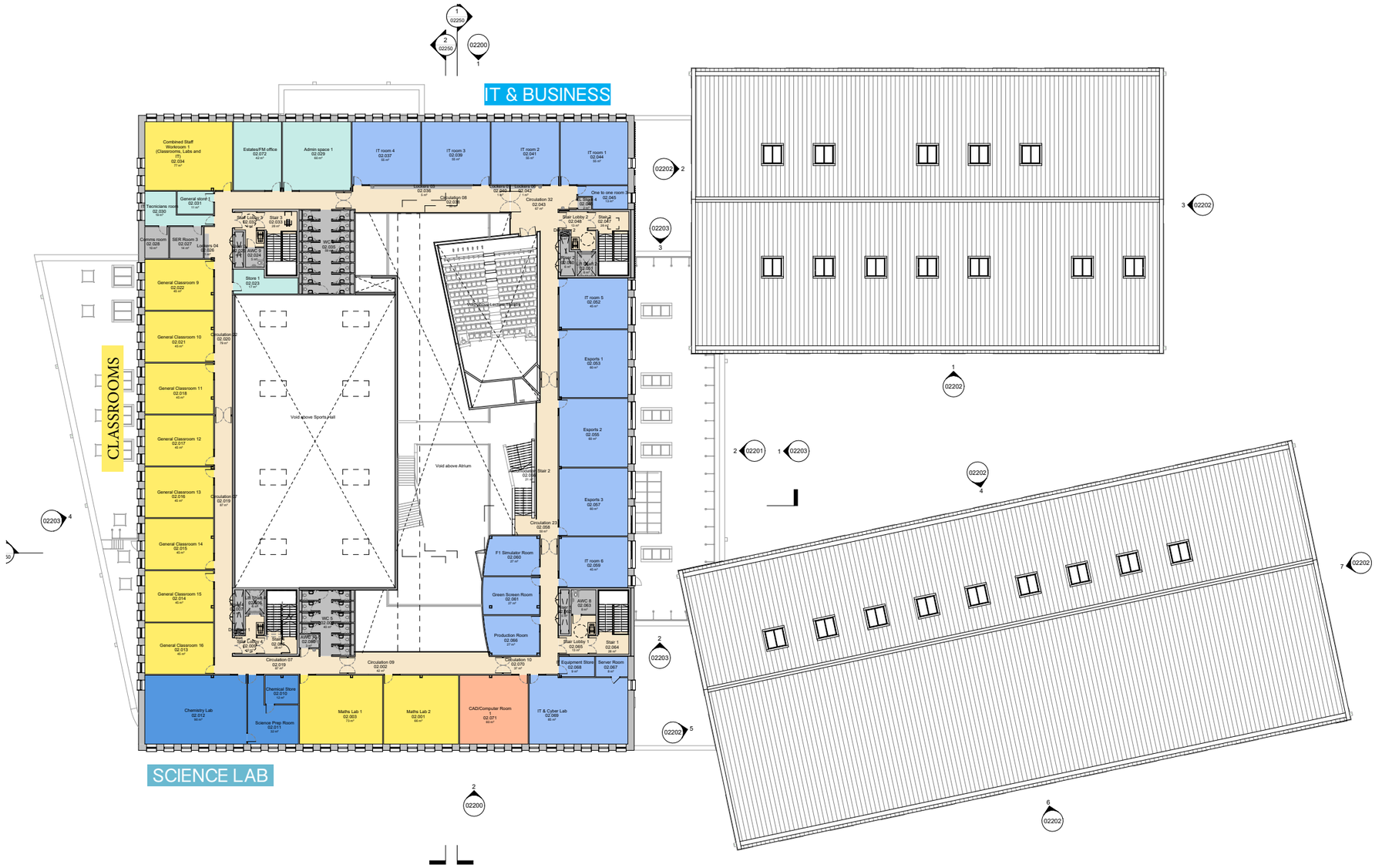
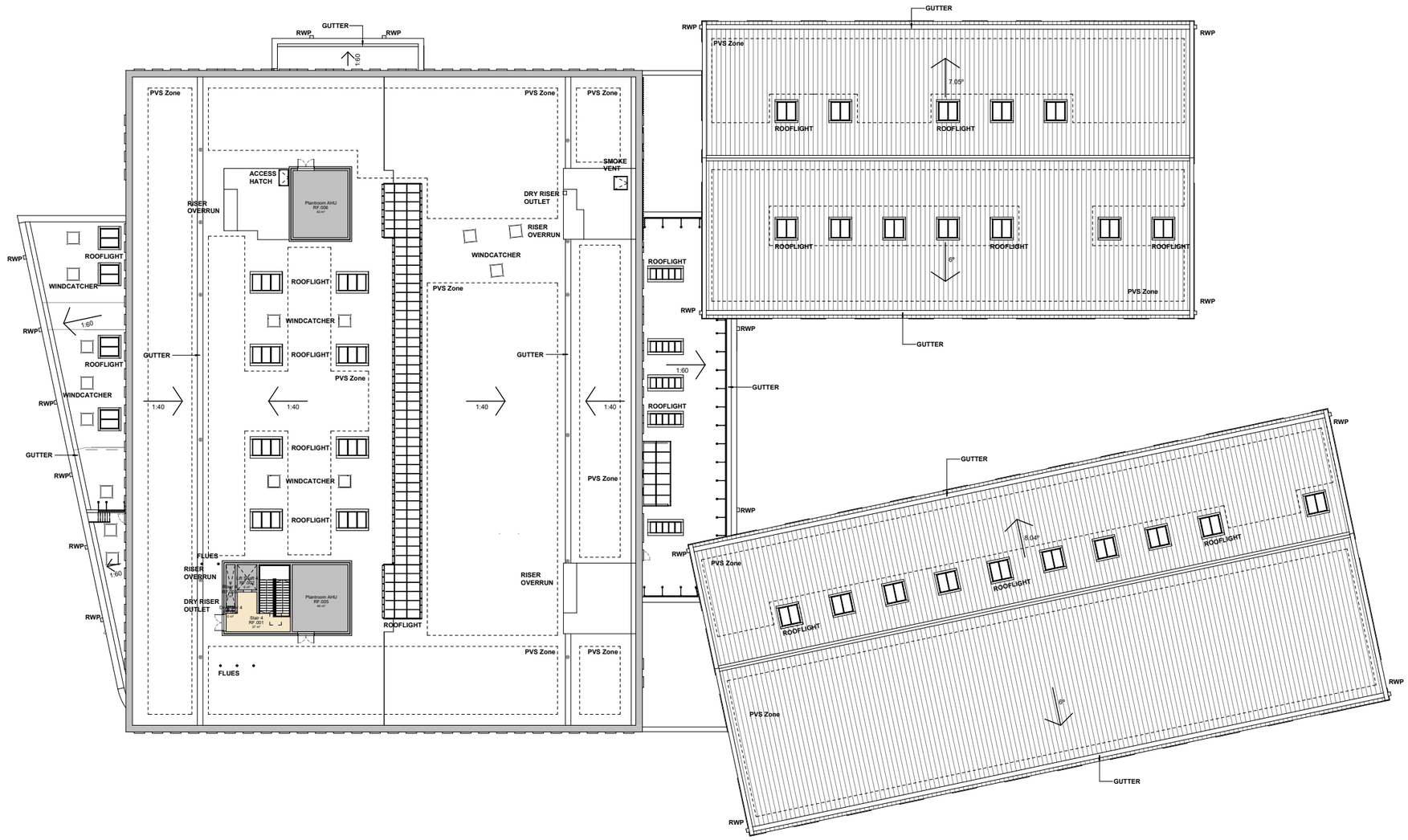
Biophilic principles have been another key design driver, considered planting has been integrated throughout the masterplan. Sustainable principles in relation to sustainable drainage features and habitat creation.

As well as this, it is important to consider the context of the site to create a strong sense of character.



The site's more rural location on the outskirts of Barry provides an opportunity to use hard landscape materials and planting that is appropriate to this context. As such, the scheme aims to combine contemporary built form with soft, rustic and natural appearing landscape materials to develop a unique proposal.



4.8 KEY SPACES

4.8.1 Car Park Entrance Plaza & Approach

4.8.2 External Dining & Social Spaces

4.8.3 External Dining & Social Spaces

4.8.4 Front Entrance Approach - Port Road

4.8.5 Front Entrance Social Spaces - Port Road

4.8.6 External Dining & Social Space - Construction Yard

4.9 Site Sections

4.10 Buffer Zone

As has been previously discussed, a buffer zone has been included around the north of the site to ensure the 'right to light and air' is not compromised for any future developments that are proposed around the site. In consultation with CaVC, it was deemed that the buffer zone could include landscape elements that would not impact on this 'right to light and air'.

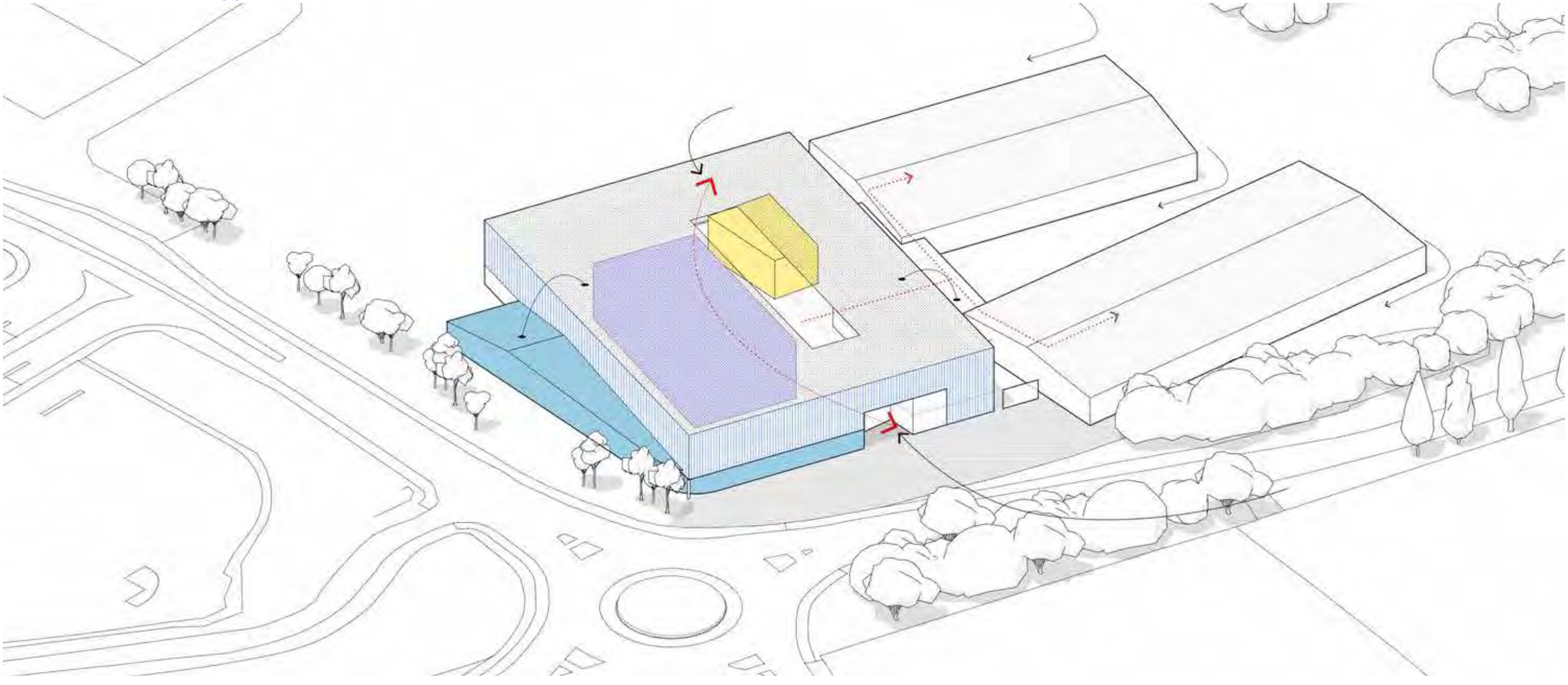
The buffer zone also ensures that there are no awkward parcels of land leftover around the site, i.e. in between the hammerhead access point and the boundary.

The size of the buffer zone was limited by CaVC to maximum 2.5 acres. The proposals fit within this limitation.

The width of the buffer zone was driven by the height of the proposed building. In doing so, a 45 degree angle was extrapolated from the roof down to the ground level.

4.11 Pedestrian & Cycle Access

The main pedestrian access is from the south



corner of the site, along Port Road, in response to the active travel route that is allocated in the SPG. CaVC have also expressed a desire to align with this allocated travel route.

An indicative bus stop location has also been shown on Port Road to encourage the use of public transport to the site. The feasibility of these locations is subject to further discussions with the Highways department.

There is also a main pedestrian access route from the North of the site which leads directly to the main entrance.

The cycle parking has been split into various accessible locations on site. There are 24 tiered spaces, with 16 standard cycle spaces along the main active travel route entrance along Port Road.

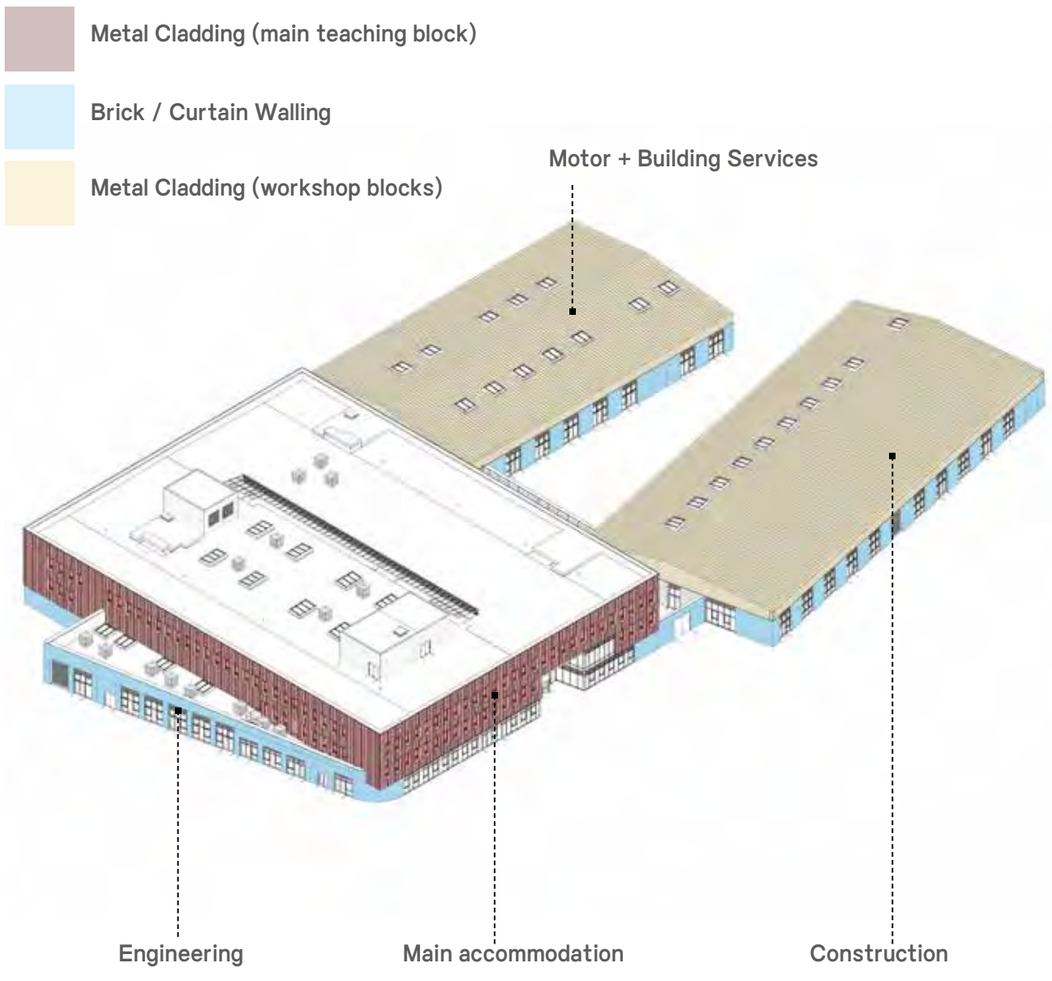
96 spaces are available in the car park to the north, with an additional 4 standard spaces to the entrance.

Then there are 160 spaces within the secure boundary line west to the main southern entrance.

The 280 total spaces have been proposed using two tier bike racks, with an additional 20 short stay cycle spaces.

4.12 Vehicular Access

Access to the site for all vehicles is from the north, via the existing hammerhead. This ensures existing infrastructure can be utilised as much as possible and that S278 works can be minimised. As a result, the car park is placed to the north side of the building. This provides separation between the pedestrian and vehicular entrances.



Typical Bay - Teaching Block

Typical Bay - Workshops

Oban high school

LJMU by Sheppard Robson

16 Church Street by Taylor Maxwell

Vejen Town Hall by Transform

Eco-cité La Garenne, Guillaume Ramillien Architecture

Oban high school

Notre Dame, Sheppard Robson

Eco-cité La Garenne, Guillaume Ramillien Architecture

The car park includes 294 standard spaces, 14 disabled bays, 32 Electric Vehicle Charging Points, and 10 Motorcycle spaces.

8 additional spaces to be utilised by the motor vehicle workshop, have been located adjacent to the

Typical Bay - Teaching Block

Opt 1: Metal Cladding Panel

Opt 2: Metal Cladding with Chamfer

Opt 3: Metal Cladding with window surround

Opt 4: Metal Cladding with facade pattern

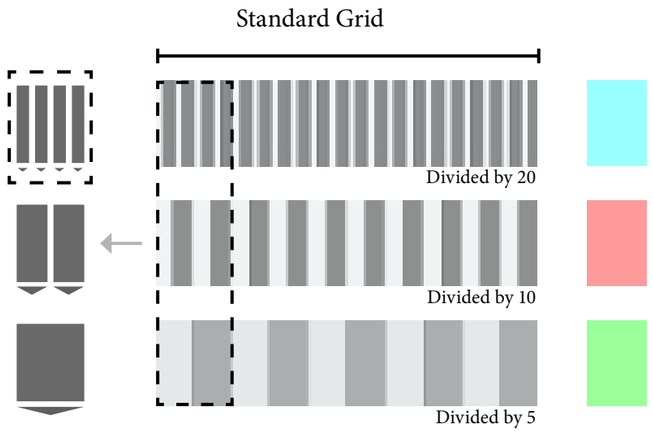
Preferred Opt 5: metal profile cladding

work shop with access point via a dropped kerb.

A safe route through the car park has been provided for pedestrians accessing the MUGA.

Refuse, service and delivery vehicles share the same circulation routes through the car park as cars. A delivery/ drop off and pick up bay has also been included adjacent to the building.

4.13 Refuse & Fire Tender Access



Metal Profile samples

Opt 1 - Preferred ✓

Opt 6

Opt 1 - Preferred ✓

Opt 2

Opt 3

Opt 4

Opt 5

Opt 6

Opt 7

Refuse vehicles share the same circulation routes through the car park as cars. A delivery bay has also been included adjacent to the building and next to the bin store for easy access.

Fire tender access also follows the same circulation route, with additional access into the contruction yard. This is to be confirmed by the fire consultant.

Option 1: Curtain Walling with Curtain Walling and Brick Piers

Option 2: Curtain walling throughout

Option 3: Curtain walling with back painted glass at column intervals ✓

4.14 Site Security

The security strategy is split into 3 levels:

- Public access: the pedestrian entrance off Port Road to the site will be open to the public. Access into the building is controlled internally.

Option 1: Metal cladding profile oversails past entrance recess

Option 2: Curtain glazing to entire LSC perimeter on first floor

Option 3: Curtain glazing to proportion of LSC perimeter to first floor (Preferred) ✓

- Controlled Access: The car park will be access controlled using automated gates that are connected to reception via intercom. This is to ensure only authorised visitors or members of staff have access to the site.

- Secure Areas: These are areas that are only accessed from inside the building or by

Elevations

Option 1: Step in Parapet height

Option 2: Parapet line falls from the end of the double height spaces

Option 3 (preferred): Gradual fall from each end of the Engineering department

3D perspective

authorised people. These areas include the cycle shelters, sprinkler tank, ASHP, MUGA, bin store and external workshop spaces.

4.15 Fencing Strategy

22.4m weldmesh fencing surrounds the majority of the site boundary and buffer zone. The exception to this is the site frontage where an open and welcoming approach is desired.

Acoustic louvred fencing is proposed to the air source heat pump enclosure and dust extaction enclosure to minimise the impact of noise adjacent to the building.

Elevations

Option 1: Feature brick pattern

Option 2: metal cladding finish

Option 3: Recessed brick

Option 4 (preferred): Recessed brick ✓

3D perspective

3m closeboard fencing has been proposed to the sprinkler tank to screen as much plant as possible from the car park.

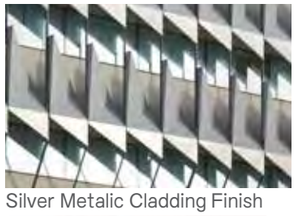
The main vehicular entrance (from the hammer head) at the north of the site will be access controlled with automated gates that are connected to reception via an intercom.

The service yards have internal secure lines to prevent unauthorised access.

Fencing to the MUGA is proposed as sports rebound weldmesh at 3m high.

A timber knee rail has been proposed to the north of the car park to separate the roadway from the swale, ensuring that vehicles avoid over-sailing the kerb in this location. It has also been proposed to the window collision details around the building, as well as an architectural knee rail which is proposed to the front and rear entrances.

Light Grey Brick



Silver Metalic Cladding Finish

Red Brick

Burnt Orange / Red Metalic Cladding Finish

Dark Grey Brick

Silver / Grey Metal Cladding Finish

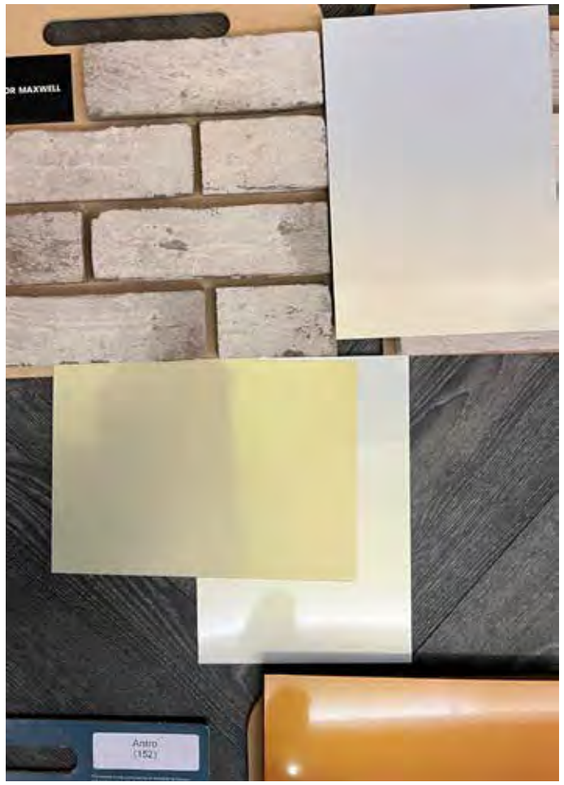
Light Grey / Buff Brick. Preferred Option

Gold/Silver Metal Cladding. Preferred

Colours and brick types shown throughout the document are indicative. Exact colour references, cladding and brick product are to be determined.

Preferred Option ✓

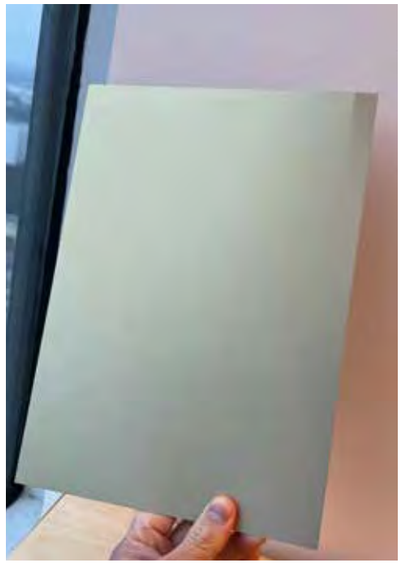
Some of the several brick types and metalwork colours being considered photographed in different light are displayed on this page. All colours will be determined at a later date with wider stakeholder input



Light Grey/Buff Brickwork Options

Metal Profile Cladding Panel

Gold/Silver Metalwork



The covered cycle shelters will form a secure

1 North West Elevation
02204 1 : 200

2 South East Elevation
02204 1 : 200

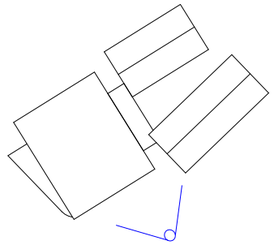
compound that will be accessed via a key pad or

1 North East Elevation
1 : 200

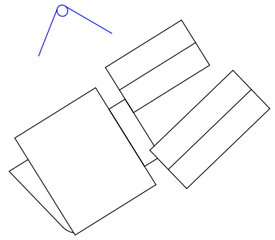
2 North East Elevation
1 : 200

3 South West Elevation
1 : 200

similar.



Visual of the front entrance



Visual of the rear of the building

Concept views

Main Entrance

Car Park Entrance

Aerial View of Car Park Side

Workshops

5.0 SUSTAINABILITY STATEMENT

5.1 Approach

The project aspiration is that the ATC building will deliver a net zero carbon in operation building. A net zero carbon in operation building is a building that is highly energy efficient and powered from renewable energy sources. The NZC carbon target will influence all aspects of the design from façade detailing, U-value calculation, passive measures such as daylight, ventilation, shading, and renewable technologies to reduce energy.

The project is working to a maximum embodied carbon target has been set at 800kgCO2/$m^{2\,GIA}$ (A1-A5) and this relates to the building en-masse, including substructure, super structure, façades and finishes. Material specification will be assessed and measured as the design develops in order to highlight any elements with a substantial impact.

5.2 Summary of Environmental Measures

Passive systems:

- Highly efficient façade
- Building orientation and perimeter space optimised to maximise daylight
- Natural ventilation throughout for summer
- Superblock form

Active Systems:

- Mechanical ventilation with heat recovery during winter
- All electric building, with the exception of laboratories and workshops areas which have specific teaching curricula (energy use in these areas is likely to be small in comparison to the rest of the building
- High efficiency ASHPs for space and water heating
- High efficiency lighting with daylight linked controls
- Sophisticated controls and energy management system
- Efficient water fittings with leak detection
- Heat scavenging from ICT server rooms
- Waste-water heat recovery from shower blocks
- Demand control in kitchen ventilation (where possible)

Renewables:

- Heat scavenging from ICT server rooms
- Waste-water heat recovery from shower blocks
- Demand control in kitchen ventilation (where possible)

5.3 Specification of Materials

To align with the agreed BREEAM targets, specification of materials will consider a number of sustainability aspects, including:

Timber – all timber and timber-based products used during construction must be legal and sustainable timber (following the UK Government's definition as outlined in the Central Point of Timber (CPET) 5th Edition of the UK Government Timber Procurement Policy (TPP))

Volatile Organic Compounds (VOCs) – at least three out of the five product types listed in BREEAM Hea 02 shall meet the emission limits, testing requirements and any additional requirements listed in the Hea 02 criteria in order to achieve one credit for Hea 02 Emissions from Construction Products

Responsible sourcing certifications – specifications will require that more than 20% of available BREEAM Mat 03 points will be achieved through procurement of materials from manufacturers with a BREEAM Mat 03-recognised responsible sourcing certifications for their products (e.g. BES 6001, ISO 14001 certification).

The BREEAM Mat 01 Life Cycle Assessment (LCA) options appraisal will also investigate the embodied carbon impact associated with key building elements. Where possible, alternative material specifications will be modelled for materials which are found to have a substantial impact, in order to allow for the environmental impacts of different specifications to be considered in decision-making, alongside other factors.

5.4 BREEAM

Advanced technology Centre (ATC) aspires to achieve a BREEAM Excellent rating which reflects the commitment to a holistic sustainability approach for the project from inception through construction and in-use energy consumption. The project has been registered with the BRE and is being assessed against BREEAM 2018 UK New Construction. The target scoring required to achieve this rating was agreed at a BREEAM pre-assessment workshop, and this continues to be adjusted and refined in line with design development. Scoring is being tracked via a live tracker, TrackerPlus. At the time of writing, the target scoring is as follows:

Target	Potential
73.74%	89.00%
Excellent	*Outstanding*

All minimum standards required for the Excellent rating are targeted, and the required 70% threshold is exceeded with a scoring buffer.

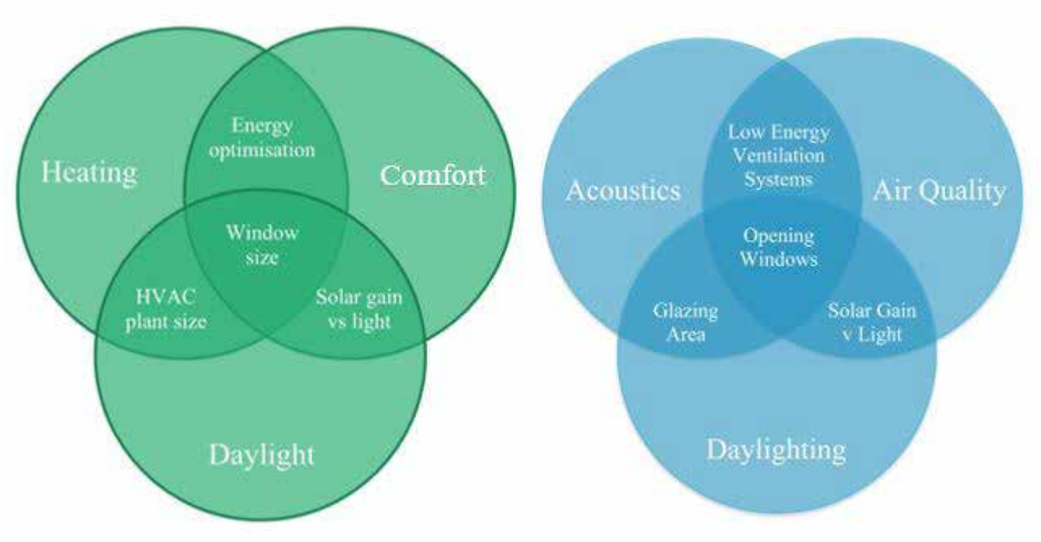
5.5 Environmental Engineering

In order to minimise the buildings overall energy usage and CO2 emissions a three-stage approach has been adopted to the design of the colleges and their associated systems. The three stages are:

1Passive design – reduce the need for energy from the offset

Active Design - supply energy efficiently and recover energy wherever practical

Use of renewable technologies



5.5.1 Passive Design

The building orientation has been considered in order to provide the optimum balance of direct solar gain that could lead to overheating against beneficial solar gain in winter. This also requires balancing against daylight requirements to give the best combination of natural light vs energy vs comfort.

Perimeter façade has been maximised to promote natural daylight and ventilation. This will improve health and well-being as well as reducing the reliance on artificial lighting.

Natural ventilation has been implemented throughout the building where possible (during the summer) as it is a fully passive means of ventilation.

Furthermore, a strong emphasis has been placed upon the fabric design to minimise thermal bridging and reduce air leakage so that not only will the building perform well at construction it shall continue to perform well for many years to come.

5.5.2 Active design

Highly energy efficient plant will be installed in the building to minimise energy use still further. The all-electric building with exceptions noted in 5.2) will use highly efficient Air Source Heat Pumps (ASHPs) to deliver space heating and Domestic hot water. Domestic hot water heat pumps will utilise CO2 refrigerant to further lower their Embodied carbon.

To further minimise heat loads during the winter, mechanical ventilation will be implemented so that any air entering or leaving the building will be via a heat recovery device as per Passivhaus principals. The Mechanical ventilation systems have been designed to have the lowest possible fan energy.

Highly efficienct lighting shall be provided with manual on and automatic off absence detection controls, with daylight dimming controls to further reduce lighting energy loads.

A highly sophisticated controls system will be implemented to ensure the any mechanical systems operate as efficiently as possible. For example, demand control ventilation that only operates when required by occupancy or CO2 levels. Furthermore, all systems will be metered with data fed back to an Energy Management System to itemise all energy within the building so that plant can be optimised over the lifetime of the building.

5.5.3 Renewables

The photovoltaic array design required to achieve net zero carbon (NZC) in operation has been developed and is substantial in size, occupying a large percentage of the roof space and other site canopies. As only limited grid export is possible, a battery storage system has been proposed for the scheme to improve the expected on site usage of energy generated for ATC.

5.5.4 Water Efficiency Plan

There is an environmental and carbon footprint associated with potable water consumption, this is attributed to the energy and resources that are required to extract, treat, and pump this water from its source to where it is needed.

The follow measures will be implemented to minimise potable water use.

- Conservation measures e.g. WCs with low water volume dual flush cisterns, low water use appliances and fittings, flow restrictors, plus automated supply shut-off where practical
- A leak detection system(s) for management of water consumption through metering & monitoring via the BMS
- A rainwater harvesting system has been developed for the college to reduce potable water demand.

A hierarchical approach has been used to define the storm water drainage strategy for the proposed development's runoff in compliance with 'Statutory standards for sustainable drainage systems - designing, constructing, operating and maintaining surface water drainage systems 2018'.

5.6 Building Ventilation Strategy

In order to achieve the NZC aspiration of the building a combination of natural ventilation (in the summer) and mechanical ventilation (during the winter) will be provided.

Natural ventilation is generally achieved using single sided ventilation for teaching spaces, and “cross-flow” ventilation for ICT, (and other areas with expected high heat gains). Cross flow ventilation is achieved using the centralised atrium to draw air through classrooms.

During the winter, windows will be closed to prevent cold air entering the building and local Hybrid Ventilation Heat Recovery units (HVHRs) will supply and extract air to the classrooms. The units will include high efficiency heat exchangers (~45% efficiency) to recover heat from the exhaust air and temper the incoming air as required by BB101 to minimise cold draughts. This provision of air will be supplied to mix and distribute evenly in the classroom.

In the main halls and double height spaces within the building they shall solely be ventilated by rooftop Windcatchers that shall provide supply and extract air into the spaces below all as natural ventilation. In order to improve performance on still days when the wind pressure is calmer, the Windcatchers shall utilise a solar powered integral fan to boost airflow.

5.7 Heating and Cooling Strategy

The college’s space heating requirements will be fulfilled by a series of air source heat pumps (ASHP’s) located externally. A thermal storage buffer vessel will be included on the primary return side to meet the minimum system water content required by the ASHP’s. This water content is required to limit the on/off cycling of the units and to aid with the defrost cycles during cold weather.

The mechanical cooling within the college will be limited wherever possible. There are some areas within the building such as the IT server rooms which will experience high heat gains and it is proposed to provide some mechanical cooling services. Cooling shall be provided through heat scavenging cooling systems that will re-purpose heat into the heating system where possible. A DX backup system will be provided for cooling resilience.

5.8 Energy Usage

The college has been designed to meet an aspiration operational NCZ target, whereby the operational energy consumed on site (both regulated and unregulated) should be generated by an extensive roof mounted solar photovoltaic (PV) array, augmented with a battery system.

In addition, the college has been designed to minimise energy demands through extensive modelling and assessment of the building (in line with contract requirements, the BREEAM assessment and a detailed energy prediction study).

ATC	
Electricity	kWhr/year
Predicted Consumption	979,170
Predicted PV generation	484,709

6.0 ACCESS STRATEGY

6.1 Access and Inclusion

The proposals have been designed to meet the requirements of current Building Regulations, The Equality Act and other relevant regulations and standards, including those accessibility standards specific to Welsh policy.

To promote equality and diversity, the following measures have been identified within the proposals:

- All toilets provided will be gender neutral and self-contained
- Provision of a faith room
- Adjustable laboratory and kitchen furniture
- Provision of induction loops in line with the requirements of the Equality Act 2010
- Project Co raises further criteria for the facilities which is listed below:
- Way-finding should be logical, easily understood and signage should be clear.
- Buildings should be accessible to all students, staff and visitors with ALN, and/or disabilities.
- Buildings should cater for the needs of people with impaired sight or hearing.

The above have been considered when designing the circulation both in proposed width and layout of corridors, stair and lift locations. The criteria will further inform the design at later stages as finishes and signage strategies are considered in more detail.

6.2 Access to Site

The main pedestrian access is from the south corner of the site, along Port Road, in response to the active travel route that is allocated in the SPG. CaVC have also expressed a desire to align with this allocated travel route.

An indicative bus stop location has also been shown on Port Road to encourage the use of public transport to the site. The feasibility of these locations is subject to further discussions with the Highways department.

There is also a main pedestrian access route from the North of the site which leads directly to the main entrance.

Access to the site for all vehicles is from the north, via the existing hammerhead. The car park will be access controlled using automated gates that are connected to reception via intercom. This is to ensure only authorised visitors or members of staff have access to the site.

6.3 Parking Provision

The car park includes 280 standard spaces, 14 disabled bays, 32 Electric Vehicle Charging Points, 10 Motorcycle spaces and 2 Minibus parking spaces.

8 additional spaces to be utilised by the motor vehicle workshop, have been located adjacent to the work shop with access point via a dropped kerb.

6.4 Cycling Provision and Amenities

The cycle parking has been split into various accessible locations on site. There are 24 tiered spaces, with 16 standard cycle spaces along the main active travel route entrance along Port Road.

96 spaces are available in the car park to the north, with an additional 4 standard spaces to the entrance.

Then there are 160 spaces within the secure boundary line west to the main southern entrance.

The 280 total spaces have been proposed using two tier bike racks, with an additional 20 short stay cycle spaces.

6.5 Public Transport Amenities

The SPG allocates an active travel route along Port Road, the site's southern boundary. This active travel route includes the allocation of a 10m wide cycleway and a bus route.

In order to respond to the 'Cardiff Airport and Gateway Development Zone' SPG, the proposed masterplan has been developed to link to the active travel route that is proposed along for Port Road. An indicative bus stop location has also been shown on Port Road to encourage the use of public transport to the site.

6.6 Service Vehicles, Refuse Lorries, Fire Engines etc

Refuse vehicles share the same circulation routes through the car park as cars. A delivery bay has also been included adjacent to the building and next to the bin store for easy access.

Fire tender access also follows the same circulation route, with additional access into the construction yard.

6.7 Internal Accessibility

The building layout and finishes will be designed to be fully useable by occupants with a range of accessibility needs including mobility needs, SEN needs, sight/hearing needs and needs specific to young pupils. The buildings elements and components will be designed to be appropriate dimensions, heights, weights, to be suitable for an all-through College:

Specifying finishes which are of a suitable robustness for a College, the design team will also specify to the correct level of slip resistance for floors

-Teaching spaces will have desks suitable for wheelchair users (dropped benches in Science Labs) and all teaching rooms will have space for wheelchairs to turn. Desks and counters will have dropped height sections for wheelchair users.

-Hearing loops etc. will be identified on the services engineers information.

Main throughfare corridor widths have been stipulated by Brief, and are generous to allow for peak flow at busy times of the day. These wide corridors will help to support the normal functioning of the College (occasional removal of large furniture etc). Corridors will as a minimum meet, and often significantly exceed, the widths required in Approved Doc. Part M for wheelchair accessibility.

6.8 Emergency Escape

The corridors will form the principal horizontal means of escape around the building and as such will be designed to meet fire regulations. There will be regular cross-corridor doors as required by the regulations. These could be held-open by détente devices -subject to detailed design at the next stage. The Fire Strategy has been designed using guidance document Building Bulletin 100 Design for fire safety in schools, 2007 (BB 100:2007) as its basis. The Fire Strategy Report will be submitted by the fire consultant as part of the

Building Regulations application.

6.9 Horizontal Circulation

Horizontal circulation in the general accommodation block is organised around a corridor route which follows the form of the building connecting all the stairwells at each quadrant/corner. Teaching accommodation is typically on both sides at ground varying slightly as one passes through dining. On the upper floors, there is greater interest with the corridor opening out overlooking the central atrium and bordering the informal breakout spaces, The workshop spaces are accessible via a route located off the main atrium. This will also act as a buffer zone between the 'clean' and 'dirty' spaces allowing students to change into workshop attire or conversely get changed before they enter the generic block. The workshops flank each side of a central corridor and a external access door is provided at the end of the corridor.

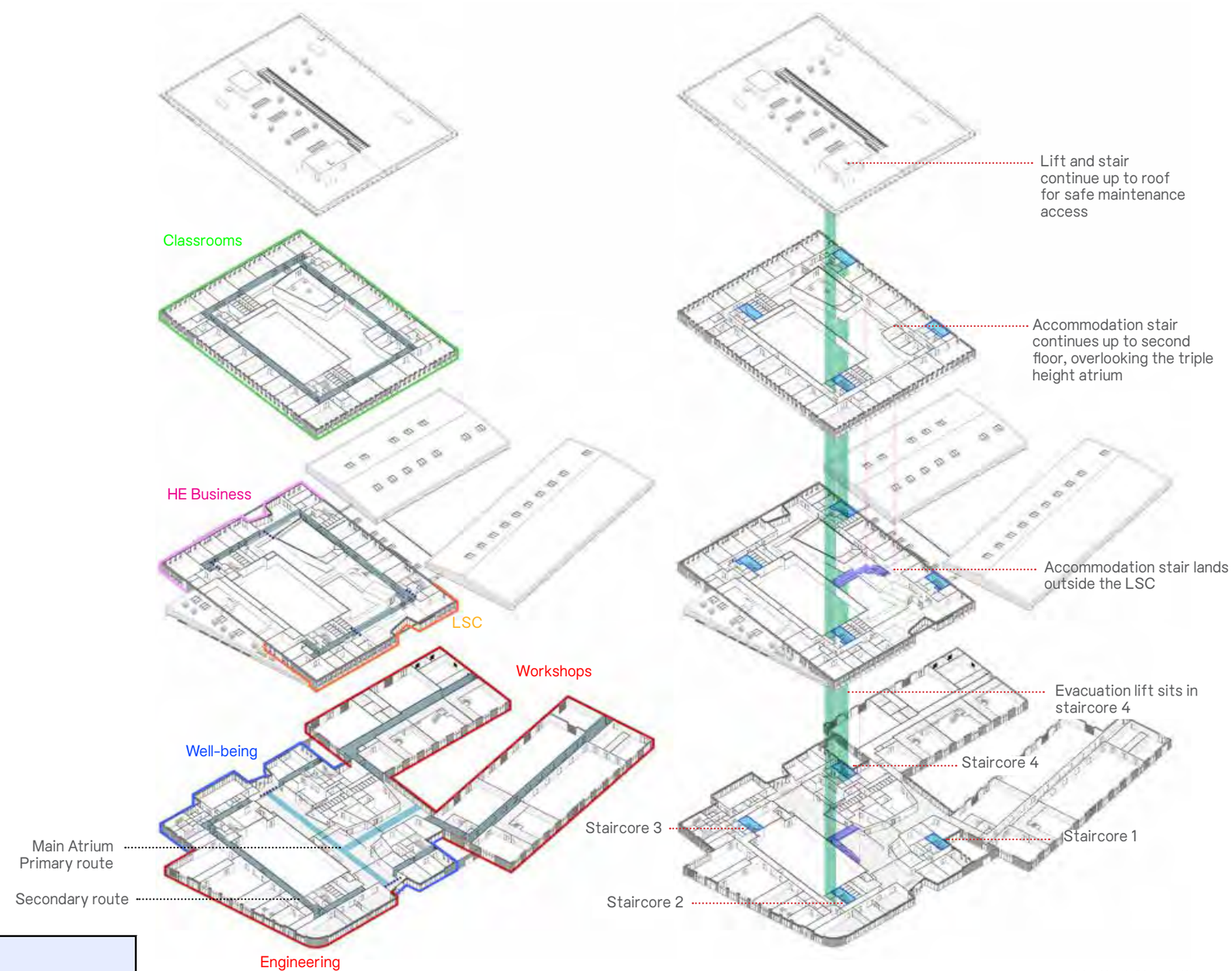
6.10 Vertical Circulation

There is a central accommodation stair located within the atrium of the building. This stair changes character as it moves up between floors and facilitates natural wayfinding through strong visual links, encouraging users to use active travel between floors (stairs rather than lifts). It provides visual activity within the space and opportunity for architectural expression. In addition to the accommodation stairs, the building is served by four stair cores with two lifts which allow direct access to departments situated at each corner of the building and easy movement of supplies and deliveries between floors.

6.11 WC Accommodation

The toilet provision is based on 85 staff (including visitors) and 1896 student occupancy assuming 80% at peak occupancy with no separate staff provision except within staff changing rooms where specifically requested by the college during departmental consultation. As the college have expressed their preference for

				Superloos		
College Staff	College Students	Total	Assumed Occupancy (80%)	Peak Occupancy	+ 25% Uplift	1 WC per 20
85	1896	1981	1585	1585	1981	99



Vertical Circulation

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