting.

5.7.7 Rainwater Goods

UWE prefers the use of cast aluminium or iron rainwater goods. If, on balancing different design considerations, plastic is preferred, high density polyethylene (HDPE) is preferred over PVC.

5.8 Fire Stopping

Refer to Design Specification Chapter 3 for full details on the UWE Fire Strategy and all other fire related requirements, including the **GOLDEN THREAD**.
All specifications or other designs for fire stopping around linear joint seals, service penetrations and small cavities must conform to the current editions of:

- Section 10 of Approved Document B of the Building Regulations.
- The Association for Specialist Fire Protection (ASFP) Red Book Fire Stopping: Penetration Seals for the Construction Industry.
- ASFP Red Book Fire-stopping: Linear joint seals, penetration seals and cavity barriers
- ASFP Technical Guidance Document TGD 17: Code of practice for the installation and inspection of fire stopping systems in buildings.
- ASFP On-site guide to installing fire-stopping.

These documents set out what fire-stopping solutions can be considered for different applications and matters to consider during installation. Fire stopping must be an integral design consideration, rather than an afterthought, to ensure that it is aesthetically in keeping/co-ordinated with the fabric and mechanical designs.

UWE expects early consideration of fire-stopping options that are flexible and adaptable to changing infrastructure demands without compromising reliability and protection against fire and smoke. The use of flexible, modular, and adaptable fire-stopping products that can easily accommodate the requirement to add and remove electrical and data cables, as well as small pipes, must be considered. Any product must be compatible and certified for use with the Quelfire or Rockwool products. One example only, is LeGrand EZ-Path product is certified for use with Rockwool Fire batt.

Only competent third-party installers are to be used for fitting only third-party accredited and certified fire stopping products. Principal Contractors are responsible for ensuring the competency of fire stopping installers whom they appoint and should undertake suitable monitoring of work during the construction phase. Evidence of third-party accreditation will be required at handover and may be requested at any time during the works.

UWE standardise on certified approved fire stopping products as supplied only by Quelfire or Rockwool. These products cannot be mixed in the same location. No expanding PU foam of any description is to be used for the purposes of firestopping, regardless of any purported fire rating properties. Other firestopping manufacturers may be considered to suit applications that have not been subject to testing by either Rockwool or Quelfire. Any such details must be submitted to UWE for acceptance **prior** to installation and a derogation agreed. In extreme circumstances it might be necessary to accept an Engineering Judgement from the manufacturer and/or suitably qualified fire engineer.

All fire seals shall be labelled, in accordance with TGD 17, using a label or plate affixed to the seal or adjacent supporting construction. This shall contain the seal number, fire resistance period, and installer company details including name of operative and date of installation.
Seal number should use the code CAMPUS/BUILDING CODE/FLOOR/ROOM NUMBER/UNIQUE IDENTIFIER (1, 2, 3 etc.).

All the label/tag information shall be supplied in an excel spreadsheet using the same headings as the label/tag. Photographs of each seal shall be inserted in a final column. If the project is being modelled in BIM, alternative arrangements can be agreed as part of the BIM execution plan.

The location of fire stops must be shown on the as-built drawings, detailing the seal number and thus enabling UWE to cross refer to the excel spreadsheet and undertake routine inspections.
UWE require that traditional methods of construction, such as block or plasterboard partition, are used to construct fire compartment walls. This instruction is mainly aimed at instances where there is a temptation to 'build' partitions from fire batt. Using fire batt as a construction method of construction is not allowed. Fire batt can only be used to close penetrations within traditionally constructed walls.
Here is an example of an accepted form of construction, where Quelfire products and fire collars are used within a framed plasterboard partition.

5.9 Internal Finishes

5.9.1 General Provision

- Robust durable finishes appropriate to each functional space.
- For renovation projects, consider the building's character and existing finishes. All material patches should blend as closely as possible. Some buildings on campus have an existing palette that must be matched. Coordinate with the UWE PM.
- All specified materials must demonstrate suitability for use in an institutional setting, with similar regularity of cleaning and maintenance.
- Colour-through homogeneous materials are preferred.
- Avoid material(s) that require routine sealing or significant specialized maintenance.
- O&M documents must clearly identify and note all finishes, including extent of coverage.
- Stencil fire rating above ceiling at all fire-rated walls, in 150mm high letters at 6m centers.
- All finishes must complete curing & drying (off-gassing) prior to Substantial Completion

5.9.2 Internal Walls

Internal walls shall be designed and constructed so that they provide a secure and stable partition between areas and spaces throughout the campus. The type and nature of any internal wall will have to be discussed and agreed by UWE Estates prior to construction, and this will be based on the general location, use of the room / area and the possible need for future flexibility.

Where block work is to be used, blocks should not weigh more than 20kg to reduce manual handling risks during construction or subsequent alterations. A risk evaluation (contained within the 'design risk register') is required if a designer wishes to specify blocks in excess of this weight.

Consideration to be given when constructing new stud partitions to incorporate additional support battens for the UWE Toprail support system, or radiators etc. When constructing corridor walls, fire resistance, durability, robustness, and good sound resistance is essential. If masonry corridor walls cannot be provided (it is the UWE preference that corridor walls are masonry), 9.5 mm plywood can be included behind the plasterboard to provide added resistance against penetration damage.

Consideration to be given for the use of Class 0 paints in escape routes. Class 0 Paint is an additional level of protection for walls or ceilings where limited combustibility is required in high-risk areas, such as escape routes. To comply with Class O materials must have a Class 1 Surface Spread of Flame and low fire propagation index, in accordance with BS 476 Part 6.

If half-height internal walls are used (typically used to demark zones or functional areas in robotic or engineering buildings), they should either be short enough that someone in a wheelchair can look over or vision panels etc. should be positioned at appropriate points.

Reference Design Specification Chapter 8 for the Provision of Digital Displays.

5.9.3 Internal Doors

Fire Door Assemblies are not to be installed. Certified Door sets are to be installed. Where existing door assemblies, and/or existing and new door sets form part of a fire separating element, they must fully comply with the requirements of BE EN 1634-1, BS EN 1634-3 and BS 9999 as applicable. Fire door sets must also be CE/UKCA marked, where applicable. A fire compartment may fail if a fire door set is installed into a surrounding element that is not proven by test to provide the required period of fire resistance. All works must consider the surrounding fabric elements before installing any new fire door sets, including over panels, etc.
All fire doors and frames are to be manufactured and installed as a single door set and appropriately certified before hand over.

All fire doors must allow integral devices for other systems to be fitted to them without compromising warranty or door integrity i.e. fitting access control devices, auto openers, flush bolts, etc.

All Fire Doors are to be fitted by installers registered with a UKAS accredited third party fire door installation certification body such as FDIS, BM Trada, etc.

UWE aims to minimise the number of automated doors to an absolute minimum, and only install hold-open devices where necessary. Where required, corridor and main circulation doors are to have hold open devices to BS EN 1155, interfaced with the fire alarm. No closer shall incorporate a hold open device unless it is an electronically powered device in accordance with EN 1155.
'Dorgard' door hold open devices are not to be used.

The maximum opening force for doors on accessible routes is 30 Newtons (N) between 0 and 30 degrees and 22.5 N between 30 and 60 degrees. Cam action closers are preferred over rack and pinion 'projecting arm' closers as they usually achieve lower opening forces.

Door closures should be deliberately flexible to allow the closing speed to be suitable for the environment in which it operates. Guidance in BS1154 suggests a smooth closure from 90 degrees to fully closed within a time of between 3 and 7 seconds.
Due to their low closing movements, door closers size 1 and 2 are not suitable for use on fire doors. Door closers with an adjustable closing force shall be capable of adjustment to at least power size 3 to BS EN 1154. The power size shall also be specified to suit the mass of the door.

Door gaps shall be in accordance with manufacturers installation instructions but will normally not exceed 3mm ±1mm at the top and sides and 10mm at the threshold. Where cold smoke leakage is a requirement (usually identified as S or Sa on the door schedule), threshold gaps shall not exceed 3mm at any point. The use of a proprietary CE marked drop seal might be appropriate in these circumstances. Always check the door manufacturers certification.

Doors must not have weather bars. They create a barrier to wheelchairs, trolleys etc. and can be a trip hazard.
Timber doors are to be self-finished to negate the need for subsequent redecorating. The head rail is to have a minimum depth of 150mm.

All fire door signage shall comply with BS 5499-10: 2014. Appropriate signage is determined by door location, use and whether it is being held-open.
Fittings & ironmongery are to be of a high-quality finish, robust stainless steel.

Where doors (or gates/shutters etc.) are powered, they must 'fail safe'. The electrical design Specification provides details of the required interface with the fire alarm system.

5.9.3.1 Door Locks

Physical door locks are not permitted on any emergency escape routes. Break glass tubes are not permitted. Maglocks should be installed for security, or thumb-turn devices.

Locks are to be profile to fit UWE Kaba 20 cylinders, with thumb-turns fitted to the non-secure side off all lockable internal doors.
Plant Room doors, riser doors, service doors etc. must all have UWE Estates key suite 1513 fitted.
Lift Motor room doors and HV Electrical doors must have specific Estates key, to be dictated by Estates Electrical Engineer.

Reference section 5.9.5 for requirements on physical locks and access control.

5.9.4 Plasterboard

- Plasterboard must not be used on ceilings without UWE's express permission (as it has historically concealed pipework etc.)
- If it is permitted, adequate access provisions shall be made.
- Where pipes and cables are boxed in access must be provided.
- Plasterboard should meet WRAP requirement for recycled content.
- Plasterboard wall linings are not deemed suitable for high trafficked locations (i.e corridors), communal areas (i.e. social spaces) or student accommodation. Plasterboard wall linings should be assessed for suitability, but restricted to teaching, learning or office areas, unless otherwise authorized by UWE Estates.
- Consideration should be made for ply-backed detailing or alternatively the use of wallboard.
- Wet areas and/or tile backer board:
    i. Use cement backer board for tile.
    ii. Paper-faced moisture resistant gypsum board panels are not permitted.

5.9.5 Tiles

5.9.5.1 Floor Tiles

- Cross-fall finished floor to floor drains.
- Maintain adequate substrate to prevent lifting of tiles due to thermal dynamic movement by hidden services.
- Glazed or polished tiles are prohibited.

5.9.5.2 Wall Tiles

- Colour contrasts to comply with BS 8300 (see visual contrast, elsewhere).
- Ceramic floor and wall tiles should not be used in wet areas (including kitchens, laundries and academic areas requiring high levels of hygiene). Instead, UWE prefers the use of vinyl safety flooring and flexible vinyl systems. The solution can also include a vinyl ceiling finish (see below).

5.9.6 Suspended Ceilings

- Ceilings should be designed to be easily accessible for maintenance and other access requirements, such as future technology installations. The depth of void must be adequate to accommodate integrated light fittings and the layout of the grid must align with M&E design.
- Ceilings within a wet, humid or hygienic environment including areas that require regular cleaning will have a product selected to suit the conditions. This can include interlocking vinyl planks.
- Tile size (unless planks) generally will be 600 x 600 with painted perimeter shadow batten.

5.9.6.1 Voids created by suspended ceilings.

The void created by a suspended ceiling should be 600mm minimum deep under flat structural soffits in order to accommodate services. This distance can be reduced depending on the nature of services with the void: Mechanical and electrical designs must be co-ordinated with the fabric/structural design to inform these decisions.

5.9.7 Flooring

- UWE can provide approved flooring systems and products for specific locations and uses.
- In general, flooring (both internal and external) shall be non-slip (even when wet).
- Floor tiles must be of a suitable size so as NOT to introduce manual handling issues for installation, maintenance, and replacement Contractors.
- Flooring must comply with general provisions in BS8300.
- Flooring shall not "turn up" the wall more than 150mm without a colour change.
- Building entrance: Primary & secondary walk off barrier matting with metal trim as applicable.
- Lift floors: Rubber tiles, classified under EN 685 for heavy use (standards 23, 32 and 41).
- Wet laboratories: Use chemical resistant flooring (also see comments in 'specialist areas', below).
- Stair Treads & Risers: Colour contrasts to comply with current guidance.

5.9.7.1 Specialist areas

Due to the diverse range of activities undertaken at UWE, there will inevitably be circumstances when standard flooring solutions are inappropriate. Examples: In one workshop there was the potential for freshly welded metal or droplets of molten metal to come into contact with the floor. Potentially, some substances may be handled which require or prohibit the use of very specific floor finishes.

The following UWE project processes will help the team to arrive at a considered and suitable solution:

- The project brief will establish anticipated teaching activities. The implications for design and specification must be established through discussion (e.g. the weight, temperature or physio-chemical properties of materials or substances etc. that may come into contact with the floor).
- Flooring solutions should be identified that meet the demands/constraints.
- Technical data and samples of bespoke products should be obtained and discussed with the client and cleaning services. The College may need to adopt specific management arrangements for the floor, leading to changes in risk assessments or standard operating procedures.
- Potentially, there may be a mixture of bespoke floor finishes through a technical area. The reasoning behind the various selections may be lost over time and eventually activities may change, meaning that the chosen floor surfaces become inappropriate. Handover documentation should explain why the various, bespoke floor surfaces were chosen. This might be conveyed in a simple, annotated plan included in the O&M information.

The HSE slip assessment tool (http://www.hse.gov.uk/slips/sat/index.htm) should be used if there is doubt about the ability of a bespoke product to reasonably prevent slips and provides information that can help influence cleaning regimes or College operating procedures.

5.9.7.2 Raised floors

No raised floors at UWE must be classified as light under the MOB PF2 PS standard (or BSEN 12825 Class 1 and 2). The majority of office and teaching spaces will be MOB PF2 PS medium standard (or BSEN 12825 Class 3 and above). Circulation spaces may need to be MOB PF2 PS heavy standard (or raised floors may be inappropriate) depending on the anticipated loads. See 'imposed loads and performance' earlier. Any raised floor should be a minimum distance of 250mm from floor finish to structural floor to allow for services.

5.9.7.3 Prohibited flooring materials

- Specialty flooring: bamboo, cork and laminate.
- Wood flooring, except at gymnasiums and certain other specialised functions.
- Masonry flooring: Not permitted if it has significant fill and/or requires routine sealing or significant specialized maintenance.

5.9.7.4 Carpeting

For offices, circulation spaces and lecture rooms carpet tiles are the preferred option.

- Any existing carpeting removed for renovation must be recycled where possible. Justification must be provided for non-compliance.
- Construction: Solution dyed, bleach proof nylon construction. The use of polypropylene pile carpet is to be avoided.
- Minimum manufacturer's warranty for wear, edge ravel, tuft bind, delamination, and static control:
    - Barrier matting: 5 years
    - Offices, teaching rooms and other areas: 10 years.

5.9.8 Painting

- The UWE palette of colours shall be used.
- UWE will consider the use of water-based undercoat and gloss finishes where appropriate.

5.9.8.1 Teaching Walls

In teaching spaces, teaching walls (i.e. the walls on which images will be projected etc.) must be 00NN 16/000 – Grey. This helps to accentuate the screen and is of great benefit to students with certain cognitive and visual impairments.

5.9.9 Vision Access/visual contrasts

- The need for contrasting colours between floors and walls and doors; stair treads and risers; doors and handles; walls with switches/sockets etc. is well established.
- While the UWE standard specifications support effective contrast, it is incumbent on designers to review colour contrast of adjoining materials and seek advice if in doubt.
- Busy, highly patterned surfaces to be avoided.
- Columns can be at risk of 'blending in' to the background and may need manifestations to ensure they are visually distinct.

5.9.10 Acoustics

- Provide appropriate acoustic absorbing surfaces to teaching and meeting spaces and to reception, refectory, assembly and sports/leisure areas where there are hard surfaces that cause reverberation issues.
- Ensure adequate sound resistance of structure for acoustic separation, particularly between teaching spaces, interview rooms, residential accommodation, and performance areas.

- **For student accommodation:**
- Approved Document Part E: Resistance to the Passage of Sound

- British Standard (BS) 8233:2014 Guidance on sound insulation and noise reduction for buildings
- BS 4142:2014 Methods for rating and assessing commercial and industrial sound.
- **For other space types:**
- Building Bulletin 93: Acoustic Design of Schools
- British Council for Offices Guide to Specification 2014
- British Standard (BS) 8233:2014 Guidance on sound insulation and noise reduction for buildings
- BS 4142:2014 Methods for rating and assessing commercial and industrial sound.

5.9.11 Fixtures and Fittings

- Notice boards located within corridors or escape routes are to be enclosed.
- Specialist fixtures and fittings for science laboratories, computer laboratories, engineering workshops etc. will be specified separately according to building/room use. However, designers are invited to bring their expertise forward and suggest solutions.

5.10 Provision for storage, deliveries and movement of materials

Through consultation with stakeholders, design teams must establish the storage and delivery requirements. Lack of storage is a frequent source of frustration. Different faculties and services have different requirements. In some cases, storage (e.g. for hazardous substances) must be secure and have a range of other controls and precautions (e.g. alarms, general or forced ventilation etc.).

In relation to deliveries, the access and maintenance strategy should set out where and how materials will be delivered to the building. Design teams will need to consider:

- Catering supplies
- Teaching materials
- Stationery supplies and office equipment (including desks and photocopiers)
- Materials required for routine maintenance and life cycle redecoration/refurbishment.

Such considerations are likely to inform the size of lifts and specification of doors (such as double leaf or leaf-and-a-half) especially into plant areas, on main access routes etc.

5.11 Catering design

An attractive, varied and efficient catering experience supports UWE's overarching priorities, Strategy 2030 and other strategic policies. Specifically, it promotes, among other things, a positive student experience, the wellbeing of staff and students, inclusivity by meeting varying dietary needs and requirements, and Value for money (e.g. through more efficient services or by designing catering facilities that can be changed to respond quickly and cheaply to changing food trends).

Clear Way Finding is required to signpost designated catering areas.

It is critical that Hospitality and Catering are engaged and engaged early enough to provide a critical input into design. Hospitality and Catering will assess catering needs for the new or refurbished space, ensuring this fits into the overarching catering strategy to include KPI's of the sustainable food plan. Then a specialist catering design team can prepare more detailed specifications.
The project brief, and budget should clarify who is responsible for providing plates, cutlery, trays, cooking utensils etc.

5.11.1 Production Kitchens

Production kitchens are significantly larger and more complex than deli / café/ bar and vending operations. They are busy spaces with a diverse array of catering equipment and activities. Much more detailed analysis will be required to determine what represents 'adequate' storage or washing facilities, for example. There is a need for very high standards of co-ordination between mechanical and electrical services, incorporation of numerous safety devices (e.g. emergency cut off devices) and liaison with other UWE stakeholders (e.g. the UWE Fire Advisor).
IT must be provided, such as connections for EPOS (electronic point of sale), network points, Wi-Fi, telephones, printers, etc.

Kitchens should be capable of accommodating duplicated appliances to cater for specific dietary requirements.

5.11.2 Deli/Café/Bar Style Operation

Considerations must be given to the general layout, room specifications and service style.
Mechanical and Electrical services must include for waste streams, such as grease traps and filter replacement / disposal.
IT and phone lines, such as connections for EPOS (electronic point of sale), PDQ (processing data quickly), network points, Wi-Fi, telephones, printers, etc.
General Service Requirements, including but not limited to segregated waste streams for food / liquids / variety of recyclables / landfill / etc.
Finishes, for aesthetic appeal as well as resilient to robust and regular cleaning, etc.

The design of a modern retail Deli/Cafe catering outlet should only be undertaken by a specialist catering Design Company with experience in delivering a "Turnkey" package, in coordination with the UWE Hospitality Team, to ensure a full understanding of the commercial aspects and technical issues demanded from the proposed outlet.

The Outlets should be so designed to create a modern bright space with the emphasis on a de-skilled or semi-skilled food production, and able to offer a range of quality light meals, snacks, sandwiches, and beverages. Consideration to design if location to be licensed for the sale of alcohol.

5.11.3 General Layout and Room Specifications

The operation will ideally be a self-sufficient unit but could be partly supplied via a larger local central catering operation.

Stores for back up stock would be required as will modular refrigeration & freezer units. Ventilated dry storage should be provided with adequate shelving space for holding stock equivalent to 30 days.

Modular cold storage units would ideally be divided into three areas, High risk storage, low risk storage and freezer storage. This facilitates the implementation of the food handling elements of the food safety act.

Depending on style an area would also be required for the Chef / Manager to receive goods and to conduct cashing up. This would normally be sited close to the entry point for goods.

There will only be a limited use of crockery with reusable or closed-loop disposables mainly being used. A dishwasher will be required for the washing of crockery and utensils, and this should be sited within an area away from food preparation areas.

This operation will produce waste and therefore, consideration should be given to separating food waste from waste that can be recycled.

Waste areas should be identified as under counter and external recyclable waste bins. External enclosed bin areas should be considered within the design or have a holding facility away from food preparation areas whereby waste can be stored prior to being taken to main waste storage areas.

A separate lockable COSHH cupboard with shelving and Belfast bucket sinks should be provided for cleaning and chemicals.

5.11.4 Kitchen Design

The operation is dependent upon a minimum of food being prepared on site and therefore the space required is relevant to the operation. However, sufficient space should be given to produce food in a safe and organised manner maintaining separate areas for high and low risk food preparation.

The operation should allow raw and cooked foods to be prepared in separate areas, having dedicated refrigeration, sinks and prep benches for those areas.

Cooking equipment should be adequate for use, with the extra ability to meet demands for increased business. Low intensity food production methods are advised for Deli/Cafe/Bar style food

operation refrigeration and oven and frying equipment to be selected for purpose of design. Extraction fan to be fit for purpose of selected equipment.
A balance of equipment power requirements should be achieved, and the UWE Decarbonisation Strategy must be followed with consideration to gas versus electrical cooking equipment. Additional electrical power to be available for any future additional equipment needed.

Separate sinks are required for food use and cleaning use. Adequate hand wash sinks are required. Sinks to be accessible to users with reduced dexterity.

The catering environment to be temperature controlled with adequate fresh air make up and if feasible adequate natural light.

All finishes within the service area should be of an impervious nature and cleanable with the ability to be regularly sanitized.

The position of pest control measures will need to be discussed/agreed with the current contractor and considered in the design.

The potential need for duplicated appliances to cater for specific dietary requirements must be established early on: This will have significant implications for space requirements, as well as services.

5.11.5 Service Style

Operation is relatively low skilled with the emphasis being placed upon low intensity food production.
The length of the main service counter would be dependent upon the design space and offer, with a back counter.

Space should be given to chilled, ambient, hot, and retail space for grab and go.

The design must consider the flow of customers to prevent bottlenecks and queuing issues. This may affect the type of coffee machines utilised which could be self-service, barista style or bean to cup.

Consideration shall be given to the careful management of staffing levels required to operate the food service points. Staff migrate between counters during quieter periods, as they are adequately trained in all areas.

Provision must be made for menu designs, specific to each counter. Incorporated logos may be required. These menus could be on digital menu screens, boards hanging from the ceiling that are interchangeable, be placed on back walls or, if the design asks for it, on floor or counter stands.

The food service counters should include:

- Limited hot section, Chilled Deli, Salad section, and Hot Snacks
- Grab and go, with easy access to tills for speed of service to include cold drinks, sandwiches, and boxed salads etc.
- Quality coffee and hot beverage offer on back or front counter.
- Each area of the counter outlet will serve and display from either hot (dry heated solid tops) or cold (chilled self-selection and served) units. This could be of a mobile nature for use elsewhere or fixed as part of the shop fitting.
- Space on the counter and their approaches should provide for the merchandising of trading up items. Each outlet will require power and data connections to operate POS systems and widescreen confirmation of service times and menu offerings.
- Easy access or dispense of plumbed-in, free drinking water to be available in all food service outlets.
- Microwaves and Hot Water points for customer use should be considered in designated locations.

5.11.6 Finishes

Consideration should be taken in applying the selection of kitchen finishes in order to ensure compliance with health and safety and the food safety act.

- Ceramic floor and wall tiles are not permitted.
- Ceiling finishes should have a plastic faced cleanable tile on a white corrosion resistant grid. A 600mm2 grid is advisable. Light fittings should be enclosed vapour proof fittings with diffusers fitted in to the ceiling grid.
- Floors should be anti-slip vinyl or quartz screed with 120-150mm coved edges.
- Wall finishes should be of a cleanable and impervious nature vinyl sheeting with an integral biocide is advised.
- Doors should be manufactured with cleanable laminate surfaces.
- All paint surfaces should be either low VOC Matt or eggshell.
- Food server counters should be manufactured in stainless steel with decorative polymer counter tops or granite and have decorative laminates to the front facing elevations. Any joins to be finished in impervious materials that are suitable for the area.
- Impulse space should be designed into the counter along with an element of retail.
- Back counters should be manufactured in stainless steel with stainless steel work surfaces.

5.11.7 Seating area

- Social spaces should have a variety of seating which would suit the varied dining styles offered.
- The mix of seating ideally would include fixed seating, breakfast bars, soft seating areas, and wheelchair / limited mobility accessible areas and seating.
- The colour scheme should be so designed as to create a bright and airy environment with the use of neutral tones accented with stronger feature colours.

- Flooring to be cleanable and possibly include some carpeted areas where soft seating is present. Consult with UWE Cleaning Services before specifying.
- The use of audio-visual facilities should be utilised within the space for information purposes, therefore data cables would be required in those areas.
- Electrical sockets and USB ports should be supplied for customer charging equipment to at least a third of the tables.
- The seating area shall be designed so that it can be used flexibly, such as a social or breakout area, and may need televisions, marketing screens etc. These requirements are to be established in the initial brief, needing power, data etc.

5.11.8 Vending Operation

5.11.8.1 General

Vending can be used to capture sales in areas of significant footfall or designed to provide an additional out of hours service to back up retail catering operations.

It can be used to provide a service in remotely located areas away from the main Catering operations.
Vending machines have changed significantly in recent years and can be used to supply a range of hot and cold food and drinks.
There may need to be a potable water supply, small power, and drainage. New beverage machines are 16Amp, for example.
Include data points and Wi-Fi boosters for futureproofing.

5.11.8.2 Design

The design of a retail Vending Operation should only be undertaken by a specialist in Supplying Vending or a catering design company with experience in delivering such a service. This ensures that the design is client based with a full understanding of the commercial aspects and technical issues demanded from the proposed outlet. The Outlets should be so designed to create a discreet vending operation which is carefully sited and fits well within a given social space.

A Vending operation will require the use of a remote storage facility sufficiently large enough to hold back up stock particularly where the supply of chilled drinks are required through vending. Space is also required for storage of hot beverage products and drinks cups.

It may be that chilled back up space is required where sandwiches and chilled snacks are held in situations where the vending machines are stocked more than once per day.

The stores should be adequately lit and well ventilated. Dry storage should be provided with adequate space for holding stock equivalent to 3-5 days.

All stock is subject to the requirements of the Food Safety Act.
Vending produces waste and therefore, consideration should be given the provision of separating wet waste from waste that can be recycled. To this effect consider the use of waste and recycling units adjacent to the vending area. As mentioned above, drainage may need to be considered.

5.11.8.3 General Service Requirements

The University Health and Safety Team should be consulted at an early stage of the design process to ensure that the vending is not sited so to cause any restriction or hazard in public spaces and will satisfy statutory regulations.

Social spaces may be adjacent to the vending area, and consideration should be given to a variety of seating which would suit the operation.

Vending is often best placed within a shop fitted housing which can be designed and built to complement the local scheme.

Consider the use of anti-slip flooring to the area immediately in front of the vending machines due to the potential slip hazard created by spillage.

5.11.9 Tea Points

Strategic Tea points are required within office areas and will be a minimum area of 4m^2 and will consist of Vinyl flooring, overhead and under counter storage, sink with draining board, and a fridge.

A dishwasher may be required, as well as a separate cold-water dispenser (Hydration Station) and separate boiling water unit can be supplied. Combined boiling / ambient / chilled water units are not permitted.
Space must be allocated for a variety of food waste, recycling, and landfill bins. Counter-top food caddies will be required as well as under-counter bins.

6.1 Chapter 6 Mechanical Engineering

UWE adopt low carbon principles in line with UWE target to be net-zero carbon by 2030. A fundamental requirement is to design out avoidable energy requirements, particularly fossil fuels. Demand reduction takes priority over covering energy requirements through low carbon or renewable sources.
The design shall follow the principles of the energy efficiency hierarchy:-

- Reduce demand by using passive measures
- Use energy efficient equipment and controls
- Use low carbon and renewable technologies

The design shall consider implications of a changing climate. UWE use their buildings throughout the year and therefore all buildings shall be thermally modelled considering extremes of heat and cold, and future-proofed for flash floods as well as temperature.

6.1 Design Co-ordination

- Analysis of the building's façade in conjunction with the building designer and structural engineer to assess thermal performance and ultimately to increase energy efficiency.
- Liaise with all members of the design team including the building designer and structural engineer to provide an integrated building/ structural / services installation. This must include coordination of mechanical builders work requirements, plant space and significant apertures within the structure.
- Coordination is also required with the electrical services designer regarding the power and control requirements for the mechanical services.
- When trenching, coordination is expected to provide suitable and sufficient excavations to accommodate mechanical, electrical, and data requirements. A minimum 50mm data duct at 350mm depth should be provided in any trenching work.
- External Shading should be considered in conjunction with the building designer to consider the full implications including minimising the effects of unwanted heat gain to occupied space. This should be done from project inception.

Plant, System Selection and Location

- Selected to maximize operational efficiency and availability.
- To suit ambient conditions (thermal & noise) during all seasons, incorporating future-proof for climate change.
- Continuity with existing plant and manufacturers where appropriate, particularly any district heating network on site.
- Business Continuity and resilience with regard failure of main services and / or utilities.
- Consideration of maintainability and the minimisation of impact within occupied spaces
- Major plant should be located at Ground Level. If this is not achievable then approval will be required from UWE Estates Operations, along with a fully detailed Access and Maintenance Strategy.

Schedule of Statutory Notifiable Plant.

Certificates for the factory pressure testing of boilers, calorifiers and other pressure vessels must be specified at tender and provided at handover.

All Safety Pressure Relief Valves must be pre-certified and pre-tested before installation, physically tagged with all relevant and required information on site, and certification provided at handover.

Fume Cupboards will be of fire resisting construction, provided with smoke / fire detection and consideration for their own suppression system subject to fire risk assessment. In the event of a temporary loss of power the Fume Cupboards shall be capable of automatic restart

Any statutory notifiable plant under the requirements of PSSR, must be included on the register of relevant statutory equipment examined by the University's competent engineers appointed by the University's insurer.

6.2 Pumped Water and Air Circuits

Water pumped circuits should have at least 100% standby (excluding HWS secondary, where a spare pump shall be provided).
+10% to be added to all pump duties (head & flow) to make allowance for commissioning tolerances.

In every instance variable volume pumps/fans with static pressure control via the BMS shall be considered. This is important when future expansion of the installation is envisaged.
Variable speed drives should be utilised where appropriate and have differential pressure sensors rather than switches.

Local visual indication via temperature and pressure gauges should be provided in addition to BMS sensors (BMS sensors alone are insufficient).

6.3 Metering

Refer to chapter 12: Controls & Metering Standards.

6.4 General Drainage

Drainage pipework must not be routed in locations where a leak could cause a hazard, such as above electrical equipment / electrical panels, data cabinets, etc.
External drains, gutters and downpipes shall be sized to consider climate changes regarding heavy rainfall.
HDPE or Stainless Steel shall be used for drainage.

UWE prefer gravity drainage. Sewage pumping, including of condensate, must be avoided. If a pumped solution is deemed unavoidable then approval for its use must be obtained from the UWE Estates team. UWE will need detailed justification and assurances that the system offers adequate reliability and resiliency (e.g., through provision of back up pumps).

6.5 Laboratory/Industrial Waste Drainage

Vulcathene pipework shall be used for chemical drainage including laboratories and workshops.
All drain runs which will carry hazardous or radioactive substances, must be labelled accordingly.

Waste traps/catch pots must be labelled with appropriate warning signage and contained in labelled cupboards.

This list of substances cannot be put down the drain without notifying the sewerage provider, who then needs to notify the Environment Agency:

Mercury and its compounds Cadmium and its compounds Gamma-hexachlorocyclohexane Pentachlorophenol and its compounds DDT Hexachlorobenzene Hexachlorobutadiene Aldrin	Dieldrin Endrin Carbon tetrachloride Polychlorinated biphenyls Dichlorvos 1,2-dichloroethane Trichlorobenzene Atrazine Simazine	Tributyltin compounds Triphenyltin compounds Trifluralin Fenitrothion Azinphos-methyl Malathion Endosulfan Trichloroethylene (above 30kg/year) Perchloroethylene (above 30kg/year)

The use of these substances shall be avoided where possible. Where the use of one of these substances is proposed by a School or College, the designer shall inform and review the full implications with the design team and UWE School / College.

6.6 Piped Supply Systems

Distribution pipework should generally be to match the existing installation.
The use of plastic pipework is generally not accepted (excluding overflows and warning pipes etc.).

Water services pipework must not be routed in locations where a leak could cause a hazard, such as above electrical equipment / electrical panels, data cabinets, etc.

Low level copper pipework to radiators is prohibited without prior agreement with Estates.

System expansion allowance shall be made in pipework design, and not expansion bellows.

Services for open plan accommodations should be designed on a grid basis.

6.7 Heating Pipework

All heating pipework up to and including 125mm shall be installed using mild steel pipes to BS1387, heavy grade, black varnished finish.

All heating pipework 150mm and over shall be installed using carbon steel grade 430 pipes to BS3601 ERW, dimensions to BS3600 table 1, standard mill protective coating finish.

All heating cold feed and open vent pipework, and safety valve or vent cock discharge pipes, shall be installed using mild steel pipes to BS1387, heavy grade galvanised finish.
All pipework off air bottles or AAV's shall be copper to BS2871, part 1, table X or Y.

All black steel pipework up to and including 50mm shall have screwed joints to BS21 taper thread.
All black steel pipework 65mm and over shall have welded/ grooved joints or flanged joints throughout.

Joints shall not be permitted within any part of the building fabric.

Screwed fittings on black mild steel pipework, other than sockets, shall be malleable cast iron to BS6681, having ends to BS143 or BS1256, black finish manufactured by Crane Ltd.

Fittings on welded pipework shall be carbon steel grade 430 seamless, to BS1965, part 1, heavy, having bevelled ends, varnished finish.

Joints shall be provided as necessary to enable all pipework to be dismantled without cutting.
All heating pipework throughout shall be adequately thermally insulated everywhere.

6.8 Hot & Cold-Water Services

The designer is responsible for checking the suitability of all existing supplies at project inception. If record information is not available, the designer shall either survey or request and provide a brief for any surveys required. The designer if required shall contact the relevant statutory supplier to establish suitability of supply capacity.

The Designer shall formally notify the statutory supplier (Bristol Water) of new installations and alterations as per the Water Regulations. Formal approval from Bristol Water must be received prior to works starting on site and included in all handover documentation.

All water services must be designed to eliminate or minimise aerosol production and water retention. They must also be designed to be readily drained, internally inspected, and cleaned.

Prior to working on any domestic water service all tools must be suitably cleaned and chlorinated. All new fittings shall be suitably clean and chlorinated. All new pipework must be chlorinated by a competent Contractor within a 7-day period prior to use. Chlorination certificates must be provided prior to use.
All components must be cleaned and disinfected prior to installation, or the entire system completely cleaned and disinfected prior to re-instatement to service. Sampling of sentinel and representative outlets shall be taken no sooner than 48 hours later to prove efficacy of the disinfection.

The use of strainers shall be minimised to Thermostatic Mixing Vales, Thermostatic Mixing Taps and Plate Heat Exchangers, if any specialist equipment or component requires a strainer this shall be agreed with Estates during design and before installation.

All hot and cold distribution pipework, cold mains and cold tank down feeds, and hot pipes shall be located to minimise heat gains to and from their environment. Pipework shall not be

routed through hot ducts or run adjacent to heat sources, such as radiators.
Ensure the hot water pipework is installed above the cold water pipework.

All hot and cold-water pipes throughout shall be adequately thermally insulated everywhere.
All plant and distribution pipework shall be clearly labelled throughout.
No rubber fittings nor any flexible hoses are to be installed in any domestic water system.

All above ground Water Services pipework up to and including 133mm shall be installed using copper tubes Table X, uncoated or current equivalent. Flexible connections are prohibited.
Above ground Water Services pipework 159mm to 219mm shall be installed using copper tubes to temper annealed, Table 5 up to 7 bar working pressure, and Table 6 up to 17 bar working pressure.

Infrared Sensor Taps and Infrared toilet flushes are not to be fitted.

The Designer must consider the possibility of loss of the mains water supply and must include injection points if required. UWE has a Water Resilience Policy which identifies injection points for maintenance of water supply via the provision of bowsers.

Temperatures shall be recorded at all outlets and storage to prove that the system can deliver the correct temperature water within the correct time period. Disinfection, sampling, and temperature certificates shall be provided.

Where substantial modifications or new systems have been installed, an independent review of the Water Safety Plan and Risk Assessment incorporating the Legionella Risk Assessment shall be carried out and funded by the Project. The Risk Assessment shall be carried out before commissioning or sampling, and a follow-up review of the Risk Assessment shall be carried out after a short period of occupation.
Where substantial modifications or new systems have been installed, a sampling plan shall be prepared in line with BS7592 and BS8554 and submitted to the Water Safety Group and Responsible Person for approval and funded by the Project.

Water Conditioning

Water Conditioning or water softening must be considered and installed in all hot and cold water services as Bristol is a very hard water area.
UWE prefers the use of electronic water conditioners that are fitted externally to the water pipe, providing protection against limescale. See section below for preferred suppliers.

Electronic water conditioners are designed to make the scale clump together and then drop out in the bottom of the cylinder, thus making it easy to remove the scale during the cylinder annual inspection. However, many new water heaters only provide small inspection hatches which are not adequate for physically removing scale or vacuuming out deposits from all of the bottom of the cylinders. In these instances only, water softeners must be considered.

Cold Water

A mains water service with no tanked supplies should be utilised wherever possible.
If cold water storage is required it should have a minimum of two independent, fully hydraulically balanced tanks to minimise down time during times of maintenance.
To minimise the risk of water stagnation or bacteriological growth, storage capacity shall be minimised to ensure sufficient turnover.

Sectional Cold Water Storage tanks shall be designed with external assembly flanges and self-draining profiles, since this arrangement facilitates easy cleaning of internal surfaces.
Externally located cold water storage tanks shall be suitably protected from environmental conditions.
Cold water storage tanks shall be protected from the ingress of light, insects, vermin, birds, etc.
Delayed-action ball valves shall be fitted wherever possible to avoid stagnation of water.
The feed to each tank shall be fitted with a water meter to allow for confirmation of equal and uniform usage from all tanks in any configuration.

Where booster pumps are to be installed, a break cistern will be required between the mains supply pipe and the pumps, to comply with the Water Supply (Water Fittings) Regulations 1999 for backflow protection.
Control of the pump(s) should be fully automatic in operation and controlled by pressure sensors. Where two or more pumps are installed, the design flow should be achieved with one pump for resilience. Automatic control shall be provided to cyclically and sequentially control all pumps to ensure that each is regularly brought into service.

Communal drinking water should be dispensed via proprietary "Hydration Station" refrigerated units with carbon filters, bottle filling as a well as drinking facilities and gravity drains.

Combined boiling / ambient / chilled water taps shall not be installed unless agreed with Estates.

To prevent any confusion between Cat 5 and domestic pipework, Cat 5 pipework shall be clearly labelled and insulated with Isogenopac throughout.

Domestic washing machines and dishwashers must have appropriate back flow protection to current Water Regulations (nominally Cat 3).

External taps for irrigation / washdown purposes, or for window cleaning, are prohibited without prior discussion with Estates. Where unavoidable, appropriate back flow protection to current water regulations must be installed.
All outside taps and bib taps shall have Fluid Category 5 backflow protection.

RPZ non-return valves shall not be used without the approval of UWE Estates Engineer.

Scald Risk Assessment

Thermostatic Mixing Valves Type 3 (TMV's) and Taps (TMT's) are not to be fitted. Only high risk areas such as Doc M Accessible Facilities, Childcare facilities, open public Sports Facilities supported by the completion of a scald risk assessment, shall have Type 3 TMV's or TMT's fitted.
Thermostatic devices that are integral to the body of the tap/shower are preferred as it reduces the length of blended water and ensures the cold water is drawn through every time the outlet is used. A TMT is preferred to a TMV in terms of bacterial risk.

These must be fitted to be fully accessible for routine maintenance. Populations that are most vulnerable to scald risks include children, older people, people with reduced mental capacity, mobility or temperature sensitivity, and people who cannot react appropriately or quickly enough to prevent injury. All other public facing areas can have separate hot & cold taps, or mixer/blender taps installed with no integral thermostatic mixer.
No remote TMVs shall be used on water systems.

Hot Water

Where a Hot Water Return is installed, a single inline circulator pump should be installed on the return. For reasons of reliability, two pumps shall be proposed, with one pump fitted in the pipe with the second pump provided as an immediate spare within the plant room. They must not be installed in parallel as this introduces areas of stagnant water.

Central water generators should have a minimum of two generators for continuation of supply during times of maintenance. Where more than one generator is used, they shall be connected in parallel, taking care to ensure that the cold feed, the hot flow and the hot return are all fully hydraulically balanced to ensure equal flow through each.

The combined storage capacity and heater output must be sufficient to ensure that the flow temperature, at continuous design flow of at least 20 minutes from calorifiers or other heaters, shall not be less than 60°C. This applies to both circulating and non-circulating hot water systems. The positioning of the control and high limit thermostats, cold feed and return water connections must ensure that these temperatures are achieved.

All HWS shall be stored at 60°C and warning labels provided at all outlets where there is a risk of scalding.
Storage calorifiers should be selected and designed to be capable of raising cold water from 10°C to 65°C, within a two hour recovery period.

Temperature gauges / temperature indication are to be provided to hot water flow and hot water return to all calorifiers. Immersion sensors are to be used in preference to strap-on sensors.
Vents shall be arranged to discharge over a separate tundish with visible Type A air gap, sited at a level that takes account of the hydrostatic head of the system.

Cathodic protection from galvanic action by means of sacrificial anodes shall be provided.

Hot water return shall be routed to the base of the calorifier to ensure the full contents of the calorifier are moved. Where the return is not at the base of the calorifier then all Calorifiers shall have anti-stratification pump circuits.

All Calorifiers are to have fully accessible drain points, directly off the lowest point of each Calorifier, with minimal dead-leg, to take samples and assure full drain down.

A check valve shall be provided in the cold feed, as close to the calorifier as practicable, to prevent warm water affecting the cold water feed. The installation of such a check valve shall not be carried out in systems that use the cold feed for expansion, and a U-bend or S-bend shall be installed in the cold-feed, sufficient distance from the connection to the calorifier, so that water which is warm is not displaced (on heating up) beyond the bend and the vertical pipe rise.

Expansion vessels used on potable water supplies shall be of a flow-through type. Where pressurisation vessels are of the single-entry type, they must be fitted with appropriate flow-through valves or drain valves to facilitate flushing of the unit. Expansion vessels shall be located on the cold feed rather than on the hot water side of the system.

Surface (i.e. non-intrusive) scale-prevention plant should be provided when performing extensive works to existing central HWS generators.
New plant shall have probes mounted within the pipework.

6.9 Natural Gas

All gas services shall be in accordance with all relevant British and European Standards, IGEM Series and references, The Gas Safety (Installation and Use) Regulations 1998, this UWE Design Specification, and the UWE Gas Safety Management Policy HSP_003 and all Appendices.

Pipework is only to be installed by competent persons, keeping mechanical joints to a minimum and initial tightness tested. All external gas pipework shall be yellow, kitemarked MDPE with trace wire. All gas pipework to be clearly labelled GAS.

Gas installation line diagrams for new installations and all amendments to existing must be provided. They shall be mounted on site plus a copy given to Estates at handover.

The Gas DSEAR Risk Assessment must be reviewed and updated with details of any new installation and amendment.

Gas detection systems linked to gas solenoid valves shall be provided within all boiler houses. For installations over 300KW, these shall be linked to the BMS.

Where Gas solenoid valves are provided the system must be designed to ensure they do not auto open upon power re-instatement, plus control provision should be made such that its power supply is not interrupted during UWE's regular fire alarm testing regime.

Gas pipework shall not have any joints that are above the high-level ventilation provision, and absolute minimal joints within 500mm of ignition source. Within plant rooms and enclosed spaces, gas pipework should have no joints upstream of the solenoid / isolation valve.
Adequate isolation valves and purge points shall be fitted to enable annual pipe tightness testing.

Emergency Isolation Points and gas proving systems shall be provided in all laboratories and kitchens.

Hard-wired interlock of gas supply with extract air for all main kitchens is essential.

6.10 Medical Gas/Laboratory Gas/Compressed Air

Pressurised systems, pressure vessels, pressure relief devices, etc. must all be identified on the register of relevant statutory equipment examined by the University's competent engineers appointed by the University's insurer.
In addition, Air Compressor systems must be added to the UWE Estates Risk Assessment RA_016.

6.11 Mechanical Ventilation

Ducted supply **ventilation**: Major supply AHU's (above 0.5m3/s) should have the following:

- Pre filter: panel to EU3
- Main filter: Bar to EU6

- BMS pressure sensors across both filters.

Facility for recirculation of air where possible via motorised dampers. Where full fresh air is essential, other methods of heat recovery shall be evaluated.

Air Handling Units: Packaged units must be able to be fitted with UWE BMS controls, such that the UWE BMS completely controls the AHU, with full visibility of the AHU status at the UWE BMS head-end.

Automated windows and Ventilators: Where installed, they should be complete with position indication or contacts**.**

Variable speed **drives**: Use of these drives to be assessed to maximise efficiency of the system.

Direct drives: Fan power should be of the direct drive type as opposed to belt drive.

Fire damper type: To be specified and installed for ease of annual testing, external resettable fire dampers shall be used wherever possible. The designer shall witness the operation of all fire dampers as part of their witnessing of the commissioning process.

Displacement Ventilation: Use of this principle is preferred where practical and cost effective.

Intake and discharge locations: These should be considered at an early stage in the project whilst applying good design principles and CIBSE guide B recommendations. Consideration of discharge and intake pollution must also be considered.

Where cost effective, a ground coupled fresh air supply system shall be used.

In all cases, the risk as detailed in the Water Safety Plan, including the legionella risk, of passing intake air over water should be considered and low-level air intakes should be sited to avoid any accumulation of floor washing or rain water.

Ducted supply & extract fans: Differential Pressure Switches to be mounted across all fans.

VAV supply & extract fans: These should have differential pressure sensors rather than switches.

Humidification: Humidifiers are not accepted. Approval must be sought from UWE Estates for the use of any humidification or dehumidification equipment.

Exhaust Air heat recovery: A section of appropriately sized ductwork section shall be allowed for the future retrofit of heat recovery before the external exhaust weather louvre, this applies even if the AHU's have Plate heat exchangers or thermal wheels.

6.12 Fire hydrants

The requirement and position of fire hydrants will be determined by the fire strategy. UWE has a full suite of drawings showing the existing hydrant circuit.
Fire Hydrant marker posts shall be set in concrete to anchor them into the ground. The posts shall be as manufactured by "Elite Precast Concrete" type Hydrant Post – CG305A.
The "H" signs shall be supplied by "Safety Sign Notices Ltd".

UWE insurers specify that all fire hydrant covers must be highlighted by yellow paint. This is in addition to the marking requirements in BS 750: "surface box covers shall be clearly marked by having the words "FIRE HYDRANT" in letters not less than 30 mm high, or the initials "F.H." in letters not less than 75 mm high, cast into the cover." UWE requires the use of "FIRE HYDRANT", rather than "F.H." unless space constraints prevent this.

All hydrants must be installed to allow fully accessible maintenance.
Handover documentation for each hydrant from the Contractor shall include:

- Certificate of Conformity in line with BS9990.
- Flow test in Litres per minute
- Pressure test in BAR
- Signage information
- Pit and cover information
- Depth of valve

6.13 Mechanical Heating/Cooling/ Refrigeration Systems

Heating Season (air temperature)

Winter ambient: - 5.5°C db/100% RH
100% outside air ventilation ambient: -7.0°C db/100% RH
Allowances for intermittent heating: as per CIBSE guides.

Cooling Season (air temperature)

Summer ambient: 28°C db/20°C wb
Summer ambient (heat-rejection plant): 30°C db/21°C wb
Mechanical cooling shall only be considered by UWE Estates once the use of natural cooling has been fully considered in accordance with TM52. TM52 shall also be used to establish the set point of any mechanical cooling system utilised.

Heating

Flow and Return Wet System Temperatures:
Optimum flow and return temperatures to achieve peak efficiency shall be selected dependant on the heat source. Generally, the flow temperature shall be kept as low as possible, with the greatest delta T across the heat emitter, if an existing heating source is used the flow shall be no higher than 60^0C.

Heat source: Low or zero carbon heating sources shall be used. Fossil Fuel heat sources shall not be used. An assessment should include consideration of connecting to the proposed district heating network at Frenchay Campus, and any other known, existing or, proposed district heating systems in the proximity to the specific site whether UWE-owned or by another.

Supply Water for Wet System: Mikrofill units meeting Category 5 requirements and shall be used.

Spare capacity: Except in individually served housing units, a minimum of two heat sources must be installed: 150% total nominal capacity.

Three or more heat sources: 120% total nominal capacity

Pumped circuits: Each pumped circuit must have dual pumps (i.e. run and standby). Pumps shall be specified with variable speed drives.

Design Margin: A minimum of +10% of heat out-put should be added to all terminal/(heat emitting) devices. Adequate allowance for heat loss from distribution pipework should be made.

Electrical Heater Batteries: Must be agreed in advance with UWE Estates.

Zoning: Appropriate heat zoning and controls should be defined to maximise system efficiency, and to accommodate differences in end user needs. Reference Design Specification Chapter 12 Controls.

Comfort Cooling

The refrigerant proposed shall be agreed in advance with the Estates team to comply with the F Gas Regulations taking into account phase-out and phase-down timescales. In accordance with the F Gas Regulations, the designer must carry out a formal documented Risk Assessment with regard the specified F-Gas, quantity, and location.

The limit for a refrigerant is the highest concentration allowed in the categorised space which will not result in any impairment effects or create a risk of ignition. The maximum charge that will be permitted is calculated by the category of the space into which the refrigerant could leak. The Project design team will provide these calculations of refrigerant volume by location exactly in line with BS EN 378.

The Project Design Team shall carry out a formal written Risk Assessment in compliance with DSEAR. The Risk Assessment shall assess all potential risks of the use, application, and presence of a dangerous, flammable, and/or explosive substance such as refrigerant.

Supply Water for Wet System: Mikrofill units meeting Category 5 requirements and shall be used.

The system/s shall also comply with the following:

- Cooling towers or other spray units will not be accepted.
- Number of chillers: A minimum of 2 chillers should normally be installed: nominal System total nominal capacity: 125%.
- Chillers must have dual safety valve configuration to minimise loss of refrigerant during maintenance procedures.
- Larger computer rooms which require comfort cooling will require sensible coolers selected with minimal latent cooling capacity, N+1 cooling provision shall be provided, consideration shall also be given to future expansion of the cooling requirement, a report shall be submitted to Estates for approval, detailing the level of cooling to be provided and method of calculation.
- Heat rejection of the Nominal cooling shall be considered for heat recovery to be utilised locally eg water to water heat pump.
- The standby system can be selected without heat recovery e.g. air source heat pumps.
- The standby system shall be utilised when heat recovery isn't possible e.g. overnight when the local heating or DHW may be turned off
- Reference Design Specification Chapter 12 Controls.
- Where possible, Auto-restart upon power reinstatement

The mechanical designer should ensure the details of the amount of refrigerant used and source of power supply is provided on a trafolyte label screwed to the condensing unit.

6.14 Approved Mechanical Suppliers

Heating Plant	
Boilers up to 70 kw	Worcester Bosch Andrews Baxi. Vaillant.
Boilers over 100 kw	Hamworthy, Hoval
Burners	Riello, Nuway
Radiators	Stelrad (or to match existing) Runtal / Hudevad in specifically agreed locations

Cooling Plant	
Chillers	Daikin, Airedale, Carrier, Trane
DX/VRV	Daikin, Mitsubishi
Ventilation Plant	
AHU	Dalair, Senior Moducel
Fans	Nuaire, Nicotra-Gilbert, Ziel-a-begg

TRV's	Oventrop TRV's. Model Series AV6 (TRV Body). Uni LGH (Sensing Head), Combi 4 (LSV).
Pumps / Pressurisation Units	Armstrong, Grundfos, Smedegaard, Mikrofil.
Grooved Jointing	Victaulic
Water Conditioning	Enigma
Fire Stopping	Quelfire, Rockwool
Basin Mixer Tap	Delabie Tempomix 79400015CO

Building Management System	
BMS	Schneider. (Trend)
Water Generators	
Instantaneous electric	Heatrae Sadia, Santon, Cooleraid
Direct gas fired	Lochinvar, Andrews, AO Smith
Drinking Water Dispensers	
Drinking Water Dispensers	Hydration Station units Cooleraid
Basin Deck-mounted Tap	Delabie Tempostop

7 Chapter 7 Electrical Engineering

7.2.1 Initial Survey

- Survey existing services and ascertain the implications of any new works. A condition survey may be required for works within existing areas. The designer is responsible for checking the suitability of all existing electrical, security & data at project inception.
- The contractor shall allow for advance tracing, identification and recording of all existing LV and ELV circuits that are identified during refurbishment works.
- Consideration and review of case studies and technical papers of similar applications.
- Consider budgetary and energy conservation requirements.

7.2.2 Design Co-ordination

- Liaise with all members of the design team including the building designer and structural engineer to provide an integrated building/ structural / services installation. This must include coordination of electrical contractors' work requirements, plant space and significant apertures within the structure.
- Particular attention must be paid to the end-users small power requirements.
- Coordination is required with the mechanical and any other services, designer regarding the power and control requirements for the mechanical services.
- Likewise, IT infrastructure has specific power, and energy consumptions, requirements which are discussed in this Chapter (but also see Chapter 8). There must be close co-ordination between the electrical services designer and UWE IT Engineers.

7.2.3 Initial Load Assessment

- This supports early assessment of plant space requirements for co-ordination with the building designer.

- An electrical load assessment must be calculated/obtained and ensure that the existing load can accommodate any additional expansion
- Existing load characteristics must be obtained at design stage.
- All design calculations must be provided prior to design approval by estates.

7.2.4 Plant, System Selection and Location

Selected to maximize operational efficiency and availability encompassing any energy saving requirements

7.2.5 Electrical Design Standards

All electrical specifications and designs shall comply with the current BS, CIBSE, BSRIA standards. If there are any doubts or questions relating to electrical systems or standards, the designer must discuss these with UWE Estates.

7.2.6 Stage Gate Approvals (RIBA Stages 2-6)

At every Stage, approval must be sought from the UWE Electrical Engineer before proceeding. Reference should be made to the UWE Electrical Safety Policy HSP_005 Appendix 1.

7.3 Resilience

Ethos – Reduce down time, and to allow work to be carried out in non-essential areas without disrupting critical University systems. This would enable non-essential items to be powered down temporarily (i.e. assist with carbon targets)

7.3.1 Essential & Non-Essential Supply

HV Tx > MP > SDB > DB > Final Circuit
Lighting, Small Power
HV Tx > MP > ESDB > EDB > Final Circuit

7.3.2 Essential Circuit

FAP, Access Ctrl, CCTV, BMS, Emergency Lighting, Comms Rooms, Air Conditioning within comms rooms, Refuge Systems.
College or service specific circuits should be fed via dedicated EDB to minimise any impact when any work on general estates equipment be needed. Likewise, any college specific work won't impact operations outside of the college work area.

7.4 Cabling

7.4.1 Overground

System	Standard	Extra Information
Power (<50v)		
Power (>50v)		
Data		
Fire	FP200 multi-core CWZ rated pliable fire-resistant cable (Firetuf or similar) with red low smoke fume zero halogen outer sheath. No	All cabling shall be mechanically secured using copper coated P-Clips and stainless-steel tie wraps

	cables smaller than 1.5mm2 cross section shall be used	
Audio Visual		AV cables should be mounted in basket, for ceilings Rigid containment used for risers, or use of dado trunking

7.4.2 Underground

System	Standard	Extra Information
Power (<50v)		
Power (>50v)		
Data		
Fire		

7.5 Containment

The designer shall utilise a factor +50% when sizing containment systems to allow spare capacity for future adaptations.
Particular attention must be given to the selection of cable containment used to ensure the integrity of the containment if subjected to fire.

All pre-harmonised coloured wiring shall not be reused and must be replaced with new LSFOH cable of the appropriate size and type (This may mean changing the existing cable size to ensure BS7671 compliance).

Wiring systems are supported such that they will not be liable to premature collapse in the event of a fire. To comply with Fire Safety standards, only metal containment and suitably metal cable ties shall be used.

7.5.1 Individual Wiring Methodology

7.5.1.1 Small Power

Final circuit wiring shall be wired in 6491B singles. Each final circuit cable in the distribution board shall be fitted with a propriety cable ferrule system identifying the final circuit cable reference. The cabling shall be sized in accordance with the latest edition of the IET Wiring Regulations.
Final circuits shall be installed in galvanised steel trunking and conduit within ceiling voids and enclosed in galvanised steel conduit in walls.

Where it has been agreed with the UWE Electrical Engineer that final circuits may be wired utilizing 6242B LSF cables they shall be contained within steel wire basket and in all instances secured with metallic cable ties.
In the plant and switch rooms final circuits shall be wired in 6491B LSFOH single core cables in exposed galvanised steel trunking and conduit.

Within teaching spaces and the like Marco Elite 3 compartment White dado trunking must accommodate CAT 6 data cables. Contrast inserts or contrasting dado lids are to be provided behind accessories for DDA Compliance.

All ring final circuits shall be a minimum of 4mm^2 conductor CSA.

7.5.1.2 Lighting

Internal lighting circuit cables shall not be less than 1.5 mm^2 or more than 2.5mm^2 conductor CSA. Final circuit wiring shall be LSF0H single core cable, reference 6491B, enclosed in galvanised steel trunking and conduit. The installation shall be concealed in the fabric of the building, flush down walls and recessed in ceiling voids.

Lighting circuits containing high wattage luminaries (above 150W) shall be individually designed. Cable sizes, protective devices shall be carefully calculated to suit the particular installation in these cases.

MCBs and RCBOs shall be 10A Type C with the load on each MCB limited to 5A maximum.

Luminaires are to be installed and wiring following the manufactures recommends methodology.

Above suspended ceilings, lighting control modules shall be utilised and associated flexible leads. Emergency luminaries shall be connected varied connectors to distinguish between lighting and emergency lighting luminaires. Lighting control modules shall be located in the ceiling void, adjacent to the luminaire fixed to the building structure/trunking, behind an accessible ceiling tile.

Where luminaries are fixed directly to the building soffit they shall be connected direct to the final circuit wiring with the final connections using heat resistant single core wiring from terminations in accessible conduit boxes or adaptable boxes.

7.5.1.3 Emergency Lighting

All wiring shall comply with BS5266-1.

Central battery emergency luminaire cabling shall have a minimum conductor CSA of 2.5mm2. Wiring shall be FP200 enhanced or an equivalent approved standard and sized in accordance with respective circuit loading.

Central battery emergency luminaire cabling shall be installed on separate or segregated containment exclusive for the use of emergency lighting cabling.

The use of proven metal cable fixings shall be utilised throughout. Plastic will not be acceptable.

Approved Equipment and Companies – Prysmian, Nexams

7.5.1.4 Fire Alarm

All wiring to comply with BS5839-1. Cabling must meet the FP200 enhanced standard or equivalent.

Fire alarm cabling shall be installed on separate or segregated containment exclusive for the use of fire alarm cabling.

The use of proven metal cable fixings shall be utilised throughout. Plastic will not be acceptable.

Approved Equipment and Companies – Prysmian

7.5.2 Individual Containment Methodology

General - Standard galvanised steel trunking or conduit and accessories is to be used throughout the site with heavy gauge trunking or conduit in boiler and plantrooms.

Dado Trunking - 3 compartment Marco Elite 3 white PVC dado trunking, with grey lids.

SWA Cables - Heavy duty galvanized steel cable tray and cable ladders/racks.

Data and Voice - Dedicated, medium/ heavy duty galvanized steel cable basket.

Fire Alarm - Dedicated, medium/ heavy duty galvanized steel cable tray with metallic cable ties.

Security - Dedicated, medium/ heavy duty galvanized steel cable basket.

Approved Equipment and Companies –

- Dado trunking - Marco Elite 3
- Accessories - Honeywell MK or Crabtree
- LS0H Cables - Delta Crompton, Prysmian or Draka UK

7.5.3 Feeder Pillars

Pillars are to be selected from either the Lucy Zodian Fortress or
Colour: Pine Green (RAL 6028)

7.5.4 Ducting, Underground & Overground

insert

7.5.5 Fire Stopping

Refer to Chapter 5 for full details of Fire Stopping requirements.
Electrical and Data cables are regularly added and removed across UWE. This requires reopening cable penetrations and installing fire-stopping material afterwards. Therefore, during the design stage, UWE expects early consideration of fire-stopping options that are flexible and adaptable to changing infrastructure demands without compromising reliability and protection against fire and smoke. The use of flexible, modular, and adaptable fire-stopping products that can easily accommodate the requirement to add and remove electrical and data cables must be considered. Refer to Chapter 5 for further information on these Fire Stopping products.

7.5.6 Permitting

All works, method and procedures shall be in accordance with UWE Estates Procedures and Permits. Electrical Permits to Work must be requested before any electrical works commence on site. As a general procedure, the UWE Term Contractor is used to manage isolations.

7.5.7 Network Topology

insert

7.5.8 HV, LV & Essential Supply

insert

7.5.9 Data, Fibre & Comms

insert

7.6 High Voltage (HV)

Any new substation shall be connected to the site wide HV network, connection details shall be agreed with UWE Estates prior to any works commencing.

HV switchgear panels must be built to IEC 60694 and appropriate sections of IEC 62271-200 or 62271-202 for prefabricated Sub stations.
Switchgear shall be a minimum of IP44 and selected according to site conditions.

Switch Panels shall be equipped with intelligent microprocessor protection relays and trip units offering data measuring and appropriate communication facilities.
All Ring Main Units (RMU) shall be of the Non-Extensible Type, unless specified otherwise.

Ring Main units to be provided with VIP protection relays to ensure that discrimination can be achieved. Time fused link may also be considered once full calculations have been carried out at detailed design stage. RMU's shall also be provided with a voltage presence indicating system and have a Pfisterer facility to enable phase comparisons to be carried out at the RMU.

Phase rotation shall be verified via the UWE Estates department when replacing equipment to ensure that cross phasing does not occur, and supplies are not connected to cross phases.

Each new RMU shall be provided with Earth Fault Passage Indication units.

All new transformers shall be, super / ultra-low loss, hermetically sealed. Insulating fluid shall be Model 7131. UWE's preference is towards Ultra Low Loss Amorphous Transformers.

Transformers shall be sized to ensure their most optimum performance. Each substation shall require a specialist earthing and bonding design to provide a safe environment and allow the HV and LV earth terminals to be interlinked. New main earth bars shall be required at each substation location. The design will firstly require specialist on-site measurements and survey, as well as the existing fault characteristics and HV supply substation 'hot' or 'cold' designation to be known.

The designer shall engage with a HV an earthing specialist to produce a HV earthing design for each/ all substations. The design shall show details such as the main earth bar and all sized connections and recommendations for all bonding within each substation.

All electrical switchboards shall be provided with a 1m wide carbon free rubber mat or mats having a ribbed upper surface and being of such continuous length to suit the full operating extent of each switchboard.

Where a design entails work on electrical plant within an existing substation, the designer shall include for a HV earthing specialist to produce a report on the existing HV earthing arrangements and provisions. The report and any recommendations shall be discussed with UWE Estates on how these may be implemented in a project. The Report should state parameters such as EPR to confirm whether substation is hot or Cold, Step potential, Touch Potentials and Transfer Potential.

7.7 Low Voltage (LV)

insert

Design

insert

Labelling

An asset tagging system is in place, the consultant should familiarise themselves with the UWE Asset Information Requirements Document (AIR) and ensure this is captured within the design.
All electrical switch rooms, cupboards and risers shall be identified with the room number and 'Danger Live
All accessories shall be labelled with the distribution board room number, distribution board number and circuit reference.
Details of cable sizes and type, protection device ratings, and point of origin shall be labelled on all LV switchboards, panel boards and distribution boards.
Details of Ze readings with the date of test shall be displayed at each switch board/panel board/distribution board.
All distribution boards shall have engraved labels fixed to the front of the distribution board.
Traffolyte labels shall be used to identify all circuit descriptions within each distribution board (adjacent to MCB's).
All cabling shall be identified by ferrule type cable markers on all phases, neutrals and cpc's.
All new distribution board and circuitry shall adopt UWE standard methodology for labelling.
Labelling standards to be obtained from estates team.
Warning labels showing voltage affixed to all switchboards, panel boards and distribution boards.
insert

Product Selection

insert

Lighting

Need for standards for lighting controls in student accommodation – align to SAP5 design standards with the following included:

- Presence detection in corridors
- Absence detection in rooms

7.1.1.1 Standard

insert

7.1.1.2 Emergency

insert

7.1.1.3 Controls

insert

7.1.1.4 Monitoring

insert

Distribution

Differentiation between Simple and Complex/ Critical circuits from DBs, so that simple (e.g. offices, teaching spaces) can be timer controlled from the DB level, and complex / critical circuits (e.g. labs, cleaner sockets, fridges / freezers, fire alarm systems, BMS, door control, etc) can be timer controlled from individual plug level where possible

LV Distribution Academic	Tier 1	Tier 2	Tier 3		Tier 4	
	T1 Panel Board	T2 Panel Board	T3 Non-Essential DB	T3e Essential DB	T4 Non-Essential DB	T4e Essential DB
Manufacturer	TBA	Schneider	Schneider Acti 9 Isobar P	Schneider Acti 9 Isobar P	Schneider Acti 9 Isobar P	Schneider Acti 9 Isobar P
3P DB min ways	TBA	TBA	18	12	16	4
1P DB min ways	TBA	TBA	N/A	N/A	20	12
Blanking Method	TBA	TBA	Blank Pole modules such as SEA9BP	Blank Pole modules such as SEA9BP	Blank Pole modules such as SEA9BP	Blank Pole modules such as SEA9BP
SPD	Mersen, Type 1, remote indication.	Mersen, Type 1/2, remote indication	Mersen or Schneider, Type 1/2, remote indication	Mersen or Schneider, Type 2/3, remote indication	Mersen or Schneider, Type 1/2, remote indication	Mersen or Schneider, Type 2/3, remote indication
Metering	Yes, all incoming and outgoing circuits	Yes, all sub-main circuits and secondary supplies.	Yes, Power and Lighting Split	Yes	Yes, Power and Lighting Split	Yes
Status Reporting and Monitoring	Remote Status on all ACBs and MCCBs	Remote status on all ACBs and T3e or T4e sub-main MCCBs	N/A	Instance Specific, discuss with UWE Engineer	N/A	Instance Specific, discuss with UWE Engineer

7.1.1.5 Panel

7.1.1.6 Distribution? (Bus Bars)

7.1.1.7

Supply

insert

7.1.1.8 Generators

7.1.1.9 UPS

7.1.1.10 Photovoltaics

7.1.1.11

7.8 Metering

Refer to Design Specification Chapter 12 for all metering specifications.

7.9 Small Power

insert

7.9.1 Reels

7.9.2 Floor Boxes

7.9.3 Sockets

7.9.4 Under-desk Power & Extension Cable Systems

Named Manufacturer	Incumbent Maintenance Provider	Incumbent Installer
??	**Sceptre Networking Limited** Telephone: 0845-121-0802	**Sceptre Networking Limited** Telephone: 0845-121-0802

To meet the requirements of BS6396 Electrical Systems in Office Furniture and Education Furniture, Faculties and Services must ensure that when purchasing and providing mains power extension cable systems for office furniture and IT systems that they meet this specification.
This applies to all new installations, office moves, refits and refurbishments and when assessing and processing Health & Safety workplace and DSE inspections.

7.9 Protection, Isolation & Switching

insert

7.9.1 Surge Protection

insert

7.9.2 Power Quality

insert

7.9.3 Power Factor

7.9.4 HF

7.10 Monitoring

insert

7.10.1 Earthing

insert

7.11 Lightning Protection

insert

7.12 Lifts

- General
  - A lift's location in the building shall be clearly signed.
  - Signage within lifts shall be large clear and contrasting.

- The lift shall be large enough to allow wheelchairs to turn around and/or have space for a carer to share the lift.

Lift Design

- Lifts are to be designed to comply with:
  - The Lift Regulations 1997
  - Part M of the Building Regulations.
  - All relevant parts of BS EN 81:2022 and in particular:
    - Doors to be resistant to fire for 120 minutes and comply with EN81-58:2018 Safety rules for the construction and installation of lifts - Examination and tests - Part 58: Landing doors fire resistance test.
    - Where Vandal resistance has been stipulated or environment indicates it is required: EN81-71:2018 Safety rules for the construction and installation of lifts - Particular applications to passenger lifts and goods passenger lifts - Part 71: Vandal resistant lifts.
  -
  - The Lifts Directive 2014/33/EU
- Consideration shall be given to the provision of more than one lift in a building to allow for repairs, maintenance and break downs.
- See CCTV section – Lift cars should include CCTV.

Fire Alarm Lift Interface

- All lifts shall be interfaced to the fire alarm system and upon activation shall bring the lift to the ground floor, park and with doors open.
- Provide an aspirating smoke detection (ASD) system at the top of each lift shaft with an accessible control panel located on the top floor. (See section)
- Careful co-ordination is to be ensured between the lift installer and fire alarm system specialist.

Evacuation Lifts

- UWE has a legal duty to ensure the evacuation of all building occupants. In all buildings with multiple levels, the provision of 'evacuation lifts' is required as part of the design.
- Evacuation lifts shall be installed as 'full evacuation lifts' to BS 9999:2017 and useable in the event of a fire.
- Where the provision of such a lift(s) is discounted the arrangements for the evacuation of people with a disability that would prevent them from evacuating the building unaided must be stated in a written risk mitigation statement.

Lift Communication

- Remote communication must be installed in all lifts in the form of an auto-dialler. All lifts shall be connected to the UWE owned/operated analogue network to enable emergency calls to the UWE Security Control Room. The line must be provided under the UWE Lift Line Contact and as such must be ordered via UWE's Unified Comms team. (see section)
- Traffic analysis reporting should be visible remotely.

Lift Controls

- Buttons and panels should be designed and positioned to be usable from a wheelchair and by persons with reduced manual dexterity and impaired vision (e.g. large buttons, with a good visual contrast between the number and the button as well as braille identification).

Commissioning

  - The testing of any new install shall be to BS8486-3:2017 Examination and test of new lifts before putting into service – Specification for means of determining compliance with BS EN 81.
- Auditory messages and visual indication must be provided to inform users of floor levels and door opening and closing.
- *Should it be determined that the refuge spaces are not available as required by EN81-20:2014, then the University would expect a derogation against 2.2 of the EHSRs of Lifts Directive 2014/33/EU to be sought from BEIS or whichever department is allocated responsibility at tender stage.
- When travel to top floor from Fire Service Access level exceeds 18000mm or the requirement for a Fire Fighter Lift has been indicated: EN81-72:2015 Safety rules for the construction and installation of lifts - Particular applications for passenger and goods passenger lifts -Part 72: Firefighters lifts

Minimum Expectations (to be read in conjunction with lift traffic analysis)

- Minimum Lift Size 630Kg 8 Persons Type 2 Access (1100w x 1400d x 2200h)
- Minimum Entrance size 900 x 2000
- Preferred size 1000Kg 13 Persons Type 3 Access (1100w x 2100d x 2200h)
- Entrance size 1000 x 2000
- For travel up to 4 floors or less than 10,000mm Lift Speed 1.0 m/s
- For travel above 4 floors or 10,000mm Lift Speed 1.6m/s
- For travels above 10 stops or 30,000mm Lift Speed 2.0m/s
- Minimum Lift Size 630Kg 8 Persons Type 2 Access (1100w x 1400d x 2200h)
- Minimum Entrance size 900 x 2000
- Preferred size 1275Kg 17 Persons Type 5 Access (1400w x 2000d x 2200h)
- Entrance size 1100 x 2100
- For travel up to 4 floors or less than 10,000mm Lift Speed 1.0 m/s
- For travel above 4 floors or 10,000mm Lift Speed 1.6m/s
- For travels above 10 stops or 30,000mm Lift Speed 2.0m/s
- All lifts to be Motor Room-less in design.
- Permanent Magnet Gear-less Motor VVVF to operate closed loop.
- Designed for 240 starts per hour
- Stopping accuracy +/- 6mm under all load conditions
- Controllers shall be located in a locked panel that shall be located on the top floor, all control equipment / panels to be **open protocol** with built in programmers not removable from site.
- All operating parameters shall be readily accessible and re-programmable by third party maintenance service provider.
- Shaft position system up to four floors tape head and monitor above four floors USP system.
- Doors to be stainless steel and have box framed architraves also in stainless steel. Door operator to be VVVF and capable of advance door opening.
- Autodiallers to be manufactured by Safeline Ltd and must be compatable with the universities safeline monitoring system.
- BREEAM Requirements
- **Traffic Analysis (Trip coun**ter)
- VVVF Drive units
- Standby Mode for controllers and indicators
- Energy efficient LED lights
- CAT6 cabling between lift car and controller included within the lift car trailing flex to allow CCTV to be connected within the car.

Approved Equipment and Companies – Consultation must be had with Estates Operations Electrical Engineer.

7.13 Hearing Loops

Analogue infrared transmission equipment should be installed to all large Lecture Theatres and at reception Counters. They should also be installed within teaching rooms and meeting spaces as appropriate. The system shall be compatible with other units installed throughout UWE.
The presence of an induction loop or infrared hearing system shall be indicated by standard symbol signage.
All equipment to be housed in a locked cabinet secured to the building fabric.
All systems are to be supplied with radio microphones.
Approved Equipment and Companies – Details can be obtained from UWE IT Services who manage the portable hearing loop devices.

7.14 Data & Fibre

For details on data and fibre see Design Specification Chapter 8.

7.15 Photovoltaics

For all PV installations:

- SolarEdge equipment/monitoring is to be used.
- New installs must be fully/correctly set up on SolarEdge portal before handover/acceptance.
- Need to include module level shut down – e.g. SolarEdge SafeDC – consult with Carbon & Energy Team for further information

7.16 Audio Visual (AV)

For details on Audio & Visual Equipment see Design Specification Chapter 8.

7.17 Arial & Antenna

insert

7.18 Radio's

insert

7.19 Deaf Alert

See Fire Alarm

7.20 Automatic Windows & Blinds

insert

7.21 Security Systems

All cabling from data outlet to security device, i.e. the patch cabling. Must be installed in it's own containment to prevent tampering or removal, especially when the patch cable exits any ceiling cable trays to the device itself. At no time should a data outlet be installed so near to a security device that it is allowing accessibility to be able to disconnect the device. Should this be unavoidable, then the outlet and the patch cable connection must be secured in a secure box.

7.22 Access Control

Named Manufacturer	Incumbent Maintenance Provider	Incumbent Installer
Assa Abloy ARX (Academic)	**KSCM Ltd** Unit 3 Trubody's Yard 121 London Road Warmley Bristol BS30 5NA Telephone: 07979-381-094	**KSCM Ltd** Unit 3 Trubody's Yard 121 London Road Warmley Bristol BS30 5NA Telephone: 07979-381-094
Salto (Accommodation)	**KSCM Ltd** Unit 3 Trubody's Yard 121 London Road Warmley Bristol BS30 5NA Telephone: 07979-381-094	**KSCM Ltd** Unit 3 Trubody's Yard 121 London Road Warmley Bristol BS30 5NA Telephone: 07979-381-094

7.22.1 Physical Security Design

There are four tiers to physical security of spaces:
Tier 4 – Protected Equipment (e.g. padlock)
Tier 3 – Magnetic Lock
Tier 2 – Mechanical (access control) wireless handles. Where infrastructure allows.
Tier 1 – Physical Lock and thumb turn.
Tier 0 – No Lock/Provision

Door Type	Access Control Notes	Normal Tier
Perimeter Entrances (Building External Doors) *This may include perimeters of ownership, like the boundary of two buildings.*	Magnetic Locks only.	Tier 3
Rooms that require restricted access to a high number of people, or for authorised people only. ***This is where key distribution would have a high administrative burden, or key holders would change frequently in short spaces of time. Postgraduate spaces, laboratories or plantrooms would be good examples.***	Ordinarily protected by electronic locks *Some justification for manual lock capability to remain, usage dependent.* *Generally, if magnetic locks fitted, then manual lock to be removed.*	Tier 2 (single doors) or Tier 3 (double doors)
General Purpose Teaching/ Meeting ***These rooms/areas should be accessible by***	n/a	Tier 0 or Tier 2 (with justification)

majority of University users, and should not be controlled by magnetic locks		
Restrooms/Kitchens ***The University doesn't want to be recording staff that take breaks in shared spaces, this may be seen as a deterrent for their use. If student access needs to be discouraged, signage should be explored first.***	n/a	Tier 0
Corridors and General areas ***Free access or movement areas.***	Ordinarily free access, Magnetic locks not required *Unless heavily justified or the entire area is restricted movement and not resulting in access control leading to access control*	Tier 1
Areas where there is a risk of theft or damage of valuable University assets. ***This may include IT Comms rooms where damage may cause huge impact to University services or public facing stationery stores where likelihood of theft is unmanageable.***	Ordinarily protected by electronic locks *(Security, ITS, Estates or Faculty)* *Some justification for manual lock capability to remain, use dependent. Generally, if access fitted, then manual lock to be removed.*	Tier 2
Storage areas with high footfall but contents still require enhanced protection ***This is where key distribution would have a high administrative burden, and access needs to be controlled for sensitivity reasons. Mailrooms, or records stores are good examples***	Ordinarily protected by electronic locks *Manual locks to be removed.*	Tier 2 (single doors) or Tier 3 (double doors)
Cleaners Cupboards ***Chemicals need to be controlled by physical keys, which are centrally monitored by TRAKKA.***	Protected by electronic locks	Tier 2

7.22.2 Magnetic Locks

A suitable maglock is to be provided for ALL operational leafs on the door system, including ¼ doors etc.
Default maglock details;

1500kg Alpro AL2400LP 12/24v
L Bracket ALAMLB2400
Z&L bracket ALAMZB2400

7.22.3 Barriers & Gates

Named Manufacturer	Incumbent Maintenance Provider	Incumbent Installer
CAME Barriers	**KSCM Ltd** Unit 3 Trubody's Yard 121 London Road Warmley Bristol BS30 5NA Telephone: 07979-381-094	**KSCM Ltd** Unit 3 Trubody's Yard 121 London Road Warmley Bristol BS30 5NA Telephone: 07979-381-094

7.23 CCTV

CCTV purpose at UWE is for the prevention and detection of crime.

Named Manufacturer	Incumbent Maintenance Provider	Incumbent Installer
Hanwha/Wise system	**KSCM Ltd** Unit 3 Trubody's Yard 121 London Road Warmley Bristol BS30 5NA Telephone: 07979-381-094	**KSCM Ltd** Unit 3 Trubody's Yard 121 London Road Warmley Bristol BS30 5NA Telephone: 07979-381-094

Document Name	Document Link
Data Protection Policy	https://www.uwe.ac.uk/-/media/uwe/documents/about/data-protection-policy.pdf
CCTV Code of Practice	Update to Surveillance Camera Code of Practice - GOV.UK (www.gov.uk)

7.23.1 CCTV Design

For CCTV installations, our incumbent installer should be approached when considering any installation design. This is so all requirements, and positioning can be achieved. The incumbent installer will co-ordinate any UWE requirements into the design.

Minimum Considerations for **All** CCTV installs:

- PoE (Power over ethernet) to be installed.
    - Any alternative derogation must be approved.

    - This allows UWE to ensure uninterrupted power on switching can be installed where required on 'key' cameras.
- 30 days storage per camera must be included as part of the project price, as this will need to be purchased alongside
- Signage survey must be undertaken of the local area, it is a legal requirement o provide signage. Signs can be requested from UWE.
- AI (Artificial intelligence) cameras must be considered for appropriate locations.

7.23.2 Internal Fixed Cameras

Internal CCTV must have justification and must be appropriate for any perceived risk within an area, installations must align to the surveillance code of practice.

1. Fixed, single/180/270/360 mounted in clear, unobstructed, maximum coverage locations to facilitate requirements, preferably at threshold of building.
2. Internal CCTV that is tasked to view external doors from in to out must be capable of viewing through any glass partitions/doors.
3. Data shall be provided within one metre of the CCTV location.

7.23.3 External Cameras

As UWE operate relative open sites, it is important to avoid "blind spots" externally.

1. AI Cameras to be included within the provision.
2. PTZ/High end zoom CCTV, flat roof building, to be mounted on swing out, weighted, maintainable arms, on the building roof areas.
3. PTZ/High end zoom CCTV, mounted on actual building envelope, to be mounted on suitable fixed bracket, maintainable arms, within reach of 12-step stepladders.
4. Fixed, single/180/270 mounted on actual building envelope, suitably high for maintenance.
5. CCTV to be mounted on buildings only. CCTV poles, masts and posts that would be located in grounds areas away from buildings are to be avoided wherever possible.
    a. CCTV poles and masts should be avoided. They present problems for maintenance, and for the required ducting and cabling/power distance problems that come with pole mounting CCTV.
6. Adequate dedicated data ducting to be provided.
   Max length 90m from relevant switch. (see data ducting specs)
7. Data and power required shall be provided within one metre left/right/above of the CCTV location, in an external IP65 type externally mounted box

7.23.4 Lift Cameras

Lift car cameras must be provided in any new installs. And must be considered in refurbishments.

No analogue or twisted pair conversions or relay boxes within lift shafts or any part of the installation will be accepted due to data loss.

7.23.5 Body Worn CCTV

The University also deploys body worn cameras for its security Personnel. This is a centrally run system (per site), that is administered by UWE Security.

Only if UWE are building a new site, with new Security staff base would any infrastructure be required.
Infrastructure is currently available at:
- Frenchay (Control)
- Bower Ashton (Control)
- Glenside (Control)
- Bush House (Arnolfini, City Campus)

Named Manufacturer	Incumbent Maintenance Provider	Incumbent Installer
Motorola	**Reliance High Tech** The Columbia Centre Station Road Bracknell Berkshire RG12 1LP Telephone: 0845-121-0802	**Reliance High Tech** The Columbia Centre Station Road Bracknell Berkshire RG12 1LP Telephone: 0845-121-0802

7.24 Intruder Alarm

Named Manufacturer	Incumbent Maintenance Provider	Incumbent Installer
Honeywell Galaxy Intruder	**Shield Fire & Security Services** Unit 6, Crown Road Warmley Bristol BS30 8JJ 0117 4286970	**Shield Fire & Security Services** Unit 6, Crown Road, Warmley, Bristol, BS30 8JJ 0117 4286970

7.25 Intercom Systems

Named Manufacturer	Incumbent Maintenance Provider	Incumbent Installer
Stenafone (on barriers)	**KSCM Ltd** Unit 3 Trubody's Yard 121 London Road Warmley Bristol BS30 5NA Telephone: 07979-381-094	**KSCM Ltd** Unit 3 Trubody's Yard 121 London Road Warmley Bristol BS30 5NA Telephone: 07979-381-094

Aiphone (in accommodation)	**KSCM Ltd** Unit 3 Trubody's Yard 121 London Road Warmley Bristol BS30 5NA Telephone: 07979-381-094	**KSCM Ltd** Unit 3 Trubody's Yard 121 London Road Warmley Bristol BS30 5NA Telephone: 07979-381-094

7.26 Panic Alarms

These are to be installed and linked back to the Control Room at Frenchay in the following areas: Receptions, Information Points & (Risk assessed) Interview Rooms.

Named Manufacturer	Incumbent Maintenance Provider	Incumbent Installer
Honeywell Galaxy	**Shield Fire & Security Services** Unit 6, Crown Road Warmley Bristol BS30 8JJ 0117 4286970	**Shield Fire & Security Services** Unit 6, Crown Road, Warmley, Bristol, BS30 8JJ 0117 4286970

7.27 Fire Detection & Alarm

Named Manufacturer	Incumbent Maintenance Provider	Incumbent Installer
Honeywell GENT	**Defensor Life Safety Systems** 15 Kingsley Street, Leicester LE2 6DY Telephone: 0116-244-8689	**Defensor Life Safety Systems** 15 Kingsley Street, Leicester LE2 6DY Telephone: 0116-244-8689

All installations must be performed by GENT approved installers. Graphics updates must be undertaken by UWE incumbent supplier.

Detection Capping or Isolation

All fire alarm isolations are to be performed by incumbent maintenance provider and will only be authorised with correct isolation permit issued by Estates.
Detection caps can be signed out from Security.
Caps must be returned daily and checked out daily.
All alterations, temporary or otherwise, must be performed by incumbent maintenance provider, so they can ensure that the UWE graphics are kept up to date.

Minimum Standard

UWE minimum standard for fire installations is full compliance to BS5839-1

- L3 Category in academic areas
    - There are additional areas specifically identified as "Critical Areas of High Risk" Please see **UWE Fire Safety Standard FSS10** for more information.
- L1 Category for sleeping accommodation.

7.28 Information and Documentation

The minimum level of information and documentation is listed below:

Item	Requirement
Zone Diagrams	Provide zoning proposals for the building and LPS1014 Certificate prior to commencement of design/ installation.
Decibel Reports	Each installation must undergo a decibel test before handover
Commissioning Certificates	Each installation or alteration to existing system must have a commissioning certificate, including reference to graphics updates. As detailed in BS 5839
Test Results	Record all the test results and present them in tabulated form and indicate on As Fitted drawings
As-Fitted Drawings	New installations and alterations to existing systems must have marked up drawings, in accordance with BS5839

7.28.1 Installation (Management) Requirements

Hardware Item	Manufacturer Data	Installation Requirements
Graphics	Literature	All devices must be available on the graphics system. And this is to be performed by incumbent maintenance supplier. The graphics must: Indicate the location of the fire
CLSS	Literature	All devices must be available on the CLSS system, to enable device management by maintenance contractor

7.28.2 Installation (Hardware) Requirements

UWE have several standard requirements to enhance the installation, these are listed below:

All devices **MUST** be fed from the correct panel. Therefore, devices must be in the correct fire zone, and the subsequent fire alarm panel.

The installer of the Fire Alarm is expected to work in conjunction with installers of periphery equipment that is interfaced. Interfaced equipment must be individually checked that they are working before handover.

Hardware Item	Manufacturer Data	Extra Installation Requirements
Fire Panel	Literature	Where possible semi-recessed installation The main panel should be located either in the reception area of a building or what is intended to be the main entrance. Repeat panels to be located in accessible position throughout the building All panels should include integral key switch to enable isolation. All loop cards shall have VIG-LPC-EN high power 800ma loop cards on all panel loops
Fire Panel – Battery Extender Boxes		The fire alarm panel shall incorporate battery extender boxes capable of supporting the system for approx. 4 days in the event of mains power failure. The standby batteries shall be mounted within, below, or next to the main Fire Panel. Equipment requirements consist of: - 1 x Fire system battery storage metal box, key locked, wall mounted. *(Part: VS-BATTBOX-72)* - 8x 21Ah Fire panel standard batteries. *(Part: 4015-602-YFR Panasonic 21Ah-12v)* - Associated battery leads for parallel connection to 48v DC GENT Fire Panel supply requirements.
Loop Cards		Loop cards shall have VIG-LPC-EN high power 800ma loop cards on all panel loops. To a maximum or no more than, 155 devices per loop, calculating device loading, to deliver the required 25% spare capacity requirement on loop milliamps, loop device numbers and the overall system design
Detection	Literature	Standard installation is white devices. Smoke detection should be provided throughout. Heat

		detection to be provided in agreed areas as follows: - Accommodation Kitchens - Detection to be provided in voids exceeding 800mm depth. Devices should always be accessible for maintenance, but where there is increased difficulty (e.g. lift shafts) self-testing devices should be deployed Use higher power V-VAD (Quad) detectors (Voice/Strobe) and Sounder beacons up to 2km max loop length All detectors should be individually identifiable with LED indicator as standard.
Manual Call Points	Literature	All MCPs should have resettable elements and a transparent hinged protective cover. All MCPs should have a standard sign installed adjacent.
Beacons (remote indicators)		Flashing beacons shall have a red lens and be EN54-23 compliant. Beacons should be located at all access points to a fire zone (internal and external including roof access points) Beacons should be located in busy areas, where noise is likely (e.g. lecture theatres, plant rooms, bars and café's. Areas where the hard of hearing may be alone should also have beacons installed (e.g. toilet facilities, or adapted accommodation areas [inc. kitchen, bedroom and en-suite areas])
Interfaces	Literature	All fire alarm system interfaces are to be installed in GENT S4 Interface Enclosures Plastic s4-34490. It is preferable to install 4 way interfaces as standard for future proofing, as opposed to single way. Both single and four way should be input/output capable. Doors located on zone boundaries will need to be fed from both zones. All access-controlled doors (mag locks, automatic

		latches etc…) will allow free exit/access to the building. Normally this means that the locks will automatically disengage upon activation of the fire alarm. On rare occasion some approved doors within high-risk area's can be exempt, however this must form part of the fire strategy and risk assessment. Entertainment venues must have interfaces, to disconnect the power to audio equipment. Entertainment venues with additional power supplies (for portable sound systems) must have interfaces to disconnect the power. E.g. 16A sockets. Ensure that an output signal is linked to the main mechanical control panel or ventilation to provide automatic shutdown or operation upon fire alarm activation. Ensure any gas and ventilation systems are interfaced into the Fire Alarm system. Interfaces for (but not limited to) systems such as smoke dampers, gas solenoid valves, CHP's etc. shall be included in consultation with M&E installers. Ensure that any sprinkler systems are interfaced into the Fire Alarm System (The fire alarm will **NOT** activate the sprinkler, the sprinkler will activate the evacuation) Automatic doors that are 'held open' must be interfaced so they close on fire activation. This is either via a Holder or Door Operator
Door Holders	Literature	For manual doors, it is acceptable to put in place door holders where there is a risk of wedges being used for example in corridor areas. But must never be used on stairwells or designated areas of safety like refuge areas.

7.28.3 Cause & Effect Requirements

Standard evacuation requirements are for full evacuation; therefore, the alarms will activate throughout the fire zone that is "in alarm".

Adjacent zones should go into a state of pre-alarm and release doors being held open and drop out magnetic locks. However, the fire alarm does not need to sound until the detection requires it.
In accommodation areas, a double knock system is in place as follows:

Location	Initial Reaction:	Double Knock Reaction:
Bedroom	Pre-alarm (Alarm activates in bedroom only)	Entire Block activation
Corridor	Alarm activates in entire Flat or House	Entire Block activation
Kitchen/Diner	Alarm activates in entire Flat or House	Entire Block activation
Landlord Area	Alarm activates in entire block	N/A
MCP Activation	Alarm activates in entire block	N/A

Any other form of evacuation must be agreed by:
a) Head of Security
b) Head of Health & Safety
c) Estates Lead

7.28 Fire Paging System (Deaf Alert)

Named Manufacturer	Incumbent Maintenance Provider	Incumbent Installer
CST **(Unit 240 Centennial Park, Centennial Avenue, Elstree, Hertfordshire, WD6 3SJ)**	**Defensor Life Safety Systems** 15 Kingsley Street, Leicester LE2 6DY Telephone: 0116-244-8689	**Defensor Life Safety Systems** 15 Kingsley Street, Leicester LE2 6DY Telephone: 0116-244-8689

Hardware Item	Manufacturer Data	Extra Installation Requirements
Paging	Literature	
Pillow Vibrators		

7.29 Door Watchers/Screamers

In Accommodation areas, door watchers are installed to stop kitchen doors being propped open by occupants. Battery powered solutions should be avoided, and these should be fitted using a dedicated power supply.

Door watchers should be fitted with a protective cage to reduce the chance of tampering by occupants.

Named Manufacturer	Incumbent Maintenance Provider	Incumbent Installer
HOYLES	**Defensor Life Safety Systems** 15 Kingsley Street, Leicester LE2 6DY Telephone: 0116-244-8689	**Defensor Life Safety Systems** 15 Kingsley Street, Leicester LE2 6DY Telephone: 0116-244-8689
HOYLES		**KSCM Ltd** Unit 3 Trubody's Yard 121 London Road Warmley Bristol BS30 5NA Telephone: 07979-381-094

7.30 Refuge & Rescue Systems

Emergency Voice Communications Refuge System (EVC)

The University specified system complies with: BS5839:Part 9 / BS9999 / BS8300

Named Manufacturer	Incumbent Maintenance Provider	Incumbent Installer
Baldwin Boxall	**Defensor Life Safety Systems** 15 Kingsley Street, Leicester LE2 6DY Telephone: 0116-244-8689	**Defensor Life Safety Systems** 15 Kingsley Street, Leicester LE2 6DY Telephone: 0116-244-8689

Design Principals

Refuge installations must communicate centrally to a University control room, and local systems must be avoided.

The refuge call point must be installed within a fire protected area, so that the users are able to use the system in safety or wait for rescue in a fire event.

Emergency signage and lighting must be provided at the refuge point, see Emergency Lighting Section

Emergency Telephones (Green)

All buildings must have an emergency communication provision, in the form of a green telephone. *Red Telephones are no longer installed at UWE. These are being replaced on a phase basis.*

Named Manufacturer	Incumbent Maintenance Provider	Incumbent Installer
Baldwin Boxall	**Defensor Life Safety Systems** 15 Kingsley Street, Leicester LE2 6DY Telephone: 0116-244-8689	**Defensor Life Safety Systems** 15 Kingsley Street, Leicester LE2 6DY Telephone: 0116-244-8689

Part Number: BVOCET

All Emergency Telephones must be installed with a protruding "3D" green sign:

Emergency phones should be located at primary ground floor ingress/egress points to buildings. Refuge call points in buildings are expected to supplement the provision on upper floors.

The handsets must be pre-programmed to call the Frenchay Security Office Refuge system upon lifting the receiver. Each handset must be labelled and must be clearly marked by the installation team with the phone's location.

For extra resilience, and visibility between UWE sites, the control room main alarm panel should be interfaced into fire system.

7.31 Accessible WC Alarms

Named Manufacturer	Incumbent Maintenance Provider	Incumbent Installer
C-TEC **(C-TEC, Challenge Way, Wigan, WN5 0LD, UK)**	**Defensor Life Safety Systems** 15 Kingsley Street, Leicester LE2 6DY Telephone: 0116-244-8689	**Defensor Life Safety Systems** 15 Kingsley Street, Leicester LE2 6DY Telephone: 0116-244-8689

In Wet Rooms and other locations, IP65 rated installations will be required. Where IP65 is required, recommended Manufacturer is Baldwin Boxall, Ceiling pull cord DTACPM, which can be supplied from Acron Fire Security as well as Baldwin Boxall.

7.32 Special Locations

insert

7.33 Washroom

insert

7.34 Temporary Events & Hook-ups

insert

7.35 External Lighting

insert

Sports Pitches

insert

7.36 E.V Charging

insert

7.37 Trace Heating

insert

7.38 Studios & Workshops

insert

7.39 Laboratories

insert

7.40 Lecture Theatres

insert

7.41 Permits & Access

UWE operates a standard permitting policy for all work carried out on the estate, and full details are available in the 'Electrical Policy'. A summary of process is below.

7.42 Isolation

Isolations require adequate notice to enable an impact assessment to be made and the relevant stakeholders engaged with prior to any isolations taking place. The amount of time needed to generate a permit varies on the type and location, however a guide on minimum notice periods is below:

Equipment Tier	Equipment Type	Minimum Notice Period
Tier 1 (HV)	HV all DSS Equipment	90 Days
Tier 1 (LV)	LV Main Panel	60 Days
	LV Sub-Panel	
Tier 3e (LV)	LV Distribution Board (Essential)	30 Days
Tier 3 (LV)	LV Distribution board (Non-Essential)	21 Days
Tier 4e (LV)	LV Distribution Board (Essential)	14 Days
Tier 4 (LV)	LV Distribution board	7 Days

	(Non-Essential)	
Tier 5e (LV)	LV Final Circuit (Essential)	4 Days
Tier 5 (LV)	LV Final Circuit (Non-Essential)	3 Days
Tier 5eC (LV)	Critical Supply Circuits	21 Days

For the avoidance of doubt, it should be noted that the above periods are for planned works and that emergency isolations are exempt.
Notice periods are set based on the impact and disruption to operational activities.
For low level final circuit isolations, a 3-day notice period is in place and for tier 3-5 sub main isolations 7 days' notice is required. This is to enable the relevant people to sign off on isolations and for the correct staff to be available.

7.42 Keys

Cliq Key?

7.43 Test & Inspection

insert

7.44 Commissioning

insert

7.45 Periodic Testing (EICR)

insert

7.46 PAT & FAT

insert

7.47 Product List

Item / Description	Manufacturer	Model
Distribution Equipment		
Switch Gear and Panel Boards	Schneider Electric	
Distribution Boards	Schneider Electric	Acti9 Isobar P
Circuit Protection	Schneider Electric	
Surge Protection Devices (SPD)		
Metering – Panel Boards	Schneider Electric	PM5111
Metering – Distribution Boards	Schneider Electric	A9MEM3255
Containment		
Ladder/Tray/Trunking/Basket		
Dado Trunking		
Cabling		
Sub-Main Distribution		XLPE

Lighting Support Couplers (LSC) / Marshalling Points	Hager	Klik
Lighting		
General Lighting	Zumtobel / Thorn / Dextra / Sylvania / Fagerhult	N/A
Emergency Lighting (ALL)	Zumtobel / Thorn / Dextra /	
External	Thorn / Sylvania /	N/A
Lighting Control (General)	Zumtobel	
Lighting Control (Architectural)		
Emergency Monitoring	Zumtobel	
Electrical Accessories		
General	MK	N/A

Item / Description	**Manufacturer**	
Switch Gear and Panel Boards	Hager	
Distribution Boards	Hager	
Circuit Protection	Hager	
Surge Protection Devices (SPD)		
Metering – Panel Boards	Schneider Electric	PM5111
Metering – Distribution Boards	Schneider Electric	A9MEM3255

Item / Description	**Manufacturer**	**Model**
HV Transformer	Wilson	E3 Amorphous
HV Ring Main Unit (RMU)	Schneider Electric	
Insulating Medium	Midel	

7.48 Maintenance Suppliers

Supplier	Discipline or Coverage	Nominated Installer	Contact Details
Defensor	Fire Alarm & Detection Refuge Emergency (green) Phone	YES	
Sceptre Networking	Data Voice	YES	

	Fiber Desktop Power		
AW Parry	Passenger and Goods Lifts		
KSCM Ltd.	CCTV Access Control Auto Door	YES	

8 Chapter 8 AV & IT

8.2 UWE IT Infrastructure

The university has deployed a fibre ring around the Frenchay campus with access via the use of feeder pillars. This will allow any new builds / refurbishments to break into ducts that feed into the fibre ring.

Therefore:

1. Connections to new builds / refurbishments to break out of buildings into ducts connected to the fibre ring
2. Connections to new builds / refurbishments will use 4 conduit fibre tube with 12 fibres occupying one of the tubes. Variations need to be approved by IT Services.
3. Each of the two new connections from the comms room using diverse routes will terminate in two different feeder pillars which form the fibre ring. Here they can be patched back to the main core routers in 2B0011 and 2D086.
   (Please check with IT Services with regards to which feeder pillars to use)

The university is going through a process of mapping all duct routes, capacities and fibre routes using BIM and a product called Patch Manager. For this to be effective it is imperative that all cables are clearly labelled.

8.3 UWE AV Infrastructure

It is current practice that ITS will appoint the AV contractor. All AV cabling is to be supplied and fitted by the AV contractor. The only exceptions are for Network Data and Power for IT and AV installations.

Underfloor installations shall use perforated cable tray run from the lectern floor box to the riser.
Riser installations shall have:

- Containment should be in the presentation wall wherever practicable.
- External dado will be considered, especially in rooms where cabling is being delivered via dado (i.e. not underfloor).
- If use of dado has been agreed by UWE, it is preferable that the riser is not on the teaching wall but is as close to the lectern as is practicable.
- Containment should not be less than 50mm x 50mm (or 50mm diameter) but may be larger depending on room type and use.
- Rigid containment will be used (such as Copex but alternative, comparable systems may be used with ITS approval).

- Where containment is hidden or inaccessible, draw cords will be required.
- Exposed containment should complement the design of the room.
- Containment will be Cat 6E compliant.

In ceiling installations shall have:

- A cable basket of suitable capacity must run from the top of the riser to the projector/speakers/camera/microphones etc.
- Where it is exposed, the basket must be in keeping with the design of the room.
- The basket should follow the most practicable, shortest route.
- AV cables can be mounted in baskets supplying other services.
- Ceilings must be capable of holding a mounting plate for the projector and the weight of the projector.

8.4 Design Requirements

8.4.1 Cable Network

Named Manufacturer	Incumbent Maintenance Provider	Incumbent Installer
CommScope (Systimax) - Copper	**Sceptre Networking Limited** 16 Canvin Court, Somerton Business Park, Somerton, Somerset, TA11 6SB Telephone: 01458 273770	**Sceptre Networking Limited** 16 Canvin Court, Somerton Business Park, Somerton, Somerset, TA11 6SB Telephone: 01458 273770
Fibre	**Sceptre Networking Limited** 16 Canvin Court, Somerton Business Park, Somerton, Somerset, TA11 6SB Telephone: 01458 273770	**Sceptre Networking Limited** 16 Canvin Court, Somerton Business Park, Somerton, Somerset, TA11 6SB Telephone: 01458 273770

All new cabling must be CAT 6a U/FTP – Unshielded outer shell/Foil Shielded Twisted Pair as a minimum with terminations and installation carried out in accordance with the manufacturer's guidelines by a certified installer and covered by a 25 year manufacturer warranty.

Cables and SCS components must be easily identifiable with manufacturing batch information printed directly on to the cable jacket or component surface.

Cable lengths for installed permanent link should be no greater than 90m.

No intermediate splices or patch panels should be used in the cable runs. The minimum bend radius should not be exceeded during installation and when the cables are in their final operating position.

8.4.2 Wi-Fi Network

All buildings should have a Wi-Fi network installed.

Named Manufacturer	Incumbent Maintenance Provider	Incumbent Installer
??	**UWE IT Services**	**Sceptre Networking Limited** 16 Canvin Court, Somerton Business Park, Somerton, Somerset, TA11 6SB Telephone: 01458 273770

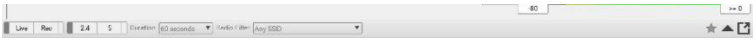
1. Where refurbishment works are planned in an area that already contains Wi-Fi Access Points, the units must be removed by UWE's incumbent cabling contractor and given to UWE ITS for safe keeping before any building works start. Following completion of works, the process steps 7 and onwards apply. Unless extensive changes to fabric design.

2. UWE IT Services should be provided with each iteration of building drawings in .dwg format as soon as they are available. The .dwg drawings should include occupancy numbers for each room and the room number designations (if known).

3. UWE IT Services staff need to meet with the UWE Estates PM, Architect and UWE's incumbent cabling contractor to further understand the design. In particular…

    - Planned usage of each room – Social, GPT (General Purpose Teaching), etc.
    - Footfall figures in each area
    - Materials used in building fabric – walls, floors, windows
    - Type of ceiling – suspended, raft, open/industrial
    - Any other potential interference sources, i.e. microwave ovens, PIR Sensors
    - Any design anomalies or aspirations

4. UWE IT Services will create a predictive Wi-Fi coverage survey (see screenshot below) using Ekahau modelling software, based on the building drawings and requirements. The predictive survey determines the type of Wi-Fi access points required and their optimum location. UWE IT Services will always provide Wi-Fi Access point that meet the latest IEEE ratified standard.



5. UWE IT Services will provide a building drawing marked with the Wi-Fi access point locations. It is then the responsibility of the project team to determine the most appropriate containment routes, cable runs, etc. to the Access Point locations, ensuring that cable lengths are within specifications. *Any deviation from the planned location must be agreed in writing with the ITS Network Team before installation and final locations should be marked in the BIM model.*

6. The installation options on Wi-Fi access points are as follows:

    a. Option 1 – Ceiling Mounted (1st preference)
        i. Beneath suspended ceiling tiles

ii. Structural Beams

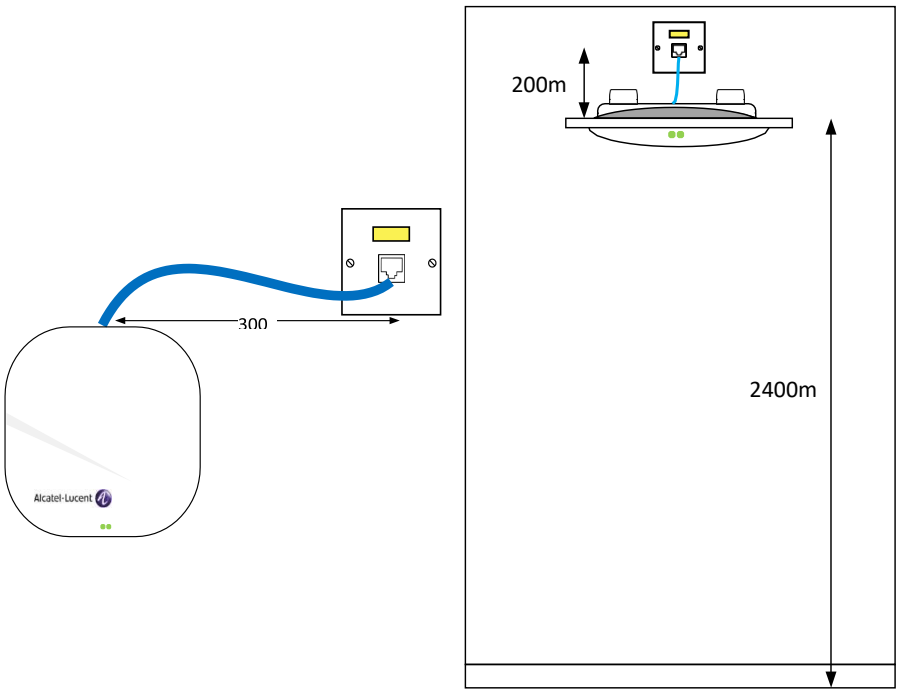
iii. Building Fabric

b. Option 2 – Semi exposed ceiling
APs should be mounted on ceiling tile "rafters" or "Islands"

c. Option 3 – Mount to containment

d. Option 4 – Wall Mounted (to only be considered if all others are not possible) This is the least effective solution of AP mounting.

7. Cabling between outlets and access points should be as follows:



8. All Wi-Fi Access Points are purchased via UWE IT Services. A project cost-code should be provided for these works.

9. Following a successful trace and test by the cabling contractor of the network outlets designated for the Access Points, UWE IT Services will configure the outlets, and prepare the Access Points. Each Access Point is labelled with a location and outlet identifier.

10. Access Points will be installed by the cabling contractor. It is imperative that the cabling contractor install the correct Access Point in its associated location.

    a. The incumbent cabling contractor will install the Access Points once the building is dust free and network outlets / Access Points are configured and labelled. Following successful installation, the cabling contractor must inform UWE IT Services, who will bring the units into service.

    b. UWE IT Services will carry out a post installation survey using Ekahau modelling software. This survey verifies that the Wi-Fi installation delivers the required service and coverage detailed in the predictive survey. To perform the survey UWE IT Services will require access to all rooms within the new building/refurbishment project. Therefore the post installation survey should take place after building handover from the principal contractor but before occupation

11. If all Wi-Fi coverage is as required, the coverage maps are published internally. If there are areas of limited or no coverage, UWE IT Services will work with the Estate PM to retro fit additional Access Points.

8.5 Comms Rooms

8.5.1 Switch Design

Named Manufacturer	Incumbent Maintenance Provider	Incumbent Installer
??	**IT Services** Telephone:	**IT Services** Telephone:

8.5.2 Cabinet Design

Named Manufacturer	Incumbent Maintenance Provider	Incumbent Installer
??	**Sceptre Networking Limited** 16 Canvin Court, Somerton Business Park, Somerton, Somerset, TA11 6SB Telephone: 01458 273770	**Sceptre Networking Limited** 16 Canvin Court, Somerton Business Park, Somerton, Somerset, TA11 6SB Telephone: 01458 273770

A suitable data cabinet should be installed as per requirements.
The two standard data cabinet are as follows:

Single compartment / user

- Used in most instances across all University campuses
- 800mm width x 1000mm depth
- 42U (27U may be used for certain applications but must be agreed with the ITS Infrastructure Team)
- Lockable Mesh doors front and rear
- Horizontal metal cable management
- Adjustable vertical mounting rails to enable equipment to be set back to give clearance of at least 100mm between equipment and inside of the door.

Image^: Single Compartment / User Cabinet

Co-Location / multiple users

- Used where multiple users exist, such as UWE and the Accommodation Network provider.
- 800mm width x 1000mm depth
- 42U (the number of compartments to be agreed with the ITS Infrastructure Team).
- Lockable Mesh doors front and rear
- Patch Panels delivered to relevant compartment
- Horizontal metal cable management
- Adjustable vertical mounting rails to enable equipment to be set back to give clearance of at least 100mm between equipment and inside of the door.

Image^: Co-location / Multiple Users cabinet

8.5.3 Cabinet Layout:

4			
3	Analogue Telephony Patch		
2	Empty		
1	Empty		

8.5.4 Ducts & Chambers

- All chambers are to be labelled as per UWE Estates requirements and added to BIM and PatchManager with location.
- All new ducts are to be uniquely numbered at either end for easy identification.
- All loose tube fibre and blown fibre tubes are to be labelled with source and destination at each chamber location using Brady Polyurethane Tags (BM71-10X75-7643-YL) or equivalent.
- The labelling convention for the fibre tubes is as follows
    - <SOURCE ROOM><CAB NOx> to <DESTINATION ROOM / Pillar><CAB NOx / Panel Ref>

      For e.g.FR-2B01/NO1 to W-Block Pillar/1a

      Or

      FR-2D086/NO3 to FR-1D008/NO1

8.6 Cabling Standards

CommScope (Systimax) is the current preferred Structure Cabling System (SCS) manufacturer of all copper cabling. Any deviation from the preferred manufacturer must be agreed in writing with the IT Services Head of Infrastructure.

All new cabling must be CAT 6a U/FTP – Unshielded outer shell/Foil Shielded Twisted Pair as a minimum with terminations and installation carried out in accordance with the manufacturer's guidelines by a certified installer and covered by a 25 year manufacturer warranty.

Cables and SCS components must be easily identifiable with manufacturing batch information printed directly on to the cable jacket or component surface.

Cable lengths for installed permanent link should be no greater than 90m.

No intermediate splices or patch panels should be used in the cable runs. The minimum bend radius should not be exceeded during installation and when the cables are in their final operating position.

For new installations, cabling should comply with fire rating requirements defined in the latest version of British Standards 6701, currently stated as Euroclass Cca s1b.d2.a2.

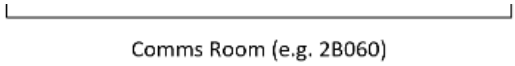
Any containment where the cables are installed should fully support the cables, as well as maintain the required bend radius and separation from other types of cable and sources of interference.

The patch leads used to connect devices to the cabling infrastructure should be the same type and standard as the installed cable from the same manufacturer.

New buildings shall be provided with blanket Wi-Fi coverage. Responsibility for the Wi-Fi design and specification is with UWE IT Services.

8.7 Labelling Standards
8.7.1 Outlet and Patch Panels

Each network and patch panel outlet must be labelled (black text on yellow label) with a unique reference, as illustrated below:



- The label should be clearly legible and be suitable for use in comms rooms that have air conditioning.
- At the Comms Room end, the unique reference should be the name of the room containing the outlet, and the increment number. The increment number is a three- digit number with leading zeroes, assigned by the cable installer and identifying the actual outlet within the room.
- At the outlet end, the unique reference should be the name of the Comms Room where the cable to the outlet is patched, and the same increment.
- for the 6th network connection in Comms Room 2B060, where the outlet is positioned in room 2D054, at the outlet end the label will read 2B060/006 and at the Comms Room end the label will read 2D054/006
- for each comms room within a building the suffix label can begin with '/001' as it is unique when combined with the comms room ID

Note: there is no difference between the labelling of data outlets and telephone outlets. Data and telephone cables are patched to different locations within the Comms Room, but labels should still

fit in with, and remain unique to, the data outlet labelling. For example, if an outlet in room 2D054 designated for telephone use is the 71st outlet in comms room 2D060, it will still be labelled 2D060/071 at the outlet end and 2D054/071 at the comms room end.
It should also be noted that, for each comms room within a building, the labelling can start with other end/001 since the uniqueness comes at the outlet end where the comms room is specified as part of the label.

8.7.2 Chambers and Ducting

- All chambers are marked/labelled as per requirements from estates and in turn added to BIM and Patch Manager with location.
- All new ducts are uniquely numbered at either end for easy identification.

8.7.3 Loose Fibre & Blow Fibre

- All loose tube fibre and blown fibre tubes labelled with source and destination at each chamber location using Brady Polyurethane Tags (BM71-10X75-7643-YL) or equivalent.
- The labelling convention for the fibre tubes is as follows
    - <SOURCE ROOM><CAB NOx> to <DESTINATION ROOM / Pillar><CAB NOx / Panel Ref>

      For e.g.

      FR-2B01/NO1 to W-Block Pillar/1a

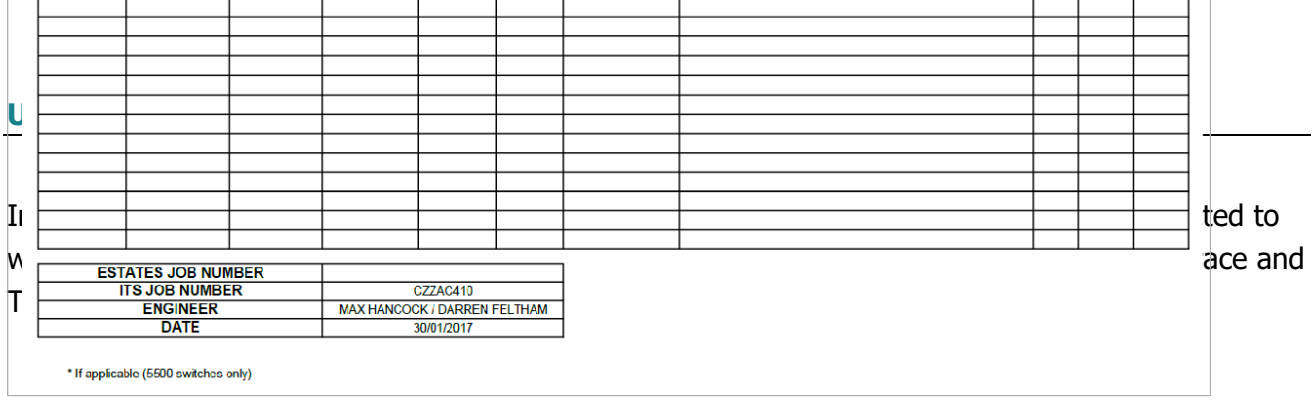
      Or

      FR-2D086/NO3 to FR-1D008/NO1

8.8 Post Installation

8.8.1 Test & Trace (Copper)

Once the network switches have been installed, the cabling contractor is required to trace and test each copper ethernet cable to confirm it meets the requirements of ISO/IEC 11801 for Category 6A cable (link/channel up 500MHz). A complete set of test results shall be provided in a format agreed with the ITS Infrastructure Team within 5 days of completing the testing.
The trace and test information must detail what each outlet is to be used for in order for ITS Network Team to configure the outlet for the correct network e.g., staff network, student network, printer network, building management system network, etc. With this is mind, the client must have specified what each and every outlet will be used for and communicated that to the cabling contractor via the UWE Estates PM.
All switch ports must be configured with description information and the VLAN appropriate for the equipment being connected to that outlet, i.e. a BMS device is connected to the BMS VLAN, a Staff PC is connected to the staff VLAN and a student PC is connected to the student VLAN.



ESTATES JOB NUMBER	
ITS JOB NUMBER	CZZAC410
ENGINEER	MAX HANCOCK / DARREN FELTHAM
DATE	30/01/2017

* If applicable (5500 switches only)

8.8.2 Fibre Cable Testing

For new fibre installs it is important to carry out tests to verify the quality of any cable splice and terminations.

For each core Tier 1 and Tier 2 test results should be provided demonstrating the performance of the fibre and associated cable splice / termination. This test should be carried out from fibre patch panel to fibre patch panel at 1310nm and 1550nm for single mode fibre. Tests should be carried out as per IEC 61280-4-2 as a minimum.

9. Chapter 9 Landscaping, Biodiversity & Public Realm

The UWE Grounds Team and Travel Team are key stakeholders in the design and planning of any project which alters or impacts on external spaces and must be consulted from the earliest stages.

UWE ambition is to create a harmonious blend of surfaces and designs. Project teams must create a solution that harmonises landscaping to that outside their own project boundary. This includes considering and accounting for new 'desire lines' that buildings will create through the campus.

Biodiversity in the built environment can be provided with high-quality green infrastructure, and is of utmost importance for social, economic, and environmental reasons, but also in terms of wellbeing, understanding the value of nature, and providing a positive learning and working space for our staff and students.

Effective design will increase UWE's resilience for Climate Change and coping with resource scarcity, such as fresh water and fuel, and the impact of extreme and unpredictable weather events.

9.1 Standards

All landscaping projects should deliver minimum 10% **biodiversity net gain** within the project boundary "red line". UWE's external realm will be designed and managed according to the principles set out in the **Building with Nature** Standard (see https://www.buildingwithnature.org.uk/) and elaborated in the UWE Landscape & Biodiversity Action Plan.

All projects must adhere to the **National Plant Specification (NPS)** guidelines when designing and implementing soft landscaping with specific reference to the NPS handling and establishment code of practice: Understanding the National Plant Specification - CloudScapes (cloudscapesdesign.com).

In any invitation to tender for plant supply and planting on UWE estates, the contractor must stipulate that the nursery adheres to NPS recommendation from lifting until dispatch. Contractors or sub-contractors must pay special consideration to Part 3 of the code of practice for Ground preparation, Planting and Aftercare.

9.1.1 General notes

The designer's approach to the public realm and the external spaces in general should be to create sustainable useful spaces which accommodate the necessary functions of urban living. All spaces should be designed to be welcoming, aesthetically outstanding and deliver high quality green infrastructure.

Pre-existing external spaces should be enhanced using variations in the visual character, orientation, scale, dimensions utilized through to the choice of materials for both hard and soft landscaping (with a view to increase biodiversity where possible).

The design team must consider future management of the external spaces and formulate an **external spaces management plan** for future maintenance within UWE's ability and resources. This plan must be produced in consultation with the Grounds Manager and delivered as a serviceable document at the completion of the project. This may form part of an access and maintenance strategy.

At the early design stages historic and original environmental features should be considered (e.g. freshwater habitats) to either incorporate them into the design or relocate them to a suitable location.

It is essential that projects carefully consider where their boundaries start and stop. Where appropriate, these boundaries may need to be extended to include a wider external area, ensuring that it is accessible and aesthetically in keeping with the wider campus.

Planting schemes must maintain good lines of visibility throughout the campus, to maintain the safety of drivers and pedestrians.

9.2 Temporary Works

UWE Grounds Team and Travel Team must be consulted on:

- Operations or temporary works which impact on soft landscaping must be done in consultation with the Grounds Manager (e.g. use of heavy equipment or creation of temporary footpaths or compound space on grassed areas).
- Proposed locations for stockpiling of soil.
- Operations or temporary works which impact on any roads, footpaths, or cycleways and must be identified during the pre-construction phase. The impact of diversions on emergency vehicles, maintenance operations etc. must be considered.

The proposed route of temporary roads, footpaths or cycleways must be inspected as early as possible, to confirm:

- The adequacy of existing surfaces that might be used and/or the standards required of temporary surfaces that may need to be formed
- The standard/adequacy of lighting
- The numbers of vehicles / pedestrians / cycles using the diversion
- The interface between pedestrians, cycles, deliveries, and vehicular traffic
- Alterations to wayfinding/signage (including responsibility for providing additional signage)
- Accessibility of alternative routes must be assessed
- Inconvenience/increased travel distances caused by temporary routes must be minimised as far as possible.

Traffic Safety Measures & Signs for Road Works and Temporary Situations "Chapter 8" must be adhered to. Diversions or disruptions to public rights of way will be subject to consultation with relevant External stakeholders outside UWE. The UWE Transport team will support this process.

9.3 Soft landscaping

Most topsoil to be found across UWE Frenchay and Glenside campuses is classified as Heavy clay soil, with >25% clay content. As such, any additional or imported soils added to the landscape are advised to be of sandy loam consistency. This will balance out the inherent characteristics including poor drainage and compaction associated with our landscape. All soils provided shall conform to BS 3882 and evidence of this as well as soil classification must be provided.

Bespoke soil types may be required for specific planting schemes, locations or landscape features (for example raised planters). This could include the addition of soil conditioners such as horticultural grit or organic matter. These specifics are to be agreed in consultation with the Grounds Manger at design stage.

When planning the addition or redevelopment of landscaping, an aftercare arrangement shall be developed in consultation with UWE Grounds Manager. The **aftercare package** should be time bound, include adequate defects periods and be contractually binding.

The access and maintenance strategy must include how watering and general ground maintenance will be done efficiently and safely.

9.3.1 Biodiversity net gain

Biodiversity has to be carefully considered to ensure that the maximum benefits will be achieved in the design and development - and ongoing liveability - of our spaces.

At the design stage the designers shall consult the UWE Landscape & Biodiversity Action Plan (https://www.uwe.ac.uk/-/media/uwe/documents/about/sustainability/landscape-and-biodiversity-action-plan.pdf) for planting schemes that are appropriate to the campus.

Impacts upon biodiversity must be considered when any project, internal or external is being planned. Impact from external compounds, delivery and storage of materials, scaffolding etc must be taken into account alongside works that have a physical effect upon the landscape. For small and medium sized maintenance or development projects a Biodiversity impact assessment report will assist by providing recommendations and mitigation for the project. This is available via the UWE Grounds Manager.

Planting schemes should seek to plant 'nectar rich' native species. 10% of planting must be 'edible' (improving environmental interaction and wellbeing). Planting schemes should seek to enhance the UWE Beeline or Meadowscape projects by the use of nectar rich native and near native plant species and by the addition of edible pollinators from the **Beeline Core plant list – available on request** from the Grounds Manager. The precise layout and location of new planting must be determined in consultation with the Grounds Manager. Inedible or poisonous berries must **not** be planted, so as not to be mistaken for edible ones.

9.3.2 Trees

Tree planting must be adopted in future developments where appropriate to soften the outline of the built form. Tree selection should be on the basis of appropriate form and growing habit, but all trees must be "clear stem" to allow visual sightlines to be maintained. Indigenous tree species should always be considered first. Deciduous woodland is the original type of woodland across the Bristol/South Gloucestershire region.

Tree selection must be done in consultation with the grounds manager to ensure that any trees or flora planted is in keeping with the campus as well as in line with grounds team maintenance ability and UWE's ambition to increase and enhance biodiversity.

Frenchay Campus includes several trees that have been designated local authority **Tree Protection Order (TPO) status** or are classified as significant to UWE Landscape. Both Glenside and Bower Ashton campuses fall within conservation areas and as such all trees within these locations are afforded the same protection as the TPO. It is therefore essential that any project or maintenance works that may have an impact upon UWE trees are discussed with the Grounds Manager at the preliminary stage of planning.

The Grounds Manager will offer guidance to ensure the least environmental impact, including advising on Root Protection Areas (RPA) and the health and condition of existing trees. It is important that all surrounding trees are considered within the scope of the project, not just those that fall immediately within the boundary of specific works. The University expects **BS 5837:2012 'Trees in relation to design, demolition and construction – Recommendations' to be followed in their entirety throughout the whole project.**

The grounds team will assist in developing the project specification, physically marking out RPA's and will ensure the planning includes actions for the protection (e.g. temporary reinforcement of grassed areas) and remediation of the campus to the original (or better) state. This consultation should take place prior to ground works starting. Project teams will be encouraged to look at improvements surrounding their project boundary.

9.4 Hard Landscaping

The proposed layout of roads, footpaths and other hard landscaping must be agreed with the UWE travel team. They will help assess the impact on people movement and potential consequences for disabled people. Consultation with the UWE Grounds Team should also take place.

Designers shall comply with the Department for Transport's Manual for Streets Parts 1 & 2. UWE expects that laying courses consist of bound materials held together by a binder such as cement.

9.4.1 Pavements/Footways/Cycleways

Footways must be at minimum 2m wide on all sides in order to enable two wheelchairs to pass at the same time. Routes should be made as inclusive as possible by:

- Avoiding circuitous routes for wheelchair users.
- Placing dropped kerbs with tactile paving at convenient and appropriate locations (which will also assist porters, catering staff etc. using trolleys etc.). For the avoidance of any doubt, a 'flush' or dropped kerb means a 0mm upstand.
- Achieving gradients that comply with BS 8300.
- A strong tonal difference should be achieved between pavement and roadway and between street furniture and the surrounding paving.
- Careful consideration must be given to the use of 'stripes' (e.g. different coloured modules creating striped bands running across pavements, courtyards etc.) and they should be avoided. For example, for someone with a visual impairment, a dark strip could create the false perception of shadows and a kerb line.
- Designs must design out trip hazards.

UWE does not desire shared spaces, where vehicles and pedestrians share the same space. Pavements and Cycleways should be designed away from vehicle carriageways by use of a soft verge or other sustainable features such as SUDS, SWALES or Rain gardens.

All the following specifications are taken from Gloucestershire County Council manual for Gloucestershire Streets (4th edition), 01/04/16. They are purely indicative.

Type	Construction Layer	Thickness (mm)	Material	Binder (Penetration Grade Macadam)	Min PSV of Coarse Aggregate	Max AAV
Footways and cycleways	Surface course	25	AC 6 Dense Surf	70/100	All situations 45	16
			AC 20 Open Bin			
	Binder course	50		160/220		
	Sub base	250	Granular Sub Base Type 1			

If paviours are to be used, they should meet the relevant council standard (this is indicative):

Type	Layer	Thickness (mm)	Material
Footways / cycleways	Surface	80	80mm (min) thick paver block
	Laying Course	35	Clean sharp sand to BS EN 12620 grading C
	Sub base	225	Granular sub base material type 1

9.4.2 Lighting

Effective external lighting reduces the likelihood of trips and promotes a sense of personal safety. Technical aspects of external lighting are addressed in the electrical chapter. All vehicular and designated pedestrian routes will be lit along with 'plazas', pedestrian bridge tunnels, external stairs etc. Designated external escape routes or assembly points will also have emergency lighting.

Lighting is to be designed and installed with the impact on neighbouring communities and ecology in mind. Designers shall:

- Use 'warm' colour temperature (below 2700 K)
- Use low-level lighting and reduced PIR sensitivity, noting that key stakeholders must be consulted, in particular the security and grounds teams
- Install directional accessories on light columns to minimise light pollution and energy wastage i.e. direct the light downwards to where it is needed
- Use downward facing light on wall-mounted fittings
- Enable automatic dimming on lights when not in use

9.4.3 'Private streets'

All main arterial roads through campuses shall be designed as a high street as set out by the local authority. This is purely an indicative standard:

Construction Layer	Thickness (mm)	Material	Binder (Penetration Grade Macadam)	Min PSV of Coarse Aggregate	Max AAV
Surface course	30	AC 10 Close Surf	100/150	i) 65 ii) 55	16
Binder course	60	AC 20 Open Bin	100/150	iii) 50 **	
Base course	110	AC 32 Dense Bin	100/150		
Sub base	390	Granular Sub Base Type 1*			

Review the specific demands a road is exposed to e.g. if the access and maintenance strategy indicate that heavy plant (such as cranes) would need to be deployed on the road.

Tracking (or 'swept path') analysis may be needed. A 3 axle refuse vehicle should be used for this study and the swept path should be no closer than 500mm from any kerb, vertical structure, tree, or formal parking space.

9.4.4 Car, motorcycle, and cycle parking

All buildings must have disabled parking spaces in line with Part M of the Building Regulations. When providing disabled parking bays, locate these within a short, level distance of the building entrance. In a row of disabled parking spaces, one will need to be sized to accommodate a large vehicle allowing for a side or rear access hoist.

'Fast chargers' recharging points for electric vehicles (i.e. minimum 22kW supply) aiming to provide a full charge in 1hr 30minutes shall be installed in any new carparks. The charging points are to have Ingress Protection rated at 55. Charging points are to be individually metered.

Provide space for at least one 3-wheel tricycle in any parking designed for motorcycles.

The requirement for secure cycle parking facilities, and size of this provision will be influenced by the number of building users, the proximity to existing facilities etc. as well as constraints such as space.

Designs shall consider wind loading/direction when selecting and positioning bike shelters, especially open-faced shelters. Shelters should not be positioned in infrequently used or obscured locations, as this could encourage theft. The transport team will advise on security requirements,

but cycle hubs will need swipe access, CCTV and lighting with attendant power/data supplies. Consult at RIBA stage 2 or earlier for any major refurbishment or new build to assess existing provision and for advice on how cycle provision could be enhanced.

In any cycle parking provision, there must be at least one cycle space that is wide enough to accommodate a recumbent trike which may be used by a disabled person. There will also need to be space for storage of a wheelchair.

9.4.5 Barrier Controls

Barrier controls should be operated by swipe cards or key codes (the transport team will advise) and without the need for users to leave their vehicle. Intercom is only a 'back up' method of operating barriers: Not all users will have hearing or speech. Barriers must be designed to prevent harm or damage to people or property and barriers shall be designed to allow cyclists to pass unhindered.

9.4.6 Designing for deliveries, maintenance & emergencies

The access and maintenance strategy, and fire strategy will help establish these requirements. UWE wishes to avoid the need to repair brand new footpaths etc. damaged by the weight of vehicular traffic which was foreseeable from the outset. Designers must ensure that there is at least one vehicular route and parking area for each building, capable of taking the weight of a 3 axle refuse vehicle.

9.4.7 Pollution prevention

Hard infrastructure must include appropriate pollution prevention measures. The UWE Sustainability Team can provide advice on the requirement for interceptors or the risk to existing drainage e.g. surface water drains in proximity to a new delivery bay.

Use the drainage plan to identify the safest place to store materials. Any higher risk external spaces (loading bays or near hydrocarbon storage tanks) will need storage for a UWE spill kit (depending on the distance to an existing kit). This will need to be allowed for in the design process.

In line with Pollution Prevention Guidelines (PPG) 1 and 22, UWE requires that: "gullies, grids and manhole covers are colour-coded to aid identification, using blue for surface water and red for foul and arrows to indicate the direction of flow." This colour-coding must be implemented.

9.5 Underground Services

Numerous mechanical, electrical, and data services, cables and ducts are underground. This makes them vulnerable to inadvertent damage, especially during works, or even by the weight of heavy

lorries. All underground services must conform to Street Works UK and BS1710 on positioning, minimum depths, and labelling all underground services.
Depths must conform to 'carriageway' standards and not footways nor verges.
Identification tape shall be applied continuously along the whole length of all underground services. The tape shall incorporate a corrosion resistant tracing system.

Consideration should be given to the use of trenches and ducts when laying or altering underground services. A minimum 50mm data duct at 350mm depth should be provided in any trenching work. Fully accessible inspection chambers must be provided.

9.6 Street Furniture

Street Furniture must be robust with a design that is sympathetic to the surrounding built and natural environment. Refer to the Design Guide section on Wayfinding and comply to the UWE Signage Specification. Street furniture must be integrated into designed elements, such as paving bands. Recognise how detrimental 'clutter' can be to the public realm.

There should be a mixture of external seating, offering opportunities for individuals to rest as well as collaborating on course work etc. Seating should include some with backs and arm rests, providing a selection that people can pick to suit their health and physical condition. If there is space for only one external seat, it shall be fitted with arm and back rests.

The design and material will need to match the environment. Design location and configuration of the seating should consider protection from exposure to prevailing winds, cold and wet weather. The comfort of the user is paramount, and design should take this into account, for example with natural or physical wind barriers, covered areas with protection from the elements.

The UWE Grounds Manager shall be consulted on design and specification of benching and external social spaces.

9.7 Waste Handling & Storage Facilities

External waste and recycling facilities (bin stores) should be designed in consultation with the Sustainability Team, specifically the Waste and Resources Manager, to ensure sufficient and appropriate facilities are provided in line with contractual and legal obligations.

Bin stores shall be enclosed to aid with secure waste containment in line with legal obligations. The size of the bin store will be in direct proportion to the square meterage of the building as per BREEAM guidance. The exact number of wheelie bins required will depend on the occupancy and use of the building; this will be determined by the relevant UWE personnel and the Waste & Resources Manager.

UWE has a strategic priority on recycling which will impact on designs; internally there must be space and adequate bins for separate recycling streams. This includes all areas of the building:

offices, kitchens, eating areas, etc. internal recycling provision must mirror the available bins in external bin stores.

All bin stores must allow for 1100L recycling and general waste bins to be moved in and out, for example wide enough access and egress points. There must also be adequate head height to lift the lid fully to empty in smaller bins and bags.

Approximate bin dimensions for the different waste streams are shown below:

	General Waste	Paper and Card	Plastic and Cans	Glass	Food
Container size	1100 litre	1100 litre	360 litre	240 litre	140 litre
Container dimensions	Width: 1265mm Depth: 984mm Height: 1280mm	Width: 1265mm Depth: 984mm Height: 1280mm	Width: 580 Depth: 875 Height: 1080mm	Width: 575 Depth: 730mm Height: 1060 mm	Width: 505 mm Depth: 555 mm Height: 1100 mm

Building plans should include the dimensions of the bin store and indicate the correct number and type of bins in each store. The plans will need to demonstrate that the bins will fit within the proposed bin store area with sufficient room for access and manoeuvring, and that all bins are always accessible. There should be sufficient space between bins to allow access for both UWE personnel and collection operatives. This will prevent waste being left on the floor and missed collections from contractors.

Bin stores should be as large as practicable to future proof against any potential changes in collection methodology resulting in a larger quantity of bins being required.

Other requirements for bin stores include lighting, drainage, Category 5 water points, easily cleanable impermeable surfaces, signage boards, hand sanitiser units.

It is essential that bin stores are well lit to allow bin signage to be read, to promote proper use and to counteract concerns about them feeling dirty or unsafe. Lighting must be controlled by motion sensors to avoid it being left on when the bin stores are not in use.

Bin stores should be designed to be attractive as well as functional. There are opportunities for in-built behavioural psychology and 'nudge' elements in design of bin stores to increase recycling outcomes.

Bins stores must be external to main buildings and located at least 10m away from all buildings for fire and insurance purposes. If this is not possible, advice should be sought from the UWE Fire Safety Adviser and Insurance Manager.

For residential developments, Schedule 1, Part H of the Building Regulations (2000) states that residents should not have to carry waste more than 30 m (excluding any vertical distance) to their

waste storage point. For non-residential buildings consideration must be given to the distance that cleaning staff will be required to transport waste to the bin store.

Access to the bin stores will be required by refuse and recycling contractors' vehicles.

- The gradient between bin store and collection vehicle should not exceed 1:12 (Building Regulations, 2000)
- The distance over which containers are transported by collectors should not exceed 15m for two-wheeled containers, and 10m for four-wheeled containers (BS 5906: 2005)
- The route between the bin store and the collection point should be free from curbs, upstands, steps (HSE) and any uneven surfaces.

UWE has a 'forward gear only' policy for waste collection vehicles on UWE campuses. Contractor access to bin stores should be designed in such a way that reversing is not required. Waste contractor access to external bin stores must be addressed in the Access and Maintenance Strategy.

Hazardous waste will need additional storage and disposal methods. Hazardous waste storage and collection is not included in BREEAM calculations. The exact requirements will depend on overall size/use of the building. The Waste and Resources Manager must be consulted regarding what containment for hazardous waste is required.

9.8 Rainwater management

Campus development projects must consider flood risk, taking note that the intensity of rainfall events is anticipated to increase over time in response to climate change.

Designers must ensure that green and blue infrastructure is included in schemes such that flood risk is mitigated (both on campus and downstream). Measures to incorporate include rainwater harvesting schemes, green roofs, rain gardens, infiltration systems, filter strips, swales, trees and soft landscaping measures, pervious paving, ponds and surface water features.

12 Chapter 12 Controls & Metering.

12.2 Building Management System (BMS) Engineering and Graphics

All buildings must have a similar look and feel to facilitate ease of use and efficient engineering. Refer to FR-X Block and/or FR-T Block for examples of the required standards as this applies to all elements throughout this document.

The UWE Building Management System comprises two platforms, Schneider ECOStruxure and Tridium Niagra. Schneider ECOStruxure forms the backbone for Frenchay and Bower Ashton, whereas Tridium Niagra interfaces with the Trend devices for Glenside, Arnolfini and Frenchay EP1, EP2 and ECC.
All new controllers to be BACNet compatible.

BMS monitoring and control shall be provided to all significant items of Mechanical Plant items, unless agreed with the Estates Team.

UWE uses condition-based maintenance (CBM) regimes. This requires specific hardware and complementary control algorithms. This must be discussed at an early stage (RIBA stage 3) with the Estates BMS Manager to ensure all requirements are met at handover. Therefore, third party packaged units (e.g., AHUs) are not permitted unless the control strategies can be modified without additional software.

Provision must be made within the construction programme for client witnessing of the BMS controls prior to handover.
A copy of all BMS graphics, control philosophy and bespoke software programming must be issued to the Estates BMS Manager for approval, with sufficient time period (two weeks) for comment.

All safety interlocks must be hardwired (i.e. temperature, pressure, airflow etc.) with indication only to be provided via the BMS where applicable.

All equipment MCCs must be linked to the site fire alarm system, with a provision to over-ride this link for regular fire alarm testing.

As a rule of thumb, room sensors should be located 1.5m AFFL, 0.5m from corners and vertical protrusions, away from draughts e.g. doorways, avoiding heat emissions and other thermal hot spots. They must be representative of the space being controlled.

Fridges/freezers that are considered business or research-critical must be monitored by the BMS.

All motorised dampers and valves should have their ‘open’ and ‘closed’ positions clearly marked on the side of their respective actuators and/or damper linkage prior to handover.

It is critical that all actuators, sensors etc. can be accessed from a position of safety (avoiding the need to work at height if practicable) and without the need for dismantling.

Trend and Extended Trend Logging shall be configured during the BMS commissioning stage, covering all plant provided under the contract, with the objective of providing a ‘defect-free’ installation at handover. The Contractor shall include for the monitoring, analysis and defect rectification of all BMS components, and software engineering throughout the entire defect’s liability period. The logged data shall be utilised during the Seasonal Commissioning phases.

Critical alarms shall be agreed at design and proven at handover. Email alerts shall also be configured.
All AHU filters (Bag and Panel) shall be monitored utilising differential pressure transducers to determine clean dirty status. The data shall be incorporated into the CBM software.

To remove duplication of PIR devices the lighting systems shall be interfaced with the BMS to provide occupancy indication. This shall be via the lighting PIRs and local control switches. BACnet is the preferred interface – *see Z Block for details*.

12.3 Input/Output module (I/O) Architecture

I/O modules shall be in the same sequence on all projects subject to power supply limitations as follows:

Power Supply Unit, Automated Server, Digital Output, Digital Input, Universal Input, Analogue Output.

Example:

Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6	Slot 7	Slot 8	Slot 9	Slot 10
PSU	AS	DO	DO	DI	DI	UI	UI	AO	AO

Note: All control panels shall no longer be supplied with hand/off/auto switches and indication lamps, therefore all output modules shall include override switches and the input LEDs configured to represent the status (e.g. on/off = green and fault = red). All modules shall have printed labels attached detailing the points being controlled/monitored.

12.4 Automation Server Naming Convention

Automation Server names shall reflect the building name, level, and room number to identify the location of the device and, since this is detailed in the alarm manager, to identify the source of alarms. For example:

BA – Bower Ashton

FC – Frenchay Campus (Historically FC and FR discriminate between HVAC and Security controllers in the same Continuum database so this convention shall be retained)

_B_ - B Block

_D_ - Block

BAP001 – Plant room reference

4D047 – Room Number

AS1 – Unique identifier for when multiple controllers are installed in the same location.

12.5 Enterprise Server Folders

Enterprise Server folders shall be created in the following format to allow easy navigation and review of buildings:

System: ES specific items, created by default
Servers: This folder contains the Automation Servers for each site and building
00_ Support Tools: This folder contains software and searches used for Daily BMS checks or Support Visits.

The subsequent folders shall then detail the campus (Frenchay, Bower Ashton etc.), blocks or areas being controlled and shall fall naturally in alphabetic order. Each folder contains a structure as shown and hold common points or shortcuts to items that are grouped for easy access or editing (e.g. Time schedules or Searches)

Example: Frenchay Campus
00_Overview: Folder contains common graphic for site and the associated Menu software
01_Global Programs: Includes Campus wide software that applies to all buildings.
04_Holiday Schedules: As a minimum, two Calendar Exceptions shall be created under the Schedules folder. This allows each building to be overridden for extended holiday periods (e.g. Christmas and Easter) or open days. The exceptions shall be linked to all building schedules (except those that are 24/7 e.g. DHWS schedules) and allow the operator to control the building via one single point.
Any additional common schedules shall be contained in this folder.

A Block: Any software or graphics relating to this building is included in this folder, however the associated server(s) remain in the Server directory and only shortcuts shall be added. Duplication of information is to be kept to a minimum.

04_ Globals: This folder identifies all points that are referencing or being referenced in different servers or buildings.
05_Extended_Logging: All extended logging shall be created within the ES and reference each server, where the trend logs are held.
06_Documents: Contains documents relating to the building (e.g. Descriptions of Operation, panel drawings etc.) are stored.
07_Search_Forced: Any searches specific to this building shall be create here.

03_Schedules: This folder shall store the schedules as detailed below

12.6 Automation Server Folders

The following Automation Server folder structure is included to allow easy navigation and review of plant within a building.
Subsequent folders and sub-folders shall be created to accommodate the plant controlled in a logical order.
Examples:

Where the AS Controller has Infinite devices (e.g. SCX920, TCX867) connected via its local comm port (A or B) then the controller nomenclature follows the same format as that for AS controllers. Although the name should identify the controller's location the Location field shall also be completed to provide further information.

When BACNet devices are connected via the local comm port these can be either Schneider (including b3 devices), third part equipment (e.g. Monodraught Coolphase units, Nuaire Units) and Schneider's new range of sensors (to be implemented during the Z Block commissioning once updated to EcoStruxure software version 3.0)

The naming convention follows the system previously described (see following example).
IP BACNet protocol is the university's preferred method of connection to third party devices but Modbus can be provided in agreed circumstances. MSTP may also be accepted if all other methods have been exhausted.

LON protocol is not to be used.
Example:

Where points from these controllers are attached to graphics (either Infinite and/or BACNet), then they shall have a duplicate point created in the Application folder, which is bound to the graphic and the controller point.

12.7 Graphics

It is the intention to navigate the system via the graphics package and therefore the user log-on shall load the site map by default. It can also be accessed via the shortcut at the bottom of the System Tree.
Each campus shall have an Overview image with links to the site's associated buildings, all links shall be present but only those with the relevant controllers shall be active. Selecting the building or area shall generate a footprint image of the extent covered. E.g. FR-X Block:
The "Campus" button returns the user back to the Building overview, then Campus and finally the original Site Map.

Three horizontal lines below the Campus button form a menu that allows the user to jump directly to the required plant - see the following image.

In addition, the user can use active areas or buttons on the main body graphic the user to jump to associated graphics
The Menu structure shall be configured via the ES structure of the system tree.

A title bar for each graphic shall also be active and allow the user to navigate to individual levels directly in a similar manner to the Campus button.

All floor levels shall be generated from CAD style drawings to show room numbers (UWE references **not** construction), sensor and controller locations and include links to plant rooms or relevant plant. The plans shall incorporate a switch to turn on/off the space temperatures (and CO_2 or Humidity if fitted) for the whole area.

By selecting an individual room a pop out graphic displaying the room control detail and providing the operator access to override or change settings and time schedules. A "Reset Zoom" button returns to the original floor plan.

The following images are examples of acceptable plant graphics using agreed symbols:

NO panels shall include Hand/Off/Auto switches or indication lamps (except panel power etc.) and therefore a graphic shall be produced to mimic how the panel fascia would have looked. The I/O module switches shall provide feedback to indicate the H/O/A status and the digital inputs shall provide condition status.

12.8 Software

12.8.1 General

The preferred programming method will use Function Block programs therefore most applications will be programmed this way. This does not preclude the use of Script programs; for instance, if a particular application could not be achieved in Function Block but can be by using Script. When software is being created in Infinet or b3 controllers then this remains as Script as a requirement of the product.

Plant demand shall be determined by the individual space requirements; therefore, each controllable space shall have a time schedule as a minimum. Where there are heating or cooling demands from coils etc. then a demand is generated only if a percentage (10% adjustable) is greater than 20% open. The demand is removed when all valves have been closed for period of 5 minutes.

Software developed for FR-X and FR-T Blocks shall be used as the basis of all control. There are numerous example Descriptions of Operation providing the details of the different elements, all available upon request. For example: Typical LTHW & Vent - Business & Law (FBL) X-Block Part 3 - M&E. Window Control & Natural Ventilation - FBL Perimeter & NV Control Strategy. Typical FCU & Chilled Beam - T Block & Energy Centre Controls Description.

12.8.2 Specific Requirements:

12.8.2.1 IT Comms Rooms:

AC Units shall operate 24/7 so do not require BMS enable signal. Unit fault and space temperature monitoring shall be included and the space temperature shall raise an alarm above 26°C. Members of the Estates and IT departments shall receive these alarms via email as determined by the current requirements.

12.8.2.2 Alarms:

In conjunction with the UWE requirements, alarms shall be created for all points as required. Alarms deemed critical form part of the escalation procedure, monitored via the Remote Bureau and added to the email circulation.
All alarm priorities shall comply with the following standard:

12.8.2.3 Global Calendars:

Global Calendars shall be linked to each Time Schedule to allow the Open_Day and Holiday_Off functions to operate for each Campus independently.

12.8.3 Trend and Extended Logging:

Comprehensive logging shall be configured suitable for use in the seasonal commissioning process and to confirm correct operation post-handover. This shall include extended logging so that the historic data can review a minimum of 365 days.
Trend logging shall be configured within the associated Automated Server and extended logging created and stored within the Enterprise Server structure.

12.8.4 Support Tools:

Support Tools are used by Estates staff to review the status of all plant on a daily basis and is accessed via the Site Map graphic. This review confirms the correct operation of heating, cooling and HWS plant and collates the data in simple to view tables. Any additional plant shall be included within these graphic pages.

12.8.5 Software Protocols:

All third party devices shall be restricted to use BACNet IP or Modbus IP only, under pre-agreed circumstances MSTP or hard-wired RS485 connections may be acceptable.
LON is not a supported protocol.

12.9 Metering

12.9.1 Metering General

Metering is used extensively in UWE for the following purposes:

- Carbon reporting
- Charging users of space and equipment
- Energy monitoring
- Leak monitoring

No meters must be disabled, moved, replaced or removed without contacting the Carbon & Energy Team to discuss the implications of this. The same applies to any datalogging or communications equipment associated with the meters.

Metering is an essential component of projects, where spaces are being divided for separate or tenanted usage or where replacement or new heating or cooling systems are being installed or zoned. The expectation for all metering is as follows:

- Meter data shall be recorded at half hourly intervals
- All meters will be clearly labelled with serial number and with an easily read end use description that relates to the area or item being metered.
- Renewable energy generation will be sub-metered
- A thorough set of mechanical / electrical schematics will be provided showing the locations of all meters, clear details of areas monitored by each meter, as well as information on maintenance and use of meters.

- Meters should be easily accessible with the use of Facilities keysets, should be outside of student accommodation private areas / cleaning cupboards / etc. Meters should be positioned to facilitate ease of maintenance and manual (visual) meter reading without any access restrictions and (for mechanical meters) include isolation valves either side of the meter for safe removal.
- Accommodation should be metered according to flat or cluster.

All meters must be fully installed, commissioned and operational at handover, with meters identified by the Carbon and Energy Team to be added onto the university's eSight energy management software platform (see section 12.9.4 below).

12.9.2 Mechanical metering

Metering and sub metering of utilities shall be installed as per CIBSE guide TM39, Heat Network Regulations (2014), BREEAM requirements, and The Building Regulations 2000 Part L Conservation of Fuel and Power. For the sub-metering of mechanical systems (HVAC and Mains Water Services), the following principles should be followed:

- At least 90% of the estimated annual energy consumption for each fuel to be metered separately.
- Major plant that consumes more than 10% of the building energy should be sub metered.
- Sub metered per floor (particularly for water services).
- Sub metering any lettable spaces e.g. leased spaces to shops or businesses within UWE.
- Any cooling loads shall be metered separately.

Space heating, cooling and DHW generating plant shall be individually and separately metered for the fuel being used and the heat/coolth energy being generated.

Metering of electricity supplying mechanical plant shall be installed to all distribution boards either in the main switchboard or integrally in each distribution board.

Mechanical meters shall be appropriately sized to accurately measure the characteristics of the associated load throughout normal expected operating conditions. Connected loads must be understood to establish the lowest and highest flow conditions. The Qmin must be considered and properly calculated so that meters will not be oversized. Choice of meter must be best fit, not necessarily the cheapest option. Introduction of a meter must not affect the performance of the plant or equipment in any way.

Where heat metering is to be installed, all flow measurement elements must be of ultrasonic measurement type whereby the ultrasonic flow body is cut and permanently mounted into the pipe. Preferred Supplier to be Kamstrup but others may be considered in consultation with Estates Operations Team and Carbon & Energy Team. Temperature probes must be of the immersion pocket type and not be strapped on to the outside of pipework. Heat meters must display their energy values in kWh not MWh meters.

Standard mechanical hot water meters used as flow measurement within a heat meter arrangement are not acceptable as these are not designed for heating systems and can corrode.
Isolation valves must be fitted on both sides of the meter for ease of maintenance. Heat meters should be powered by mains not battery and should have Modbus communications protocol.

Water and gas meters shall be appropriately sized for the full expected range of flow measurement and can have pulse output communications. Isolation valves shall be installed both sides of meters.

All mechanical meters installed into pipework DN100 or larger shall have by-pass valve/pipework arrangements to allow removal of the meter without disruption to the site or building.

Where meters are to be used for tenant billing purposes, these should be approved by the Measuring Instrument Directive (MID) or certified under UK national legislation as required.

Where a building or development includes connection to grid or incoming utility supplies where billing utility fiscal meters are included, then these fiscal meters shall also be connected to the same UWE datalogging system.

Where the system needs to be augmented then a complete system shall be installed.

12.9.3 Electrical metering

Metering is an essential component of projects, where spaces are being divided for separate or tenanted usage or where replacement or new heating or cooling systems are being installed or zoned – in such instances it is expected that sub meters will be installed to record consumption. The expectation for all metering is as follows:

- Meter data shall be recorded at half hourly intervals
- All meters will be clearly labelled with serial number and end use
- Renewable energy generation will be sub-metered
- A thorough set of electrical schematics will be provided showing the locations of all meters and areas supplied, as well as information on maintenance and use of meters.

Main/sub metering is to be provided to comply with Building Regulations, Part L2, CIBSE guide TM39 and BREEAM requirements.

For the electricity metering the following principles should be followed:

- At least 90% of the estimated annual energy consumption for each fuel is to be metered separately.
- Any major plant that consumes more than 10% of the building energy should be sub metered.
- Sub metered per floor.
- Sub metering of lighting and small power separately.
- Sub metering any lettable spaces e.g. leased spaces to shops or businesses within UWE. Where meters are used for tenant billing purposes, these should be approved by the Measuring Instrument Directive (MID) or certified under UK national legislation as required.
    - Electrically powered space heating, cooling and DHW generating plant shall be individually and separately metered, not metered from combined HVAC plant panels that include other HVAC items such as pumps and AHUs.
    - Any cooling loads shall be metered separately.
    - Electricity meters shall have Modbus communications capability.
    - Schneider PM5111 or iEM3255 is the preferred electricity sub-meter.
    - Class 1 or better Current Transformers shall be used.
    - Where current transformers (CTs) are used they shall be appropriately sized to measure the electrical load and ensure they are not oversized.
    - CTs shall be installed and secured in accordance with manufacturer's instructions.
    - CT shorting terminal blocks shall be installed in an accessible location (e.g. metering compartment)

- Fused disconnect protection shall be provided for each voltage reference and meter power supply.
- All Modbus wiring in panels to be taken to a common accessible terminal within/near the panel.
- Labels shall be installed adjacent to each meter describing the meter name in accordance with the university naming protocol.
- All wiring shall be ferruled and clearly labelled/numbered.

Electricity sub-meters on the incomer to each panel board shall be multifunction to measure the following:

- Voltage (400/230V AC)
- kW & kVA
- Power Factor
- Line current on all phases and neutral
- kWh
- Maximum Demand
- Peak Amps/Volts
- Harmonic monitoring THD

Metering units shall be installed to all distribution boards either in the main switchboard or integrally in each distribution board.

All necessary equipment required to ensure that each metering unit can be connected onto the Estates Energy metering systems including data points and power supplies shall be provided. Where required, allowance shall be made for modifying and/or extending the existing system as required ensuring that it is sufficiently sized to accommodate the additional metering units within the buildings and an additional 25% spare capacity.

Where the system needs to be augmented then a complete system shall be installed.

Electricity meters shall be installed in accordance with the current version of BS 7671 (IET Wiring Regulations).

12.9.4 Metering software

Metering units shall be linked to the Estates Energy Metering system, communicating to the Tridium Niagara database. This includes electric, gas, water and heat meters. UWE's current metering contractor is Enica. On large projects, Enica must be engaged at the earliest opportunity (RIBA stage 2) to ensure joined up working. If Enica are not to be engaged directly by the project then a discussion with the UWE Carbon & Energy Team must take place to agree the types of meters to be installed and metering systems to be utilised.

Where communication is to be via a radio link, an analysis study shall be completed for the buildings to ensure that radio signals can reach the existing transmitter/receiver of the Estates Energy Monitoring Package and that there is spare capacity on the system. Where the signal strength is weak or not present then number of additional transmitter/receiver units shall be installed as required, at Project cost.

All meters must be fully installed, commissioned and operational at handover. The project should allow for the first tier of meters (building or block incoming meters) to be added to the eSight software platform for review by the Carbon & Energy Team prior to sign off.

12.9.5 Commissioning of Meters and Metering Systems

All meters (mechanical or electrical) must undergo individual commissioning processes to ensure correct installation, operation, and data accuracy. The meter commissioning process for each meter must include collection of the following as a minimum with evidence provided to UWE for each meter:

- Meter name.
- Meter location (including description).
- Photograph of as fitted meter and its location.
- Meter make, model (and serial if applicable).
- Copies of any meter calibration certificates etc.
- Meter communications type.
- Meter communications settings.
- Current transformer (CT) settings (including witnessing of actual CTs if feasible).
- Correct installation of each meter including correct CT installation.
- Description of which communications datalogger/system device it is connected to.