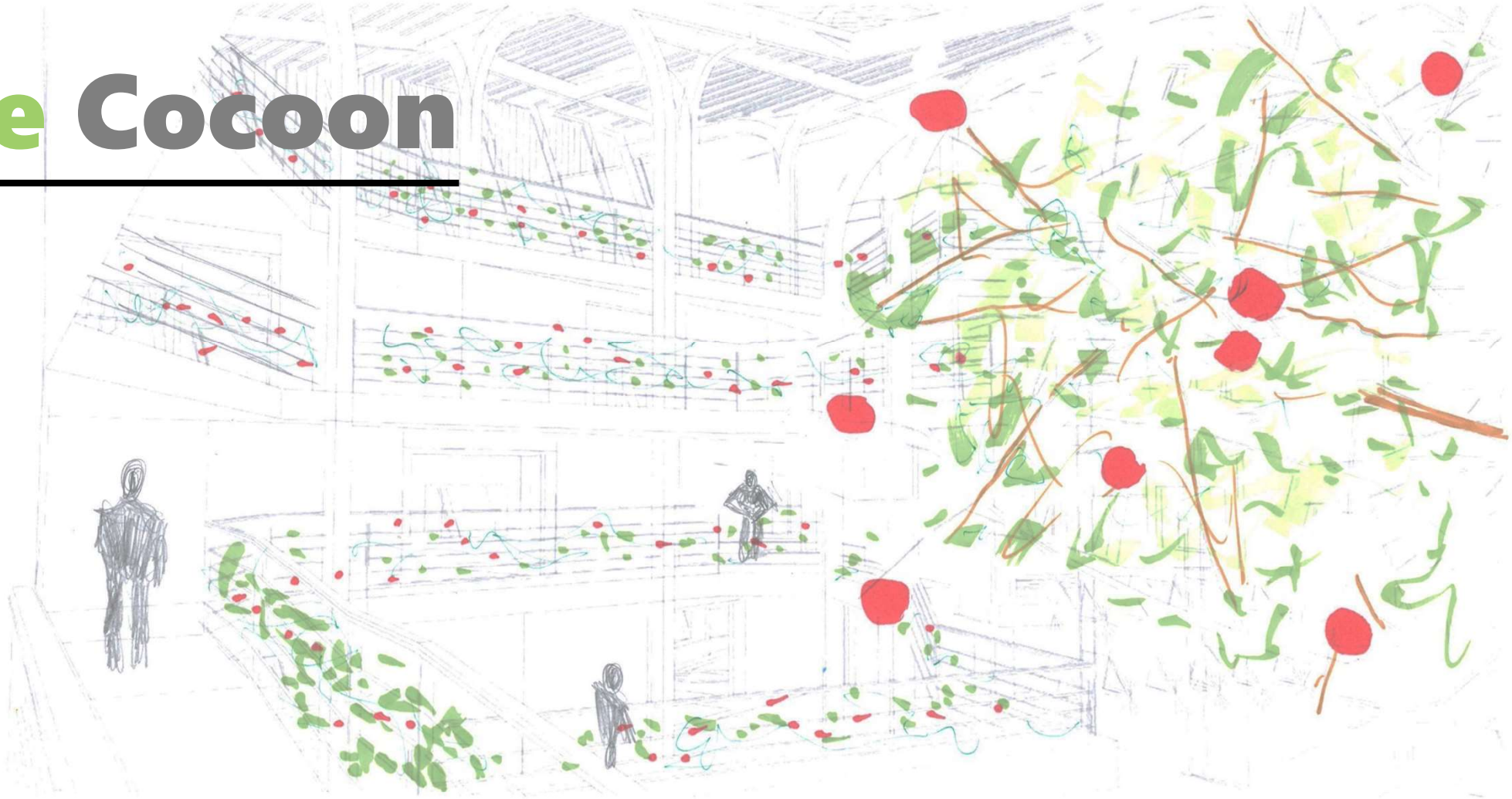
the Cocoon



..the Cocoon is a modern & exciting business incubation centre and coworking zone. Its aim is to provide a habitat which positively influences people, business and the environment...

100430923

00 Contents

01 Design Specification

A three strand approach will interweave the needs of people, business and the environment to create a meaningful and beneficial piece of architecture.

Nurture: People

Biophilic Patterns: the integration of biophilic patterns into the design creates a positive and healthy environment. Included Biophilic Patterns (18) are: Visual & Non visual connections with nature, Thermal/ Airflow Variability, Dynamic Light, Connection to natural systems, Material Connection to Nature, Complexity and Order, Prospect & Refuge, Mystery and Risk/Peril.
Nutrition: the on-site café and kitchen allows for the creation of healthy meals utilising produce grown on-site
Natural Light: natural light is known to beneficially effect the body and mind improving productivity and enhancing sleep.

Nurture: Business

Mentoring: a variety of mentors will have office space within the facility
Support Services: support service such as accountants, technical support and legal advice will be available.
Adaptable Environments: allow for the 4 types of brain operation as envisioned by the creators of the 'Fosbury & Sons' coworking spaces. These are ***individual work, focused work, collaborating*** and ***rest.****(16)*
Community: the co-working space will allow members to take part in a community of entrepreneurs.
Knowledge & Learning: Facilities, workshops and lectures will be made available to members.
Business City: aligns with council objective to create *"**A diverse range of high quality office accommodation including managed workspaces, "grow on" space, conference facilities and business support services"***(17)

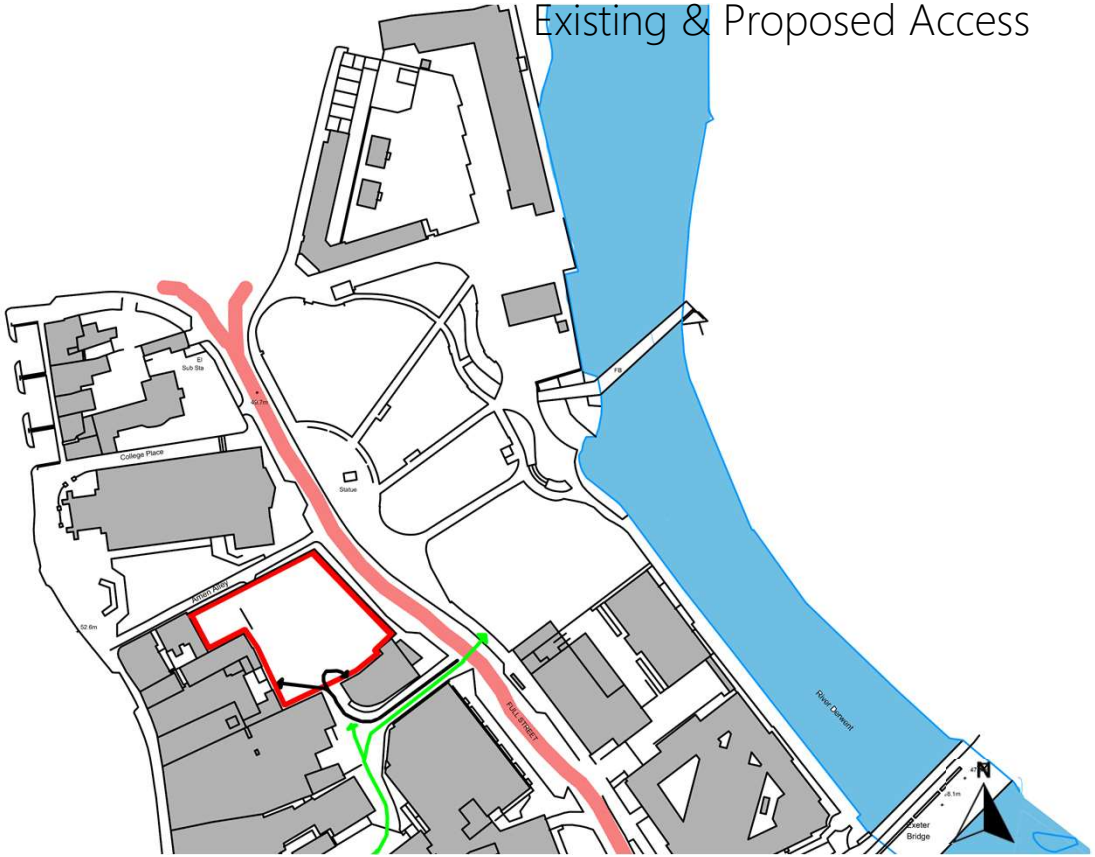
Nurture: Environment

Reduce: a series of induvial zones means heating and lighting is only used when it is required.
Modular Build: reduces waste and allows for higher standards of construction.
Passive Strategies: integration of a variety of passive strategies such as: solar shading, the stack effect and natural light.
Transport: provision of bicycle storage and showers as well as the sites proximity to the city centre means a reduced reliance on private motor vehicles.
Solar & Rainwater Harvesting: Photovoltaics used as louvres and rain water harvesting from the large roof will help mitigate the buildings power and water requirements.

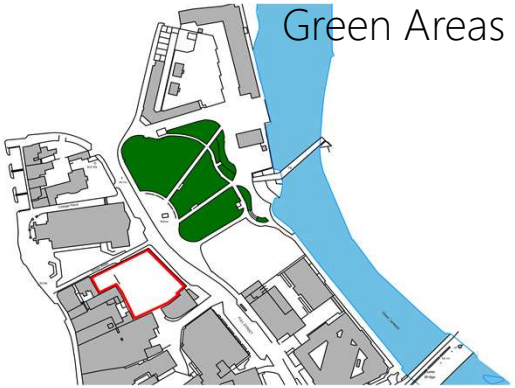
02 Site Investigation

The chosen site DE1 3AF (outlined in red) is currently being used as a car park on Full Street. It is situated behind the road that runs from the Square to the Cathedral. It has the backs of shops and bars on its west side, to its south is Huub a bicycle repair shop. Across Full Street to its east is a hotel and residential block.

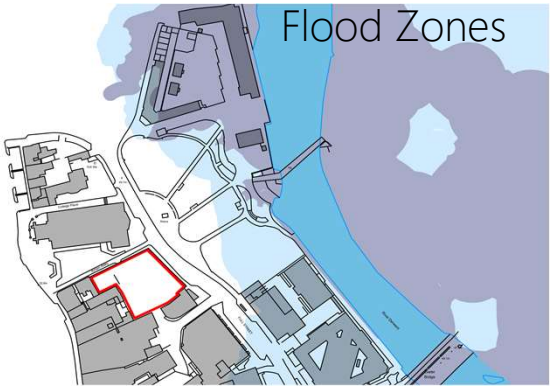
Existing & Proposed Access



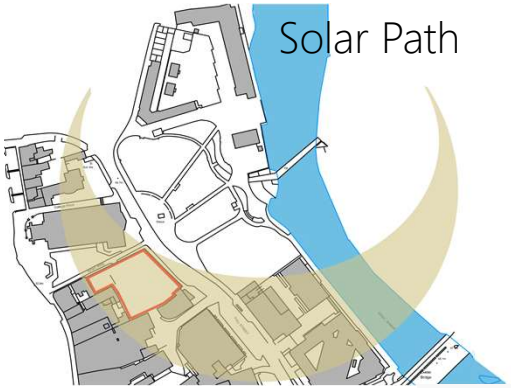
Green Areas



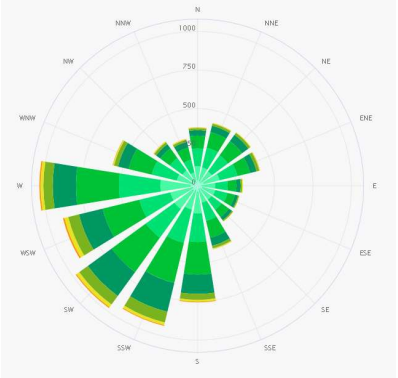
Flood Zones

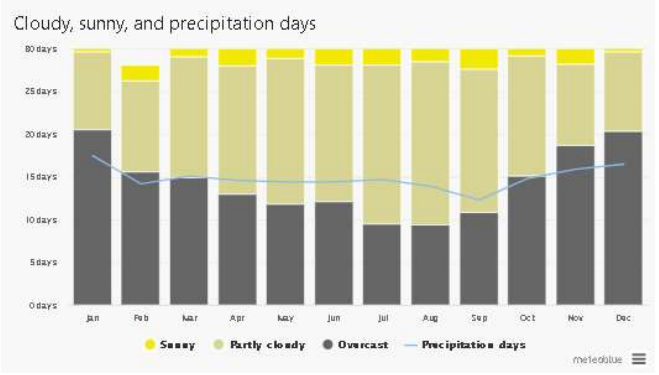


Solar Path



Listed Buildings



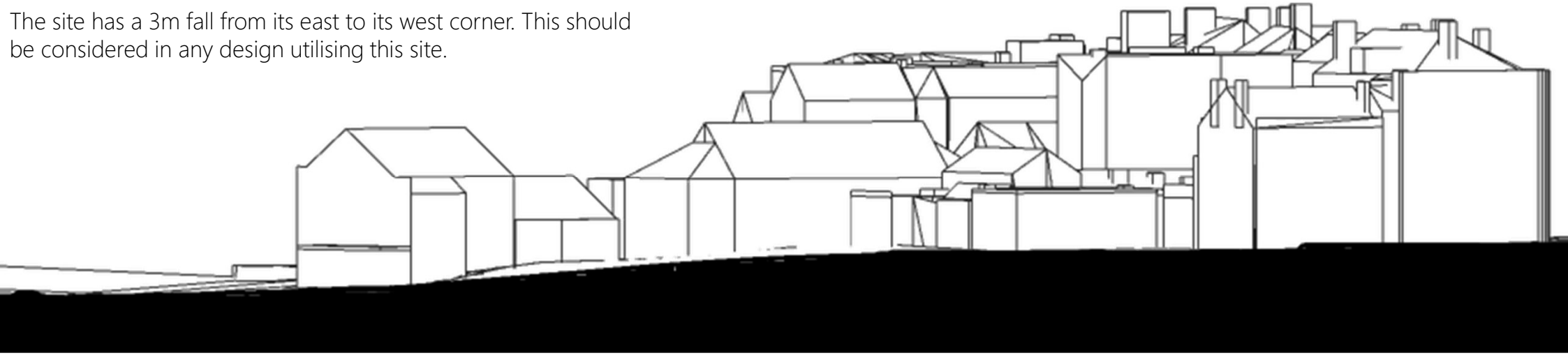


The existing access required across the site is highlighted by black arrows. The green arrows show the new permeability proposed in our city centre master plan. Our proposed master plan adds a crossing point on Full Street which we identified as not pedestrian friendly.

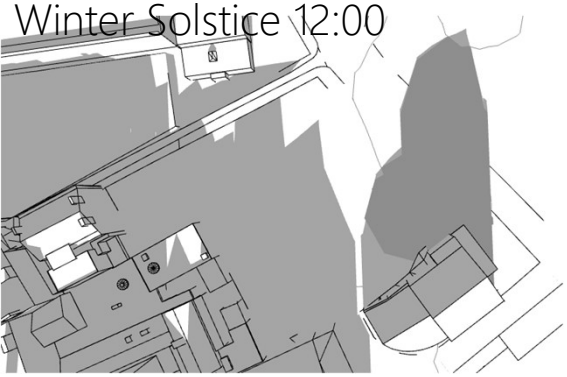
The site is located in an area which has around 15 days rainfall per month. This site is exposed to the prevailing wind (see wind rose).There is no recorded radon risk on the site 1. No existing planning applications on the site have met major resistance.

02 Site Investigation

The site has a 3m fall from its east to its west corner. This should be considered in any design utilising this site.

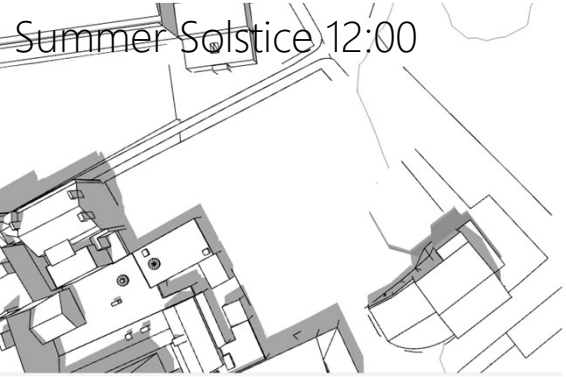


Winter Solstice 12:00

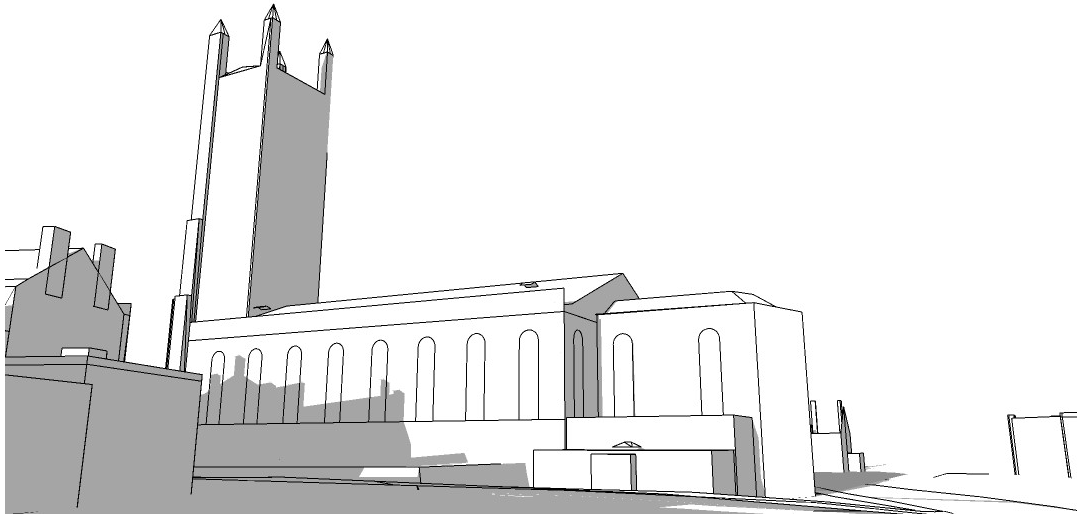


Winter Solstice 12:00 + 3m

Summer Solstice 12:00



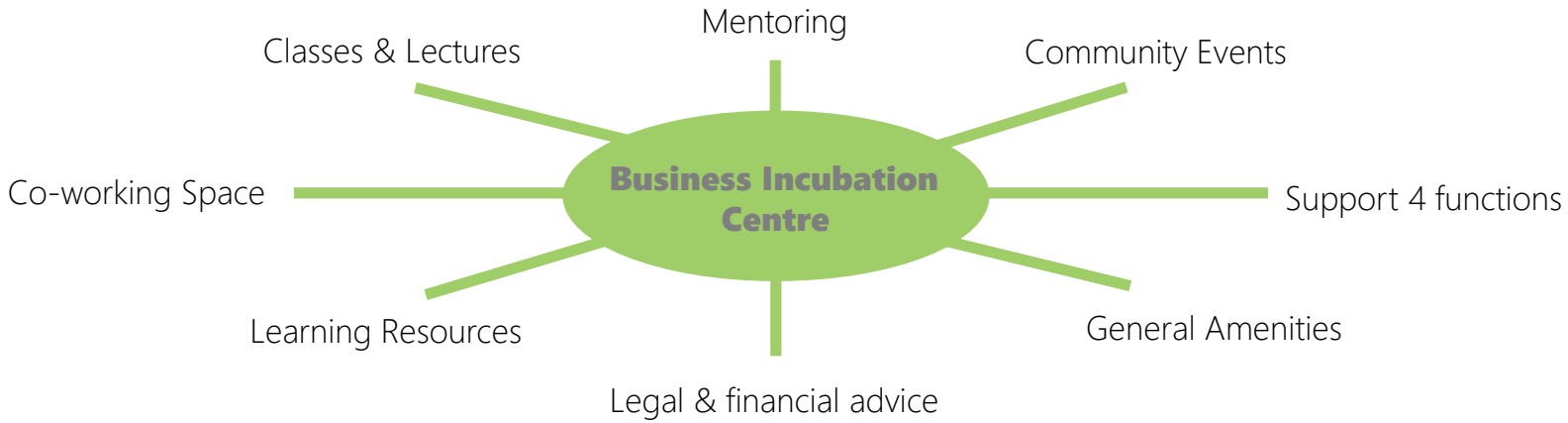
The surrounding buildings shade the site at winter solstice. By raising the maximum site level 3 meters we can gain much more sun. At summer solstice there is very little shade provided by the surrounding buildings.



There are large glazed windows which provide the cathedral interior with direct sunlight. These are already partially obscured by existing buildings (12pm winter solstice). Any building which fully obscures this will detract from the interior space of the cathedral, any shading should be minimised.

03 Precedent Analysis

A general analysis of existing business incubation centres, their facilities and their services has been conducted to gain an understanding of what is required. This space is being developed in-line with the Derby Masterplan which notes a requirement for *"A diverse range of high quality office accommodation including* ***managed workspaces****, "grow on" space, conference facilities and* ***business support services****"* (18)



Business Incubation

There are large amount of business incubation centres in the UK, a selection of these were analysed to see what was offered:

- The Hive in Nottingham has an 80% success rate and provides:
- Facilities and office space, advice and mentoring, business guidance, business planning support and social events.
- The Innovation Factory in Belfast offers a variety of facilities including; coworking space, private offices, meeting rooms and skills classes.
- Bathtub 2 Boardroom provides; affordable coworking space, meeting rooms, enterprise education, mentors, financial legal & intellectual property advice.
- A large amount of business incubation centres capitalise on the benefits of coworking spaces to improve their offers.

Coworking

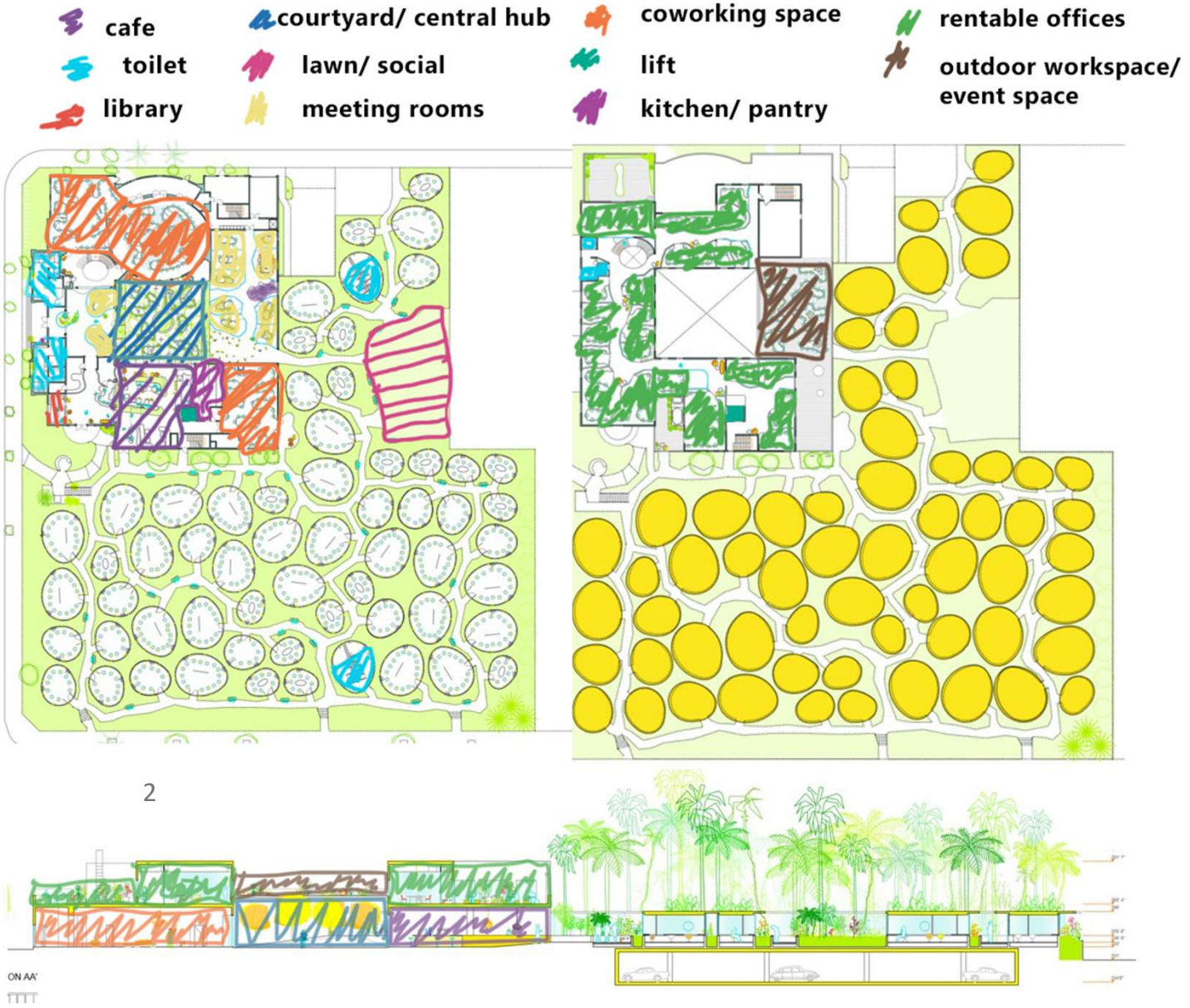
'Coworking MAG' has complied a list of the benefits of coworking, these are:

- Flexibility
- Better Networking
- Reduces Overheads
- Like Minded Community
- Collaboration & Peer to Peer Learning
- Emotional Support
- Mix of Work & Rest Spaces
- Increased Inspiration

In an analysis of coworking the following quote was discovered *"four basic functions of the brain: individual work, collaborating, focused work – really diving deep into a matter – and rest. The brain needs to rest"* (17)–Founder of Fosbury & Sons Co-working spaces

03 Precedent Analysis

The second home LA coworking zone was analysed in order to better understand what is required in this type of space. There are a large variety of space types that have been included in this precedent.



03 Precedent Analysis


3


2

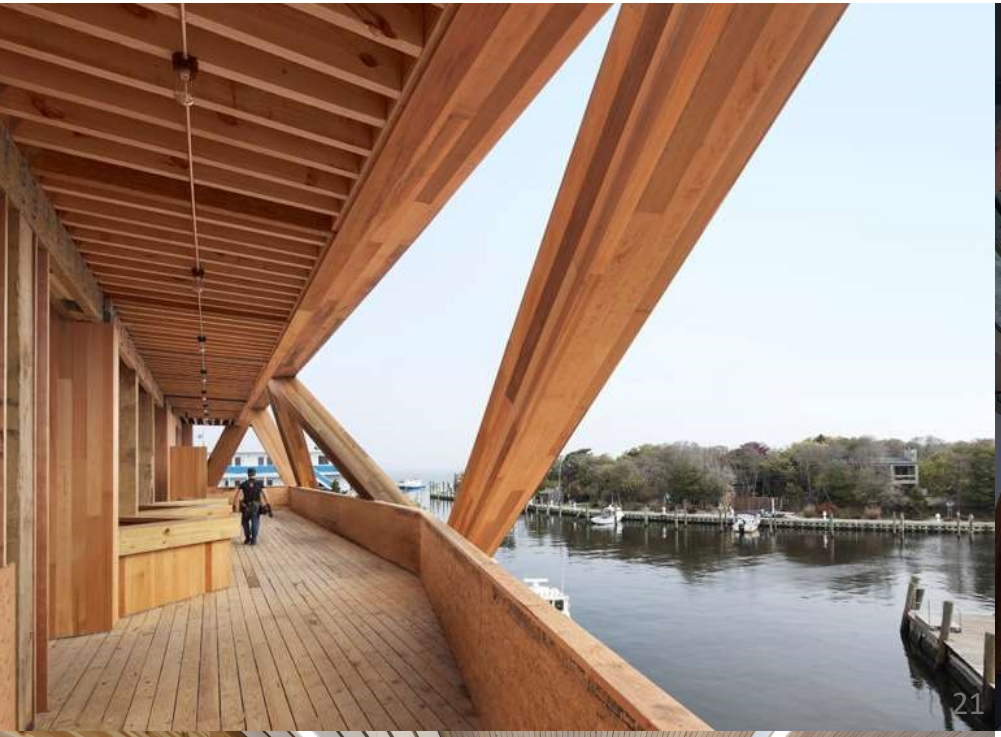

2

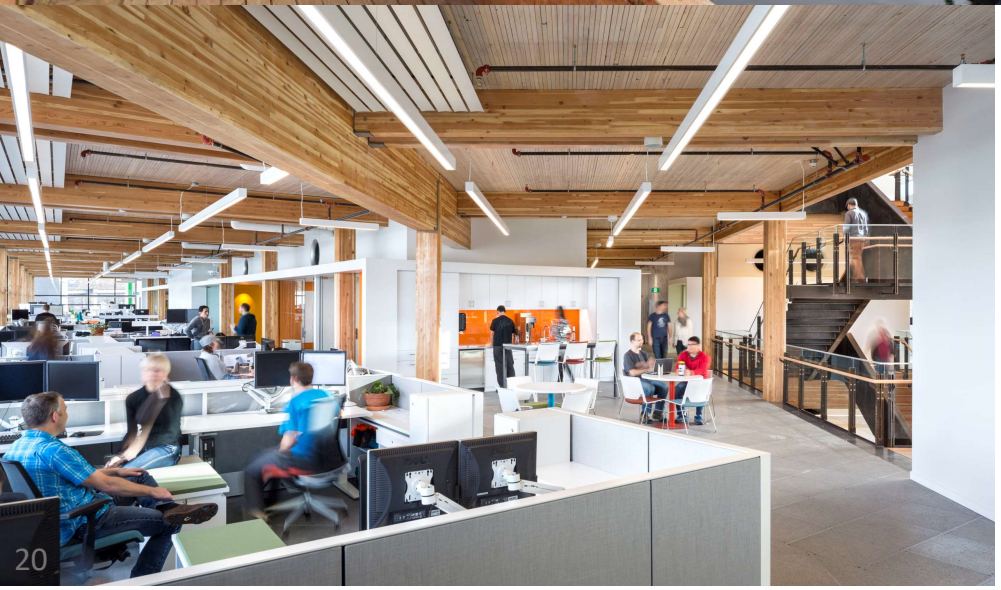
While I was inspired by the 'second home LA' coworking offices (shown above). I needed to find a way to create a similar environment in a British climate. A little research lead me to consider a large greenhouse, such as the Sheffield Winter Garden or Eden Project (shown below). There is a further challenge with sustainability with any large glazed structure. While the use of a greenhouse will help with heating in the cooler months the heat in the summer must be appropriately mitigated. This combined with my concept lead me to the idea of buildings withing buildings, in order to allow controllable environments. This has been implemented in Derby's 'Roundhouse' by Marber (bottom right).


4


5

03 Precedent Analysis





During precedent research the spaces which stood out aesthetically where the three surrounding images. These show a combination glulam beams, glazing and cast concrete. The combination of these materials creates a warm and modern feeling which is not overbearing due to the offset of the cooler concrete. They are also all well light spaces with an open feel, something which I intend to mirror

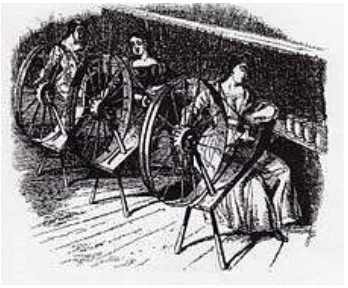
The integration of plants and ideas of indoor/outdoor space with this combination of materials is of specific interest for my design as I intend to integrate the principles of biophilic design into this project.

The integration on surface services in this office space (lower left) does not detract from the aesthetic of the building and actually provides complexity to the design.

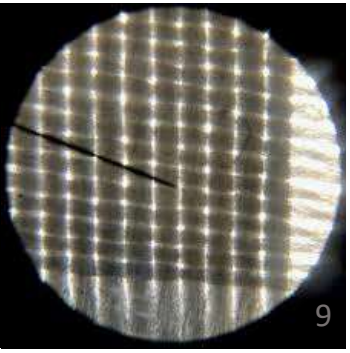
The large view towards a river (upper left) is something I can use in my site, as one edge of the site is aligned with the river and river gardens.

04 Concept Inspiration

Cocoon



Spun Threads



Woven Fabric

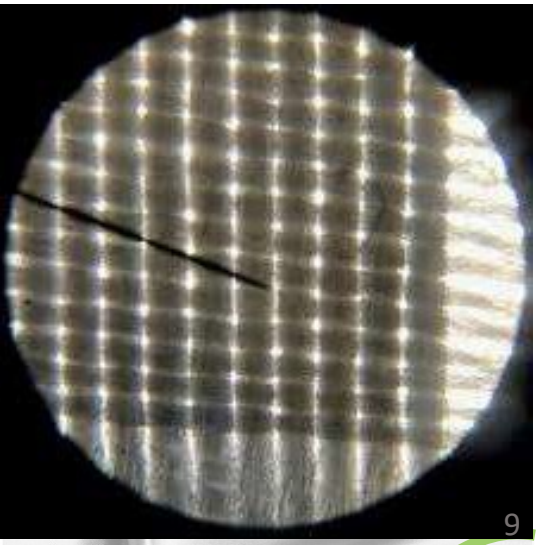
Finished Silk

*"I was inspired by the way a thread spun from **multiple cocoons** could be woven **into** such an **orderly pattern**, but **create** such a light, **flowing fabric**"*

The silk mill is known as the birthplace of the industrial revolution. John Lombe stole the secrets of industrial silk production from Italy and brought them back to Derby. The silk trade became a cornerstone of industry in Derby and the surrounding area(7).This seems like a suitable inspiration for my building not only due to its proximity to the site but also because it was founded by one of Derby's most influential entrepreneurs.

The silk making process, often know as silk throwing, involves strands from multiple cocoons being spun into a single thread. This thread is then woven together to create silk. Due to the intricate nature of this process it was done by hand for many years meaning the cost of silk was incredibly high.

04 Concept Development



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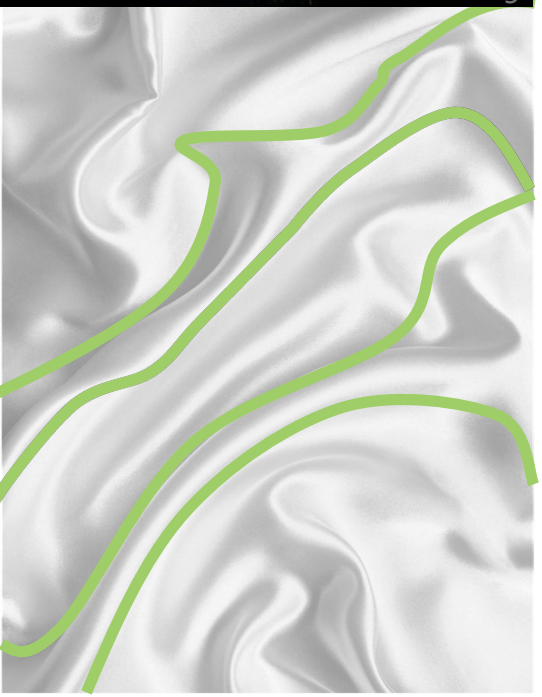


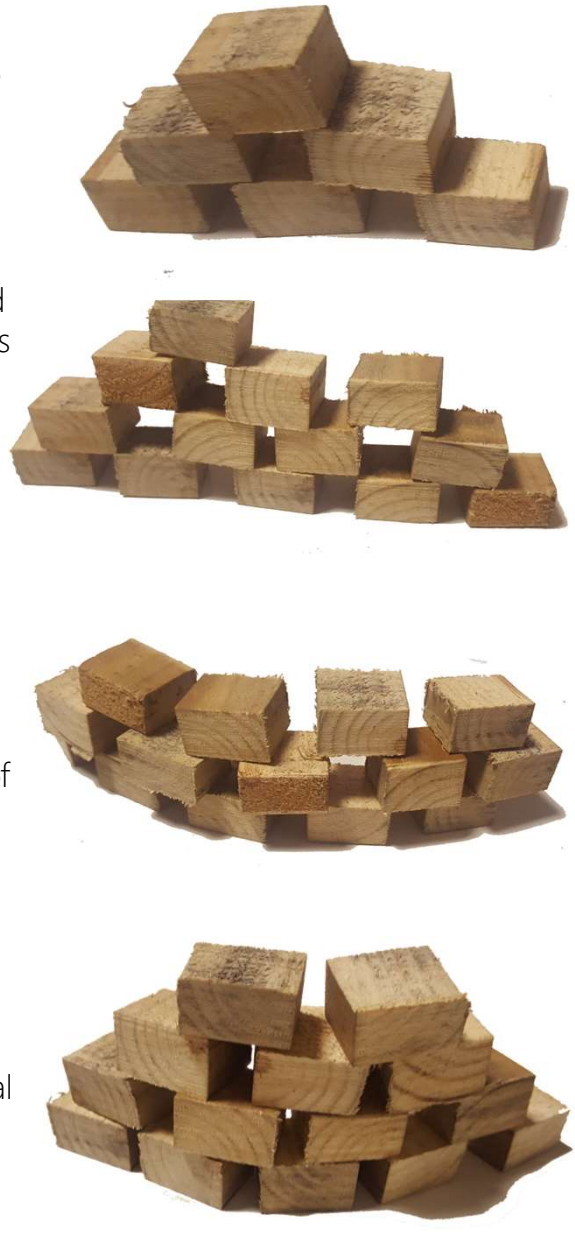
8

The idea of a regular pattern being used to create a flowing shape such as that seen in rippled silk (bottom left) inspired further precedent research into building with regular patterns.

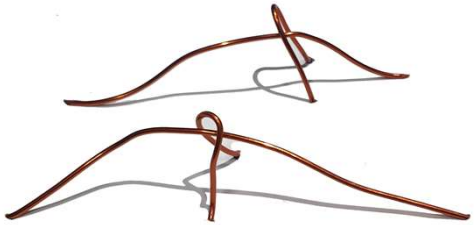
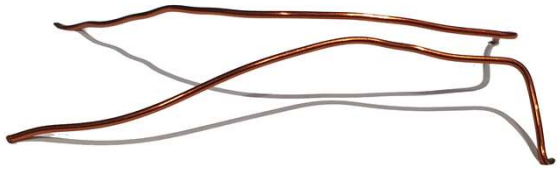
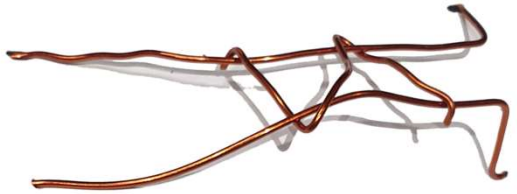
The Farmhouse' (centre) is not just an example of series of modules arranged in an aesthetic pattern. The way it plays wood, glazing and plants was also congruent with ideas I had for my design. Further the triangular shape used as a base form has been cleverly used to create exciting and aesthetically pleasing interior spaces.

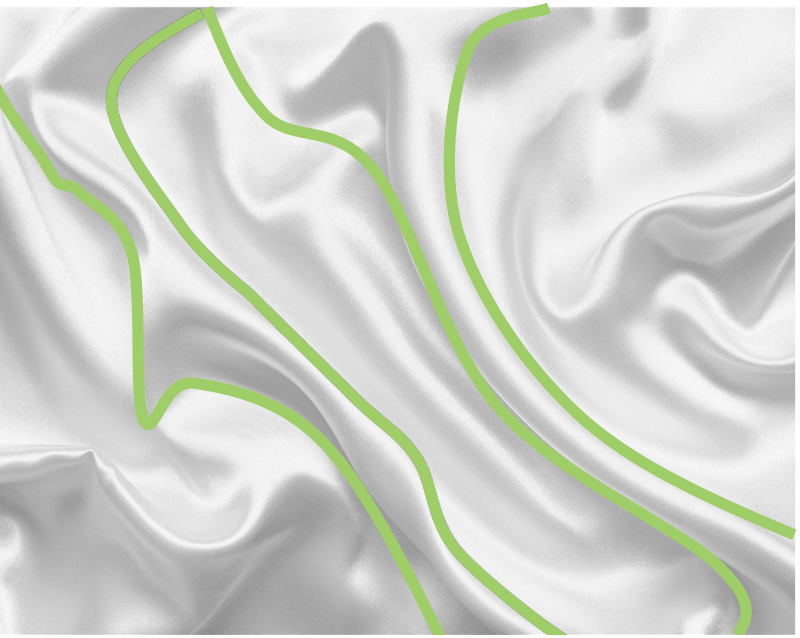
The idea of a modular build fit my concept, the idea of cocoons beings spun together to create a flowing shape. It is also aligned with my goal of creating a highly sustainable building. Modular builds can reduce waste and increase the quality of a finished building. They also work well with my precedent inspired ideas of using the buildings withing building approach. .

The wooden blocks (right) are my initial experimentations in form finding. A cuboid was used due to the rectilinear pattern present in woven silk.



04 Concept Development

The idea of flowing silk was further explored through the means of physical modelling. This started off with wires models this then progressed to solid card models. The wire frame models attempted to mimic the shapes which inherently form in fallen silk. The idea of splaying shapes where experimented with along with the idea of more regular forms.

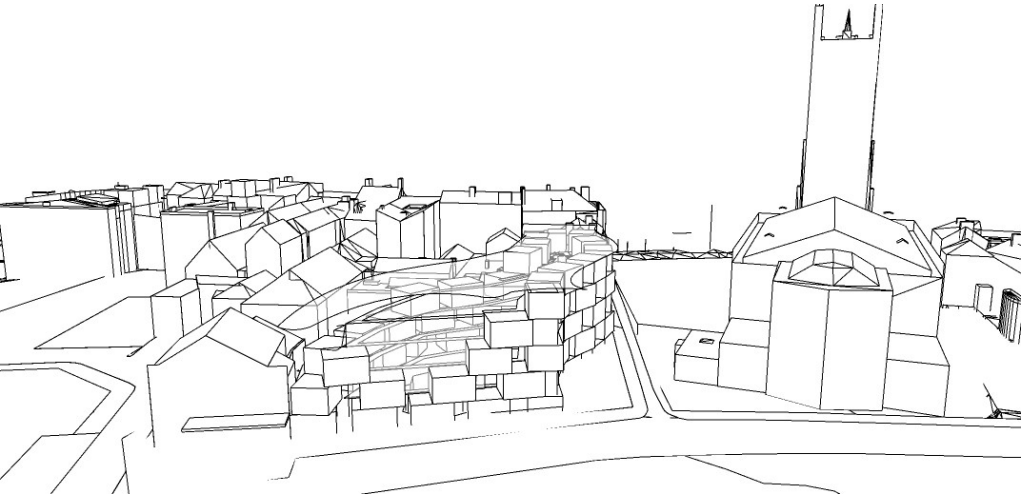
The solid models made of card further explored the splayed form previously noted through experimentation with wire models. The card forms where used as the support structure for a softer roofing material, intended to better create the illusion of fabric. The material used in modelling was cling film, double folded to give it more rigidity.

The below forms are a selection of the previously discussed models. They start with mimicking ripples, then progress to a more solid form. These provided a starting point for the design development, which commenced after further exploration of the concept of silk and the regular gird created during the weaving process. This is carried out using looms and transforms the silken thread into the light silk fabric which can then be used in the creation of garments.



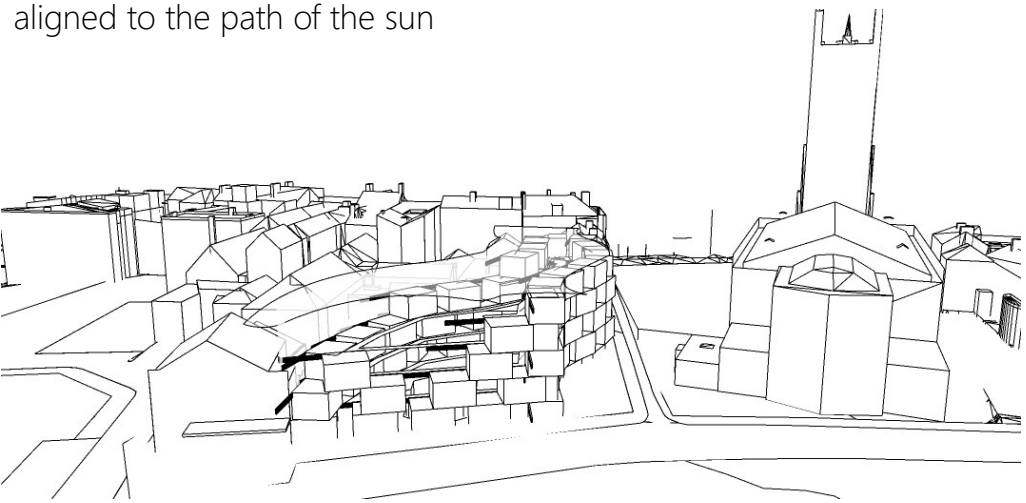


05 Design Development



1: Taking what I had learned from my physical modelling, I created a an initial model on the site inspired by the ripples present in fallen silk. In this variation the model is internally glazed with ripple curvature aligned to the path of the sun

2: glazed façade moved to exterior. Walkways integrated which act as solar shading.

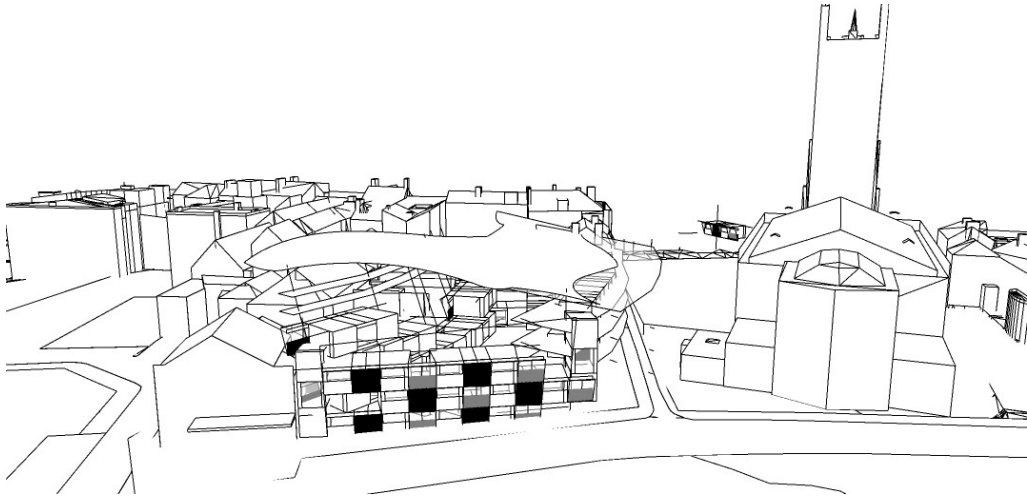


3: Still feels like a collection of boxes instead of a building, experimentation to develop a more regular patten commences.

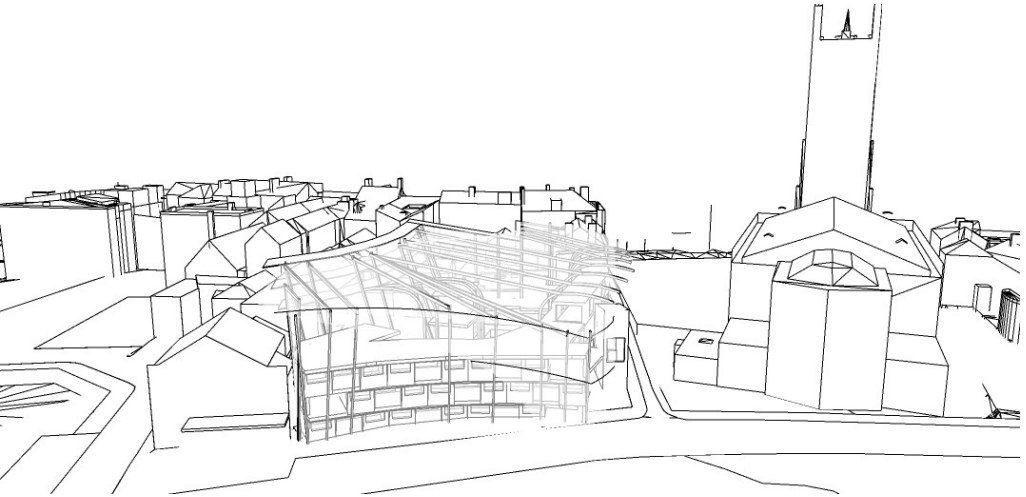
4: Module shape changes with angled end wall allow the creation of curves. Shape has become more regular. Roof angle amended to incorporate winter sun.

05 Design Development

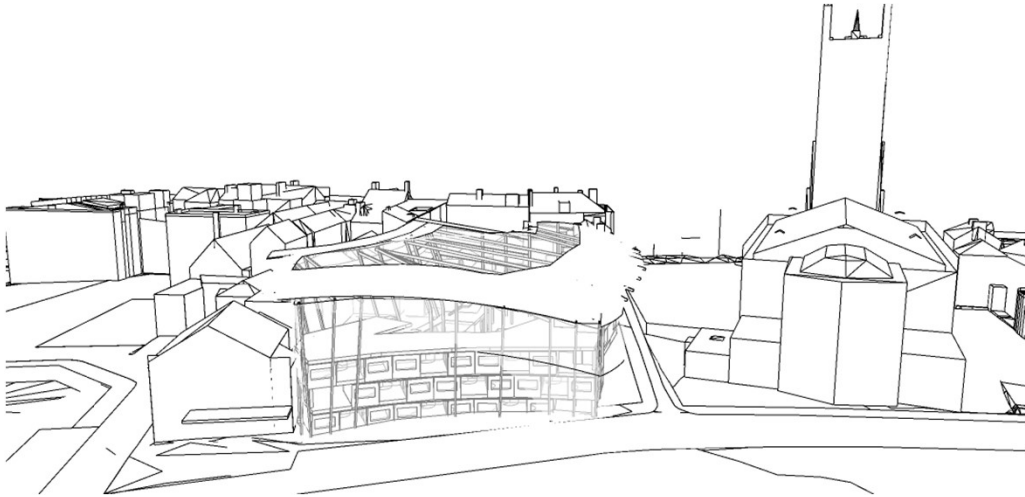
5: Regular form complied with, integration of stair cores begins. Careful arrangement of modules creates more cohesive effect., still requires work.



6: Overhang of modules implemented. Further attempts to create more unified aesthetic. Louvres added to filter summer sun.



7: Roof shape modified to sweep into pavement. Modules now abutted against each other to create unified aesthetic.



8: Module glazing amended to create more balanced aesthetic. Roof amended to create internal shading and improve feeling of shelter..

05 Design Development

Using the types of activities which where identified in the precedent analysis, the mind map was expanded to explore there requirements and uses of space.

Facilitate social interaction
Provide Refuge / Privacy

Shared Public Area

Community & Events
Rest & Recuperation Space
Act as building hub
Circulation Space

Zoned Area
Fixed Layouts

Combined Module Rooms

Open Offices
Café
Library
Collaborating

Privacy
Auditory Separation

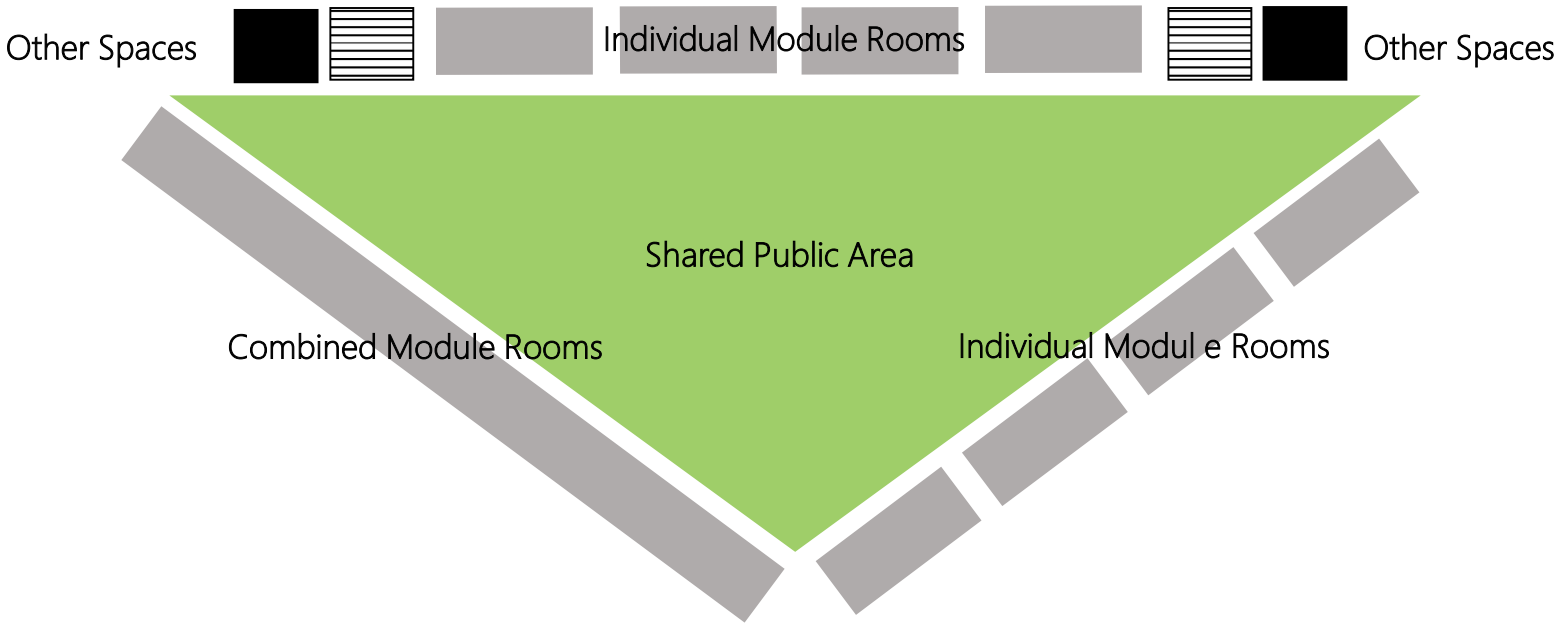
Individual Modul e Rooms

Focused Work
Induvial Work
Meeting Rooms
Mentor Offices
Legal & Financial

Specific Rooms

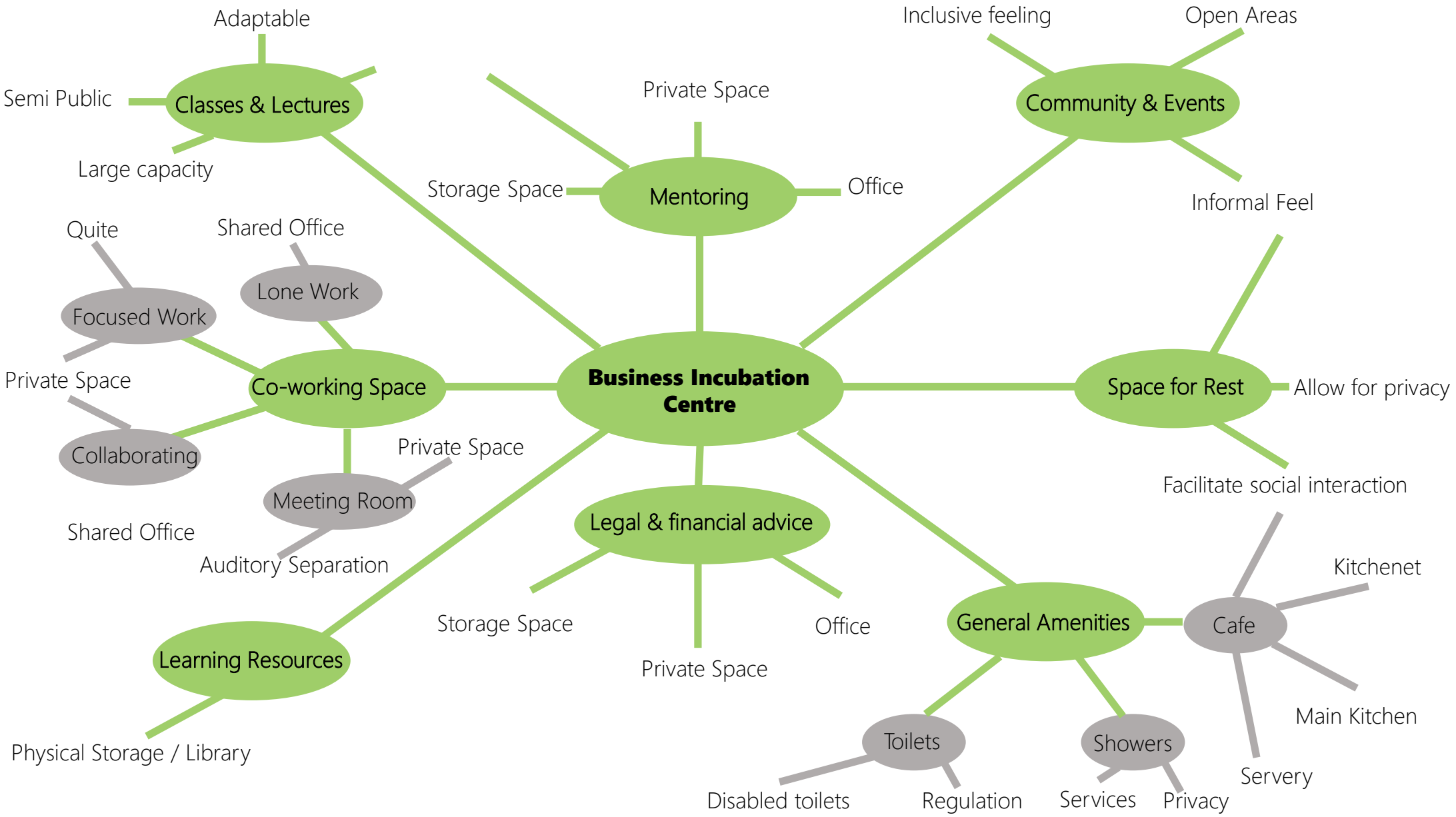
Other Spaces

Showers
Toilets
Stairs
Classes & Lectures



05 Design Development

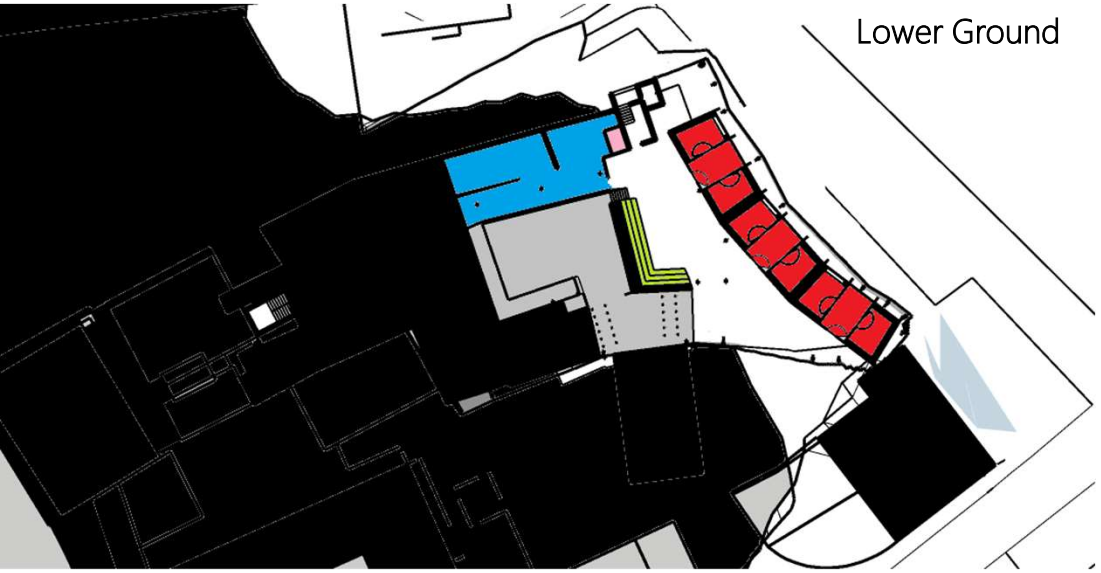
Using the types of activities which where identified in the precedent analysis, the mind map was expanded to explore there requirements and uses of space.

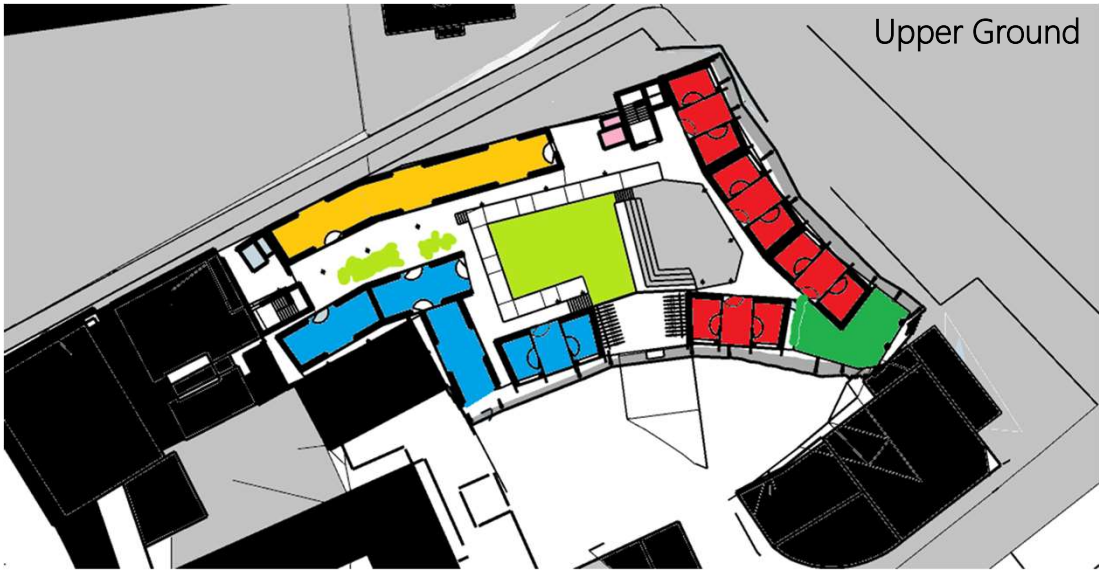


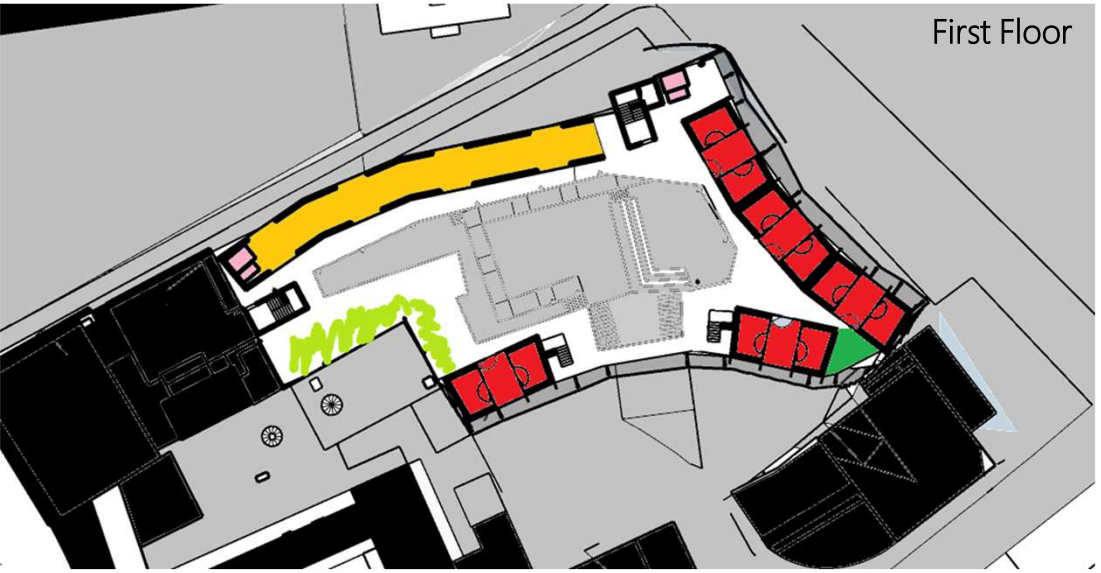
05 Design Development

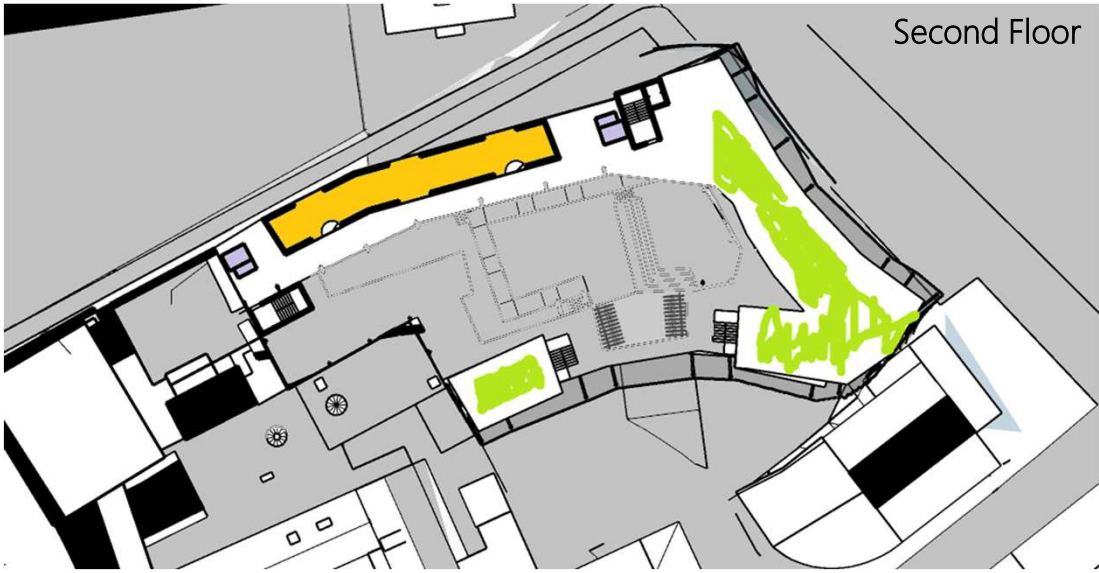
Initial floor plans had office space (yellow & red) interspersed with public space, with the majority of amenities provided on the upper ground floor (blue on plan). This meant the building had poor engagement with Full Street and was not as legible as it could be.

Single Space
Office Space
Amenities
Toilets
Garden
Lower Floors





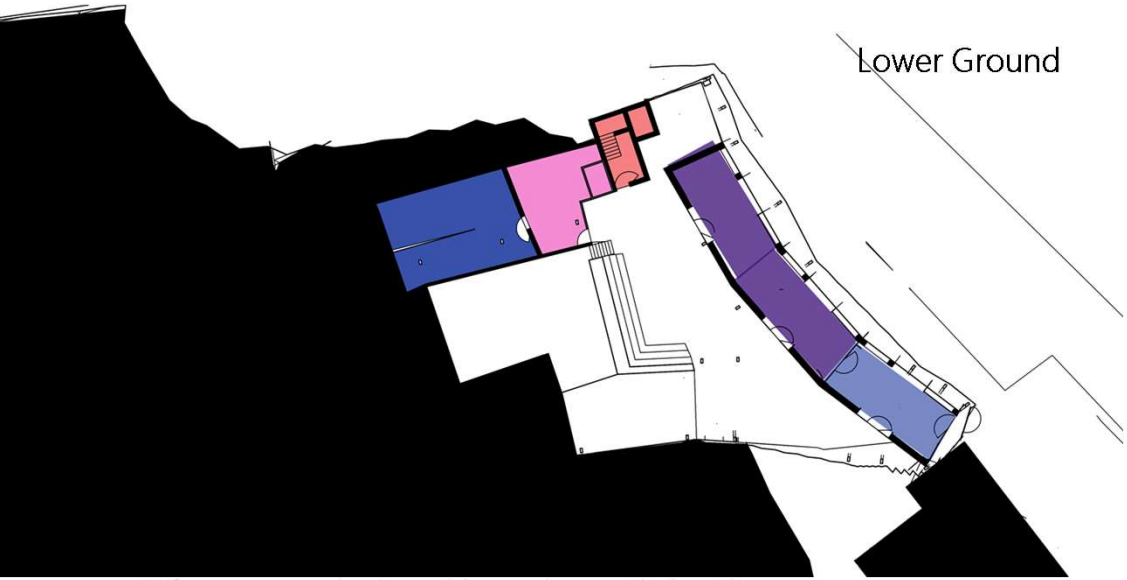


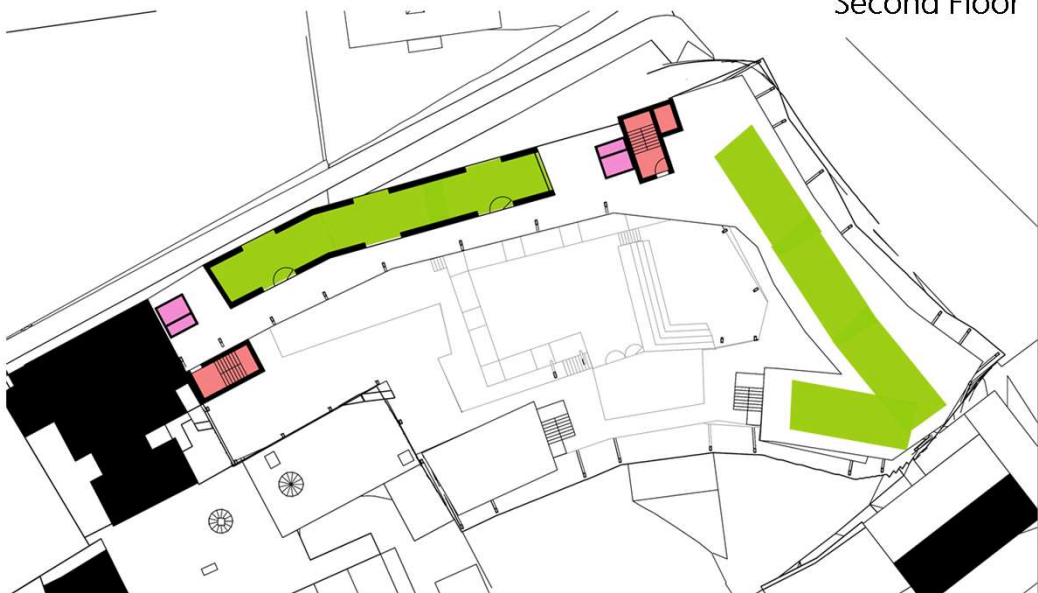


05 Design Development

The amended from private working areas to café, kitchenette and kitchen on the LG floor. This was done to provided a more engaging façade on the full street frontage. Showers where moved from a more public area on UG to a hidden area on LG. Legibility was increased with office and workspaces being consolidated onto floors 1 &2 with amenities being kept to floors LG and UG.

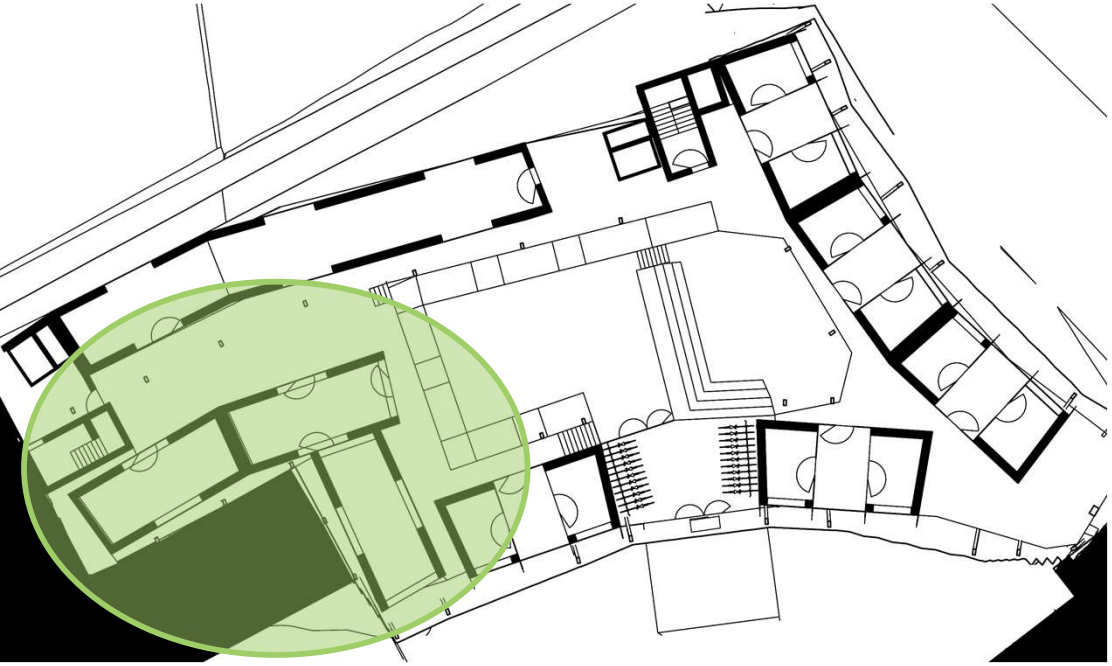
Toilets/sanitary
General Library
Amenities
Zoned Library
Service Area
Protected Stairways

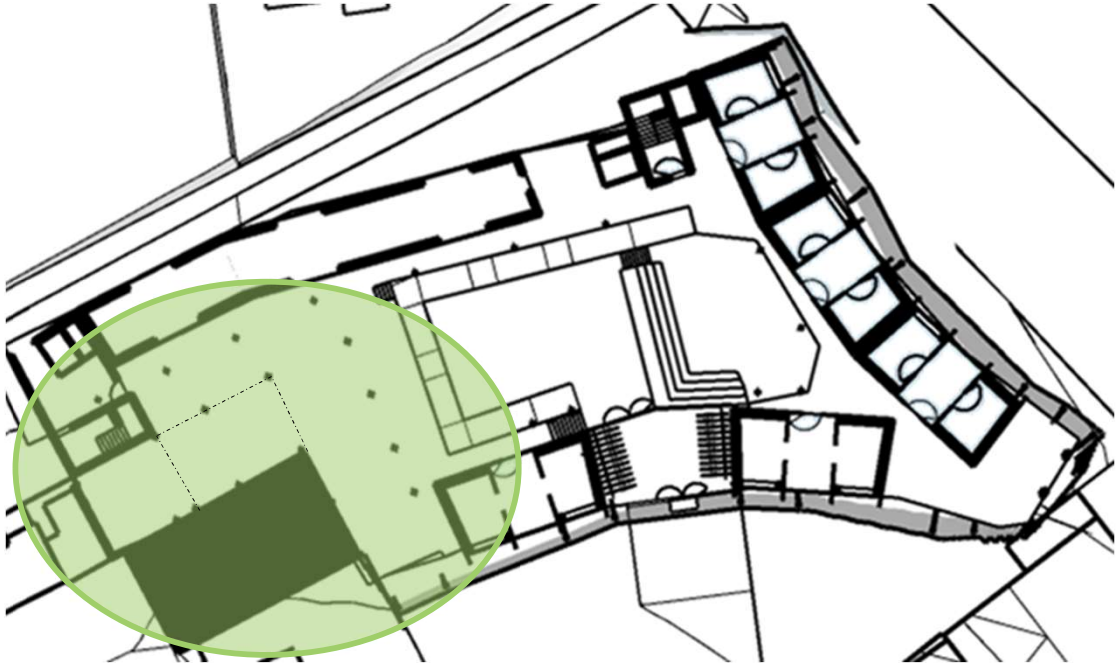




05 Design Development

The Upper Ground (UG) floor plan was amended to improve engagement with existing buildings and remove the awkward spaces created by the placement of modules forced by the shape and angled ends. This will also require support to be given to the walkway and modules directly above it.

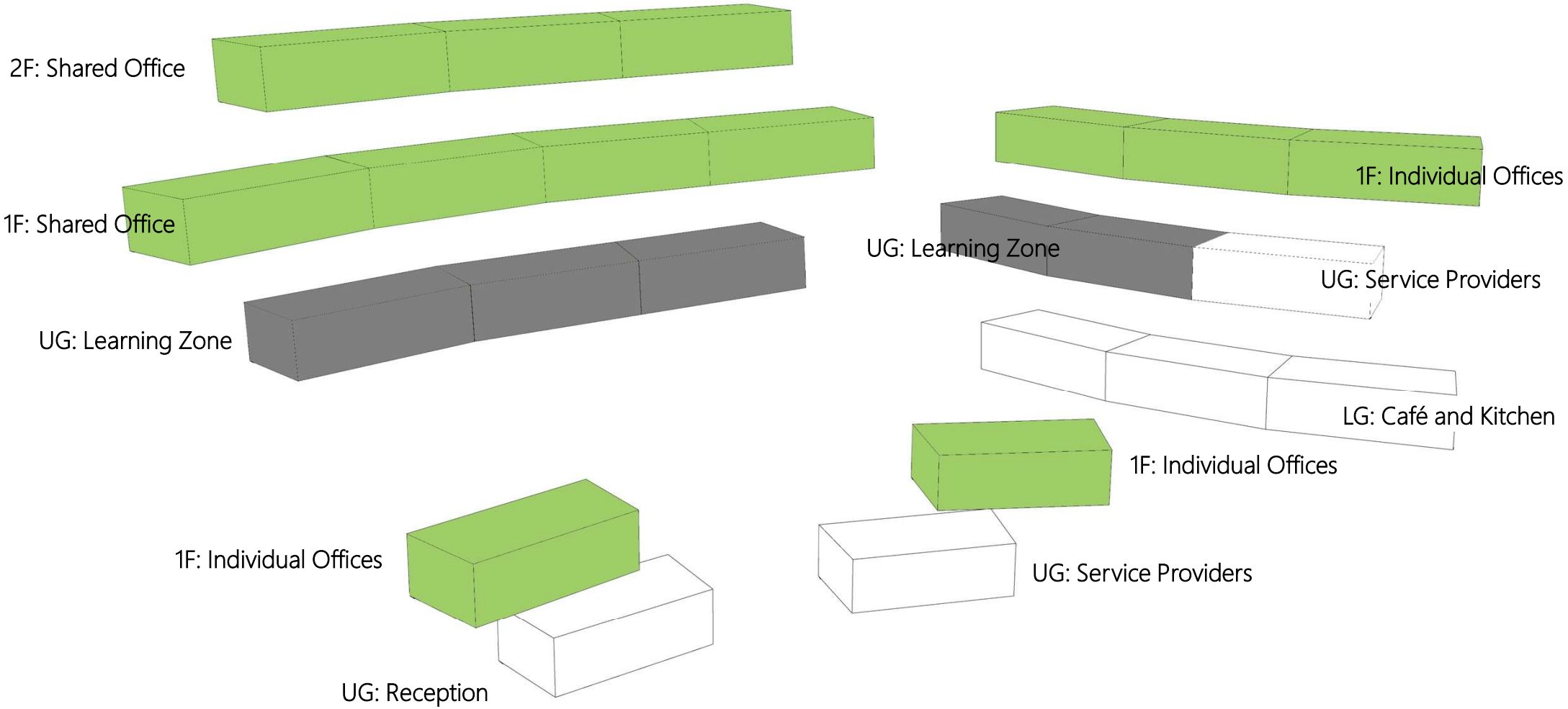




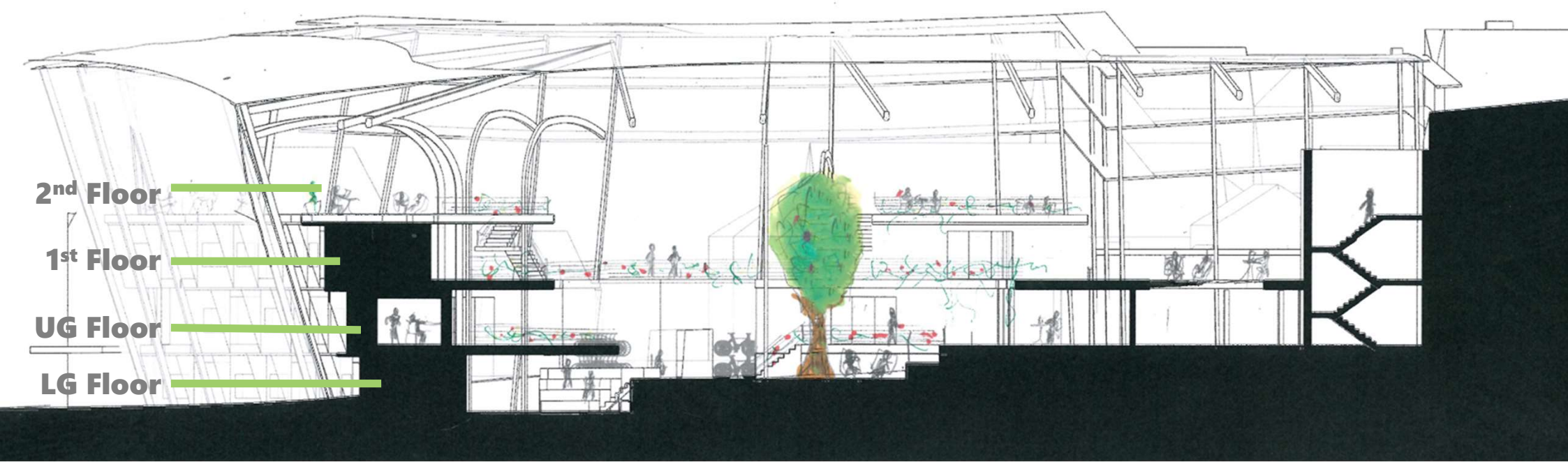
Through the use of movable walls the newly opened space adds a versatile area which can be used as a lecture space or simply a larger social space on the Upper Ground floor. This improves the design, as a lecturing and teaching space will be useful for a business incubation centre, through further use of movable walls the space can also be expanded or reduced to suit the activity at hand. It also engages better with the existing building on the site making a more aesthetically pleasing and well rounded design.

The modules and walkway on the floor above will be supported with columns. The movable wall will be selected to be easy and safe to use while also providing good sound insulation for the partitioned space.

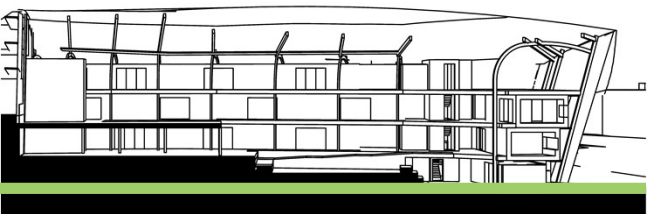
05 Design Development



06 Vertical Level Outline



06 Lower Ground



Biophilic Patterns

A: Mystery

Creation of unexpected spaces with narrow irregular entrances that do not allow view into the space which opens up on entry can create a sense of anticipation and discovery.

B: Material Connection to Nature

Modules are intended to be finished in timber sheets. This will provide a material connection to nature. This theme continues throughout the building.

Spatial Zoning

1: Plant & Server Room
Space for ground source heat pumps and servers for high speed internet.

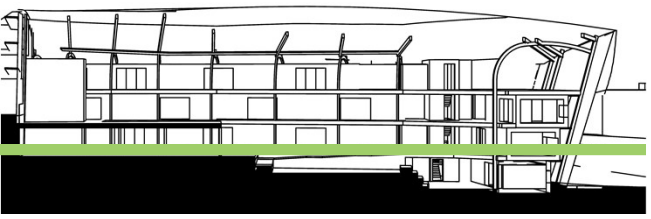
2: Showers
Provided to encourage cycling or running to work.

3: Café/Kitchenette
The servery area of the café where hot food is available. Kitchenette also allows for cooking courses to be run using produce grown on site.

4: Kitchen
Café kitchen with access to Full Street for deliveries.

5: Stepped Seating
Break out space or more seating for Café

06 Upper Ground



Spatial Zoning

1: Library & Learning Zone
Books & resources on business development and associated topics.

2: Drop Down Classroom
Retractable walls provide a variable size for lectures and other classes.

3: Reception
Reception with view over bike racks, also doubles as technical support.

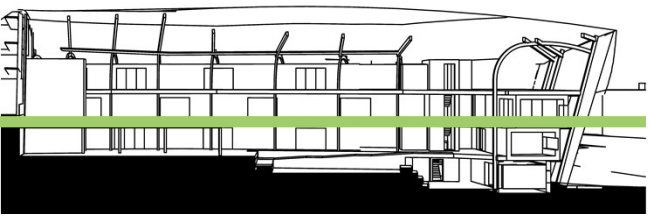
4: Service Providers
Services such as financial & legal advice provided on site.

5: Mentor Offices
Offices for permanent onsite mentors

Biophilic Patterns

A: Complexity & Order,
The repeating modules arranged throughout the space, creates a complex environment from a repeating pattern throughout the building. provides an interesting balance of complexity and order.
B: Visual & Non Visual Connections with Nature + Connection to Natural Systems,
The integration of variety of plants both highly visibly and also within hands reach provides a strong connection with nature, correct selection of plants also provides a connection to natural systems .
This theme also continues throughout the building.

06 First Floor



Biophilic Patterns

A: Mystery

Creation of unexpected spaces with narrow irregular entrances that do not allow view into the space which then opens up on entry can create a sense of anticipation and discovery.

B: Prospect & Refuge

The individual pods allow the feeling of refuge with views to the exterior space contrasting this against the prospect presented expansive views

Spatial Zoning

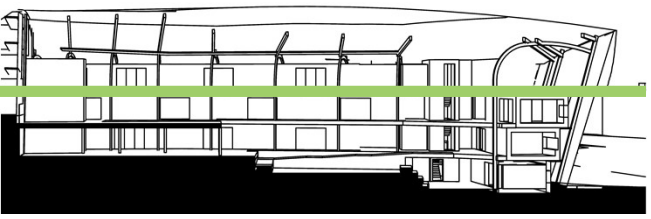
1: Shared Office

Large shared office zone suitable for up to 24 people. Great for *individual work* or some forms of *collaborating*.

2: Pod Offices

Adaptable office spaces suitable for up to 6 people. These can be configured as either two offices with up to two people or adapted to provide a single larger office. Suitable for *individual work* or some forms of *collaborating* and *focused work*. Potential layout demonstrated after plans and elevations.

06 Second Floor



Biophilic Patterns

A: Thermal/ Airflow Variability

Differing zones are created through the concept of building withing buildings, when air flow is increased through utilisation of the stack effect in summer months the flow of air in the central space will vary dramatically from the individual pods. Air flow in pods can also be controlled independently.

B: Risk/Peril

The large atrium with walkways around it on all levels exposes the occupants to the perception of risk.

Spatial Zoning

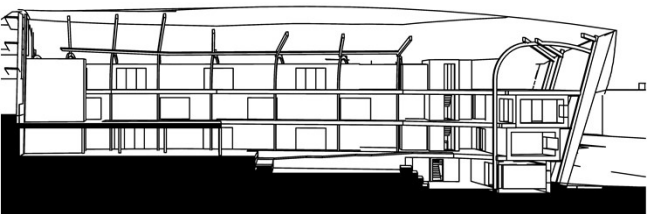
1: Shared Office

Large shared office zone suitable for up to 24 people. Great for *individual work* or some forms of *collaborating*.

2: Social Space

The largest single area of social space in the building. Provides space for casual working as well as socialising. Suitable for some forms of *collaborating* and *rest*.

06 Roof Plan



Biophilic Patterns

A: Dynamic Light

Dynamic light is provided through solar shading and interaction of light with roof beams through the translucent roof.

B: Refuge

The use of a solid edge to the roof provides a feeling of shelter contrasting against the glazed walls and translucent roof.

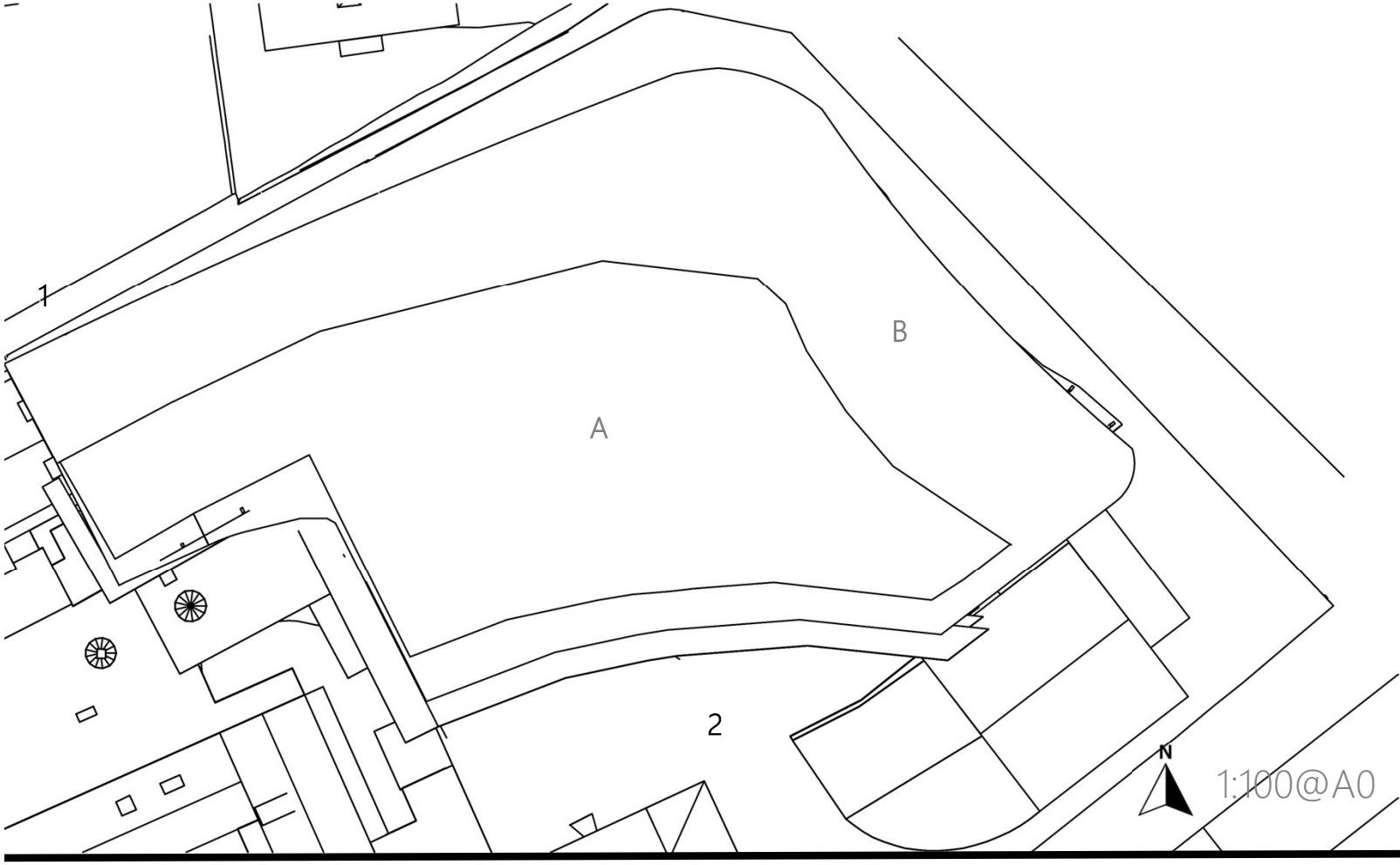
Spatial Zoning

1: Amen Alley Entrance

A back entrance to the building provides access from Amen Alley.

2: Main Entrance

The main entrance oriented towards the new access created towards the square will encourage foot traffic and creates a more private feeling to the space than an entrance on the exposed elevation on Full Street.



06 Site Sections

1:100@A0

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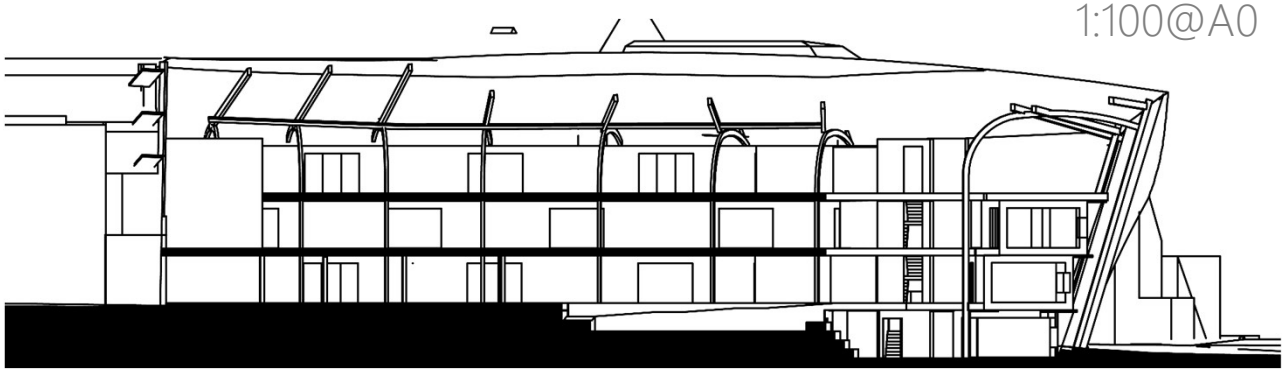
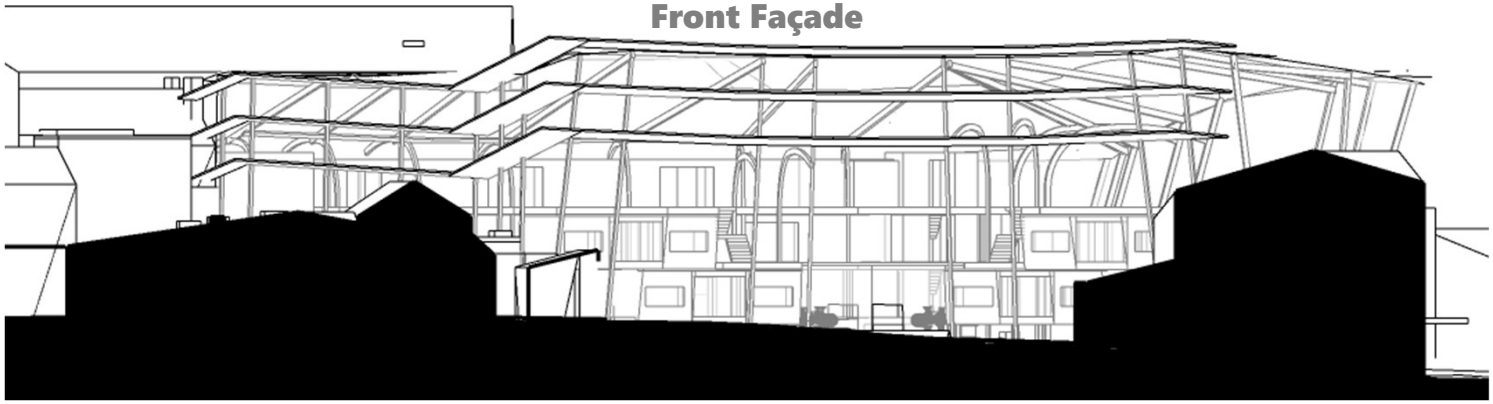


06 Site Elevations

Front Façade



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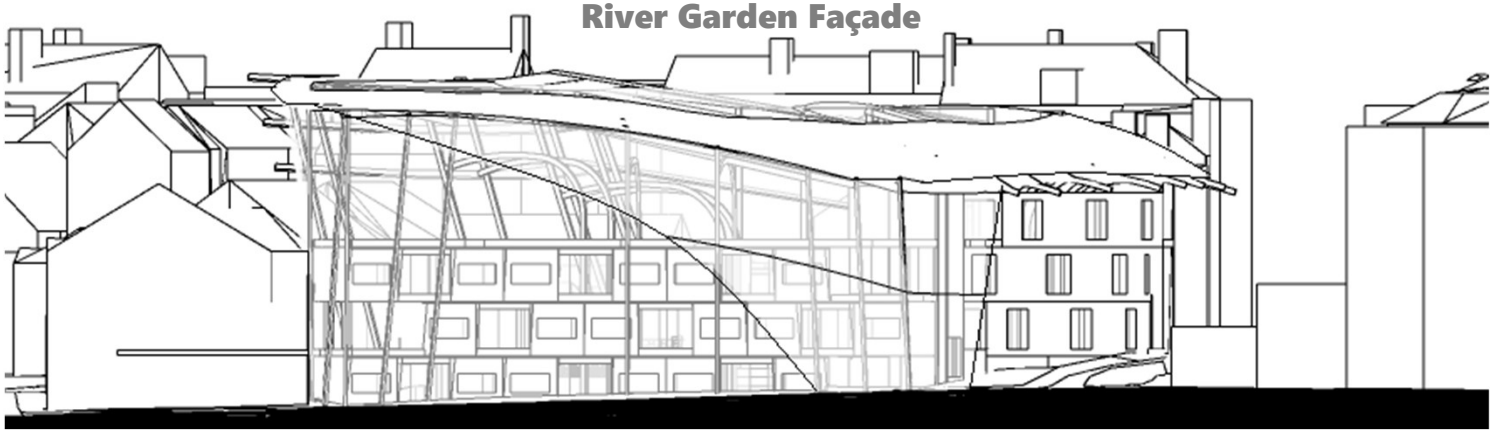
River Garden Façade



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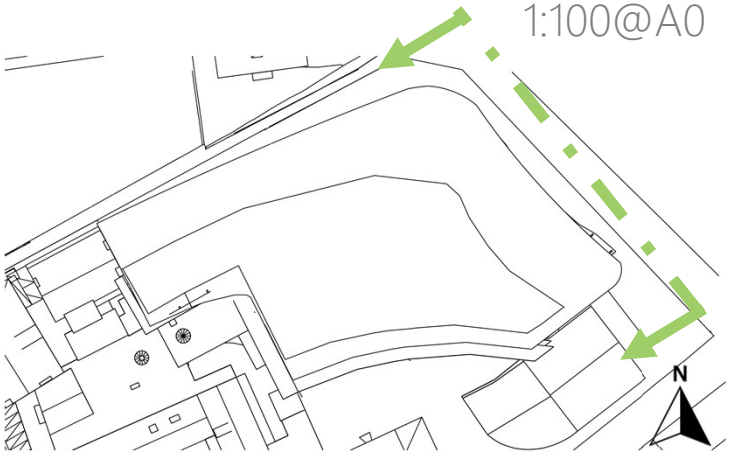
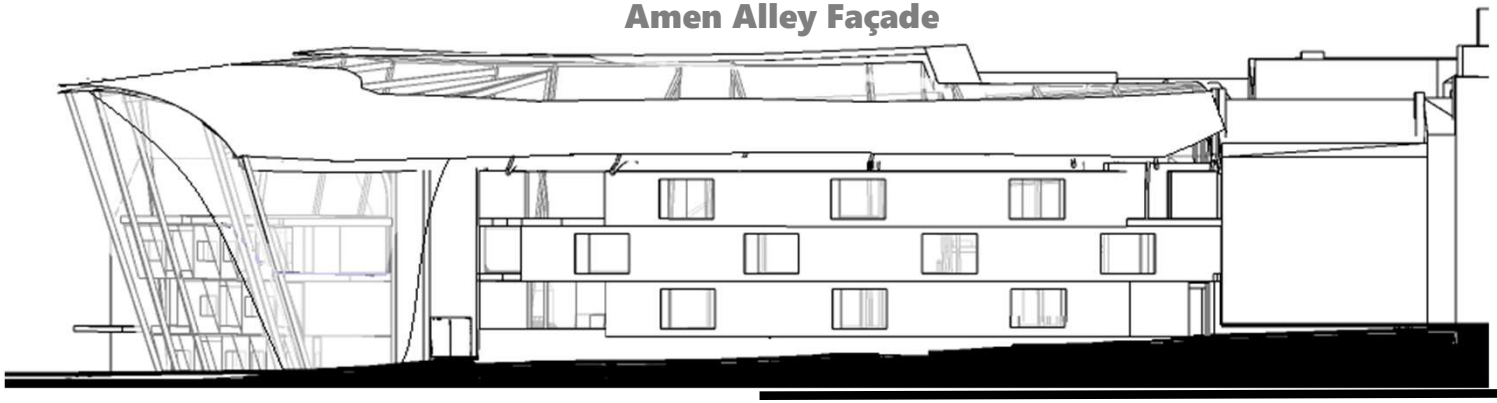


Amen Alley Façade



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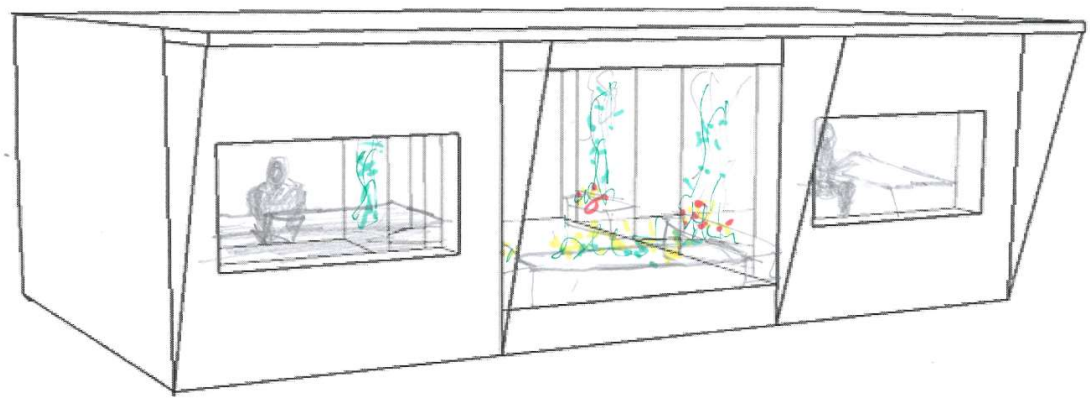
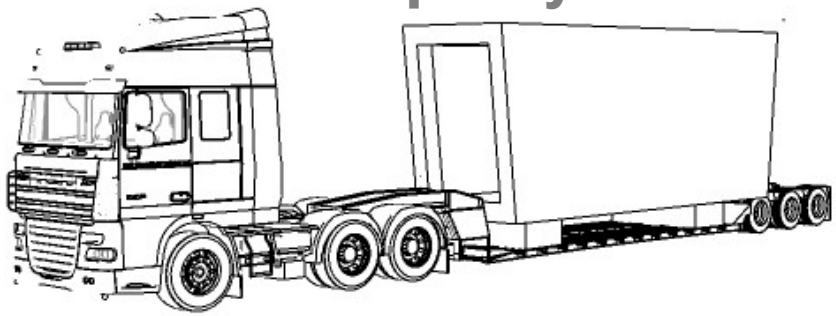
07 Individual Module Design

Module Concept



The modules are designed to be configurable as either individual offices or combined to create a larger space. Various configurations are shown (right) Each module has an internal volume of 66m³ without internal partition means this is suitable for up to 6 people to work in. The proposed structure will be self supporting with the capacity to hold up to twice its own laden weight in a running bond pattern.

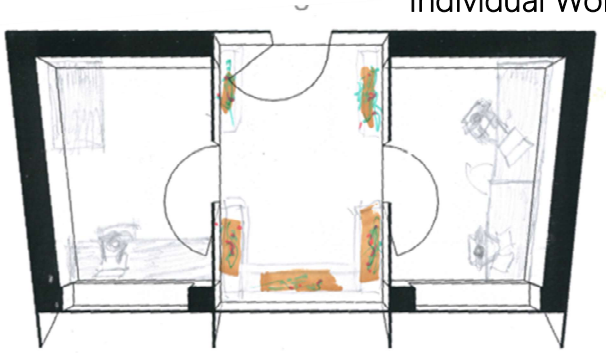
Transport by Road



Transportable without escort on UK roads (15) through use of low loader such as the Broshuis SL2 (16). As the load will delivered 90° out from its finished alignment it should be safely rotated through the use of appropriate equipment such as Pelloby's Load Turning Units (26).

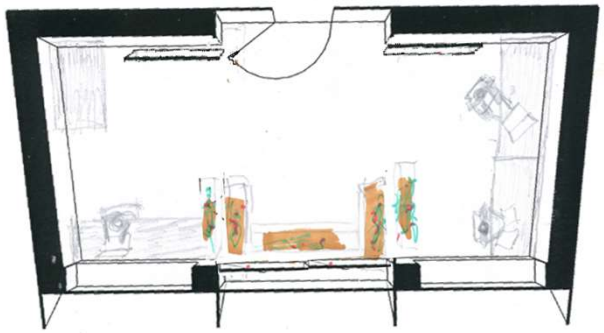
Module Configurations

Individual Work Space



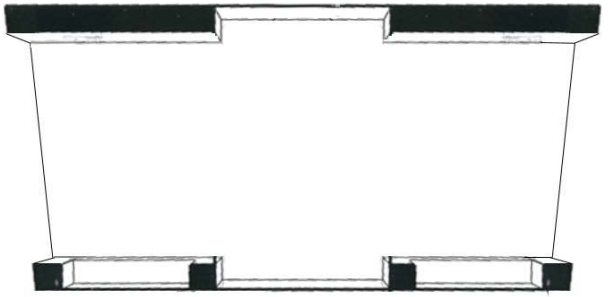
In the individual configuration movable partitions divide the space into 2 sperate offices suitable for up to 2 people. These are access through a shared lobby

Collaborative Work Space



In the shared configuration the movable partitions fold away leaving an office suitable for up to 6 people. Plants from the lobby are assimilated into the office space.

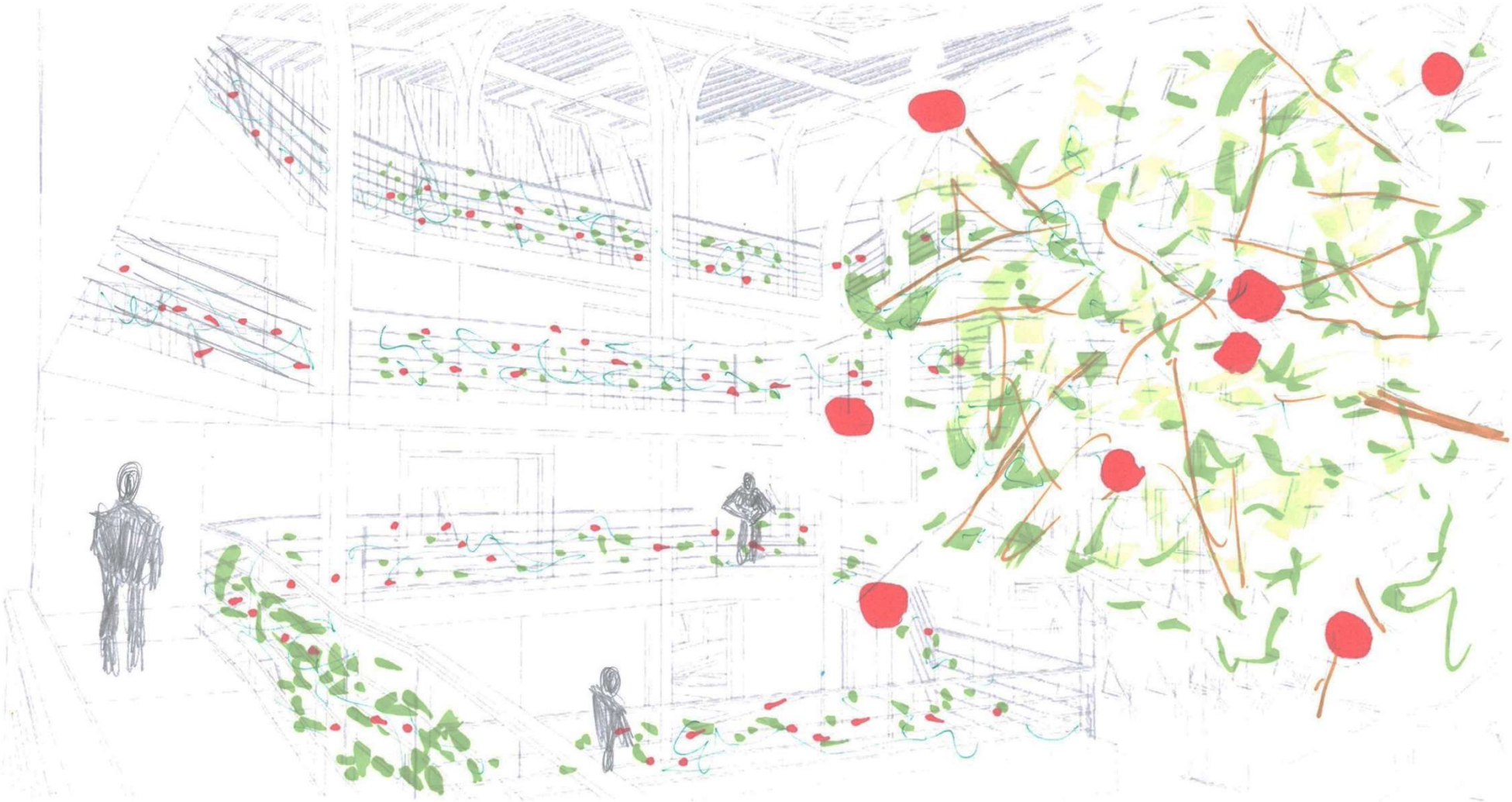
Combined Office



In the combined configuration no end walls are fitted to the modules allowing them to be fixed next to each other. The solar shading has also not been added to this model.

09 Interior Visual

09 Interior Visual



09 Interior Visual

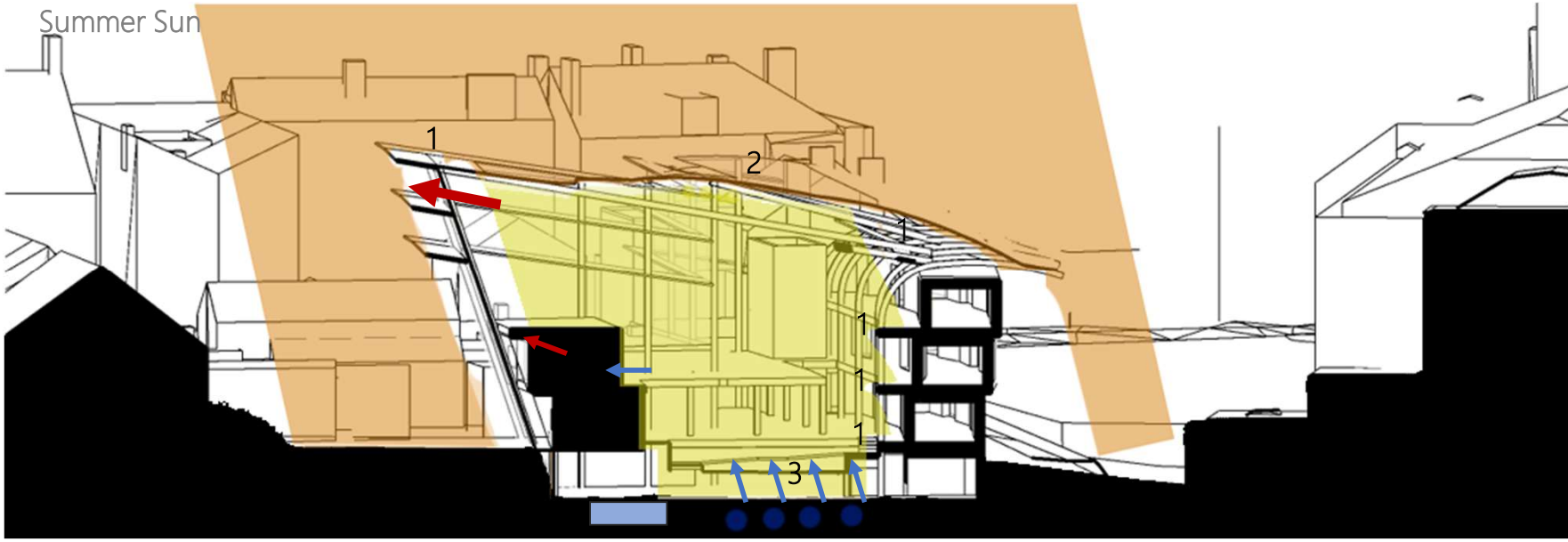
08 Sustainability

1: Solar Shading
Prevent thermal gain in summer months and provides shading

2: ETFE Pillow Roof
Allows transmission of light but prevents excessive solar gain in summer months

3: Cooling Tubes
Provide air cooled at sub surface temperatures

4: Stack Effect
Hot air vented at highest point to create stack effect

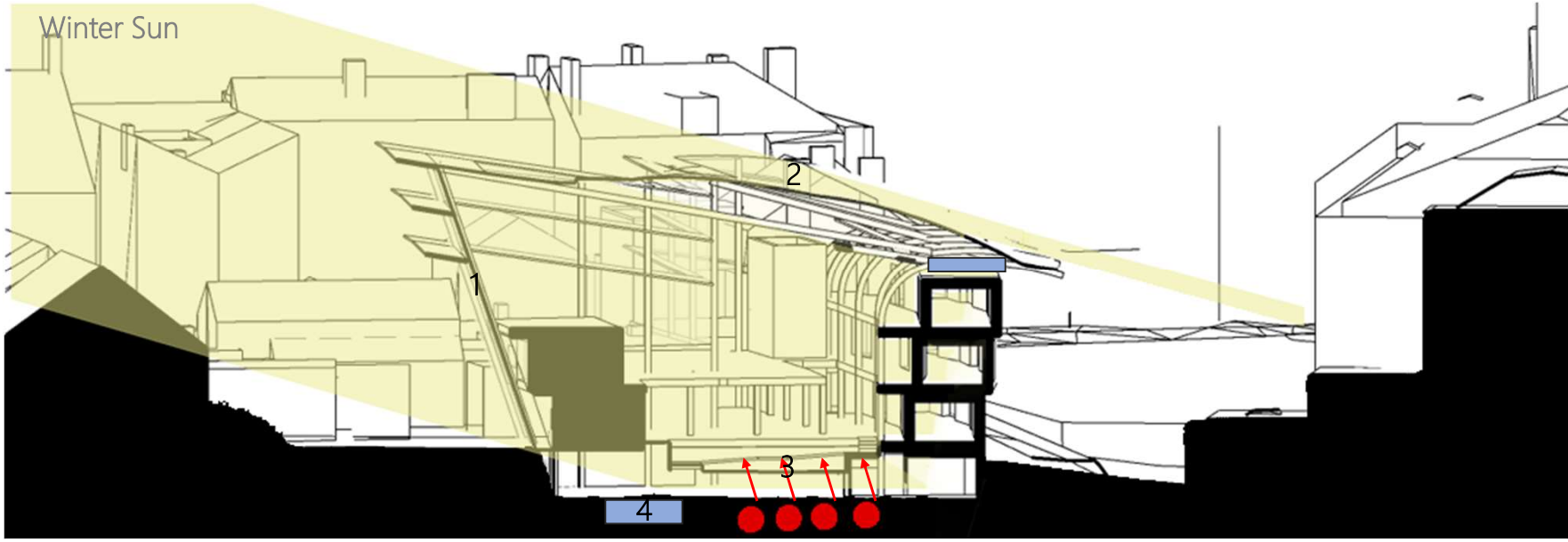


1: Solar Gain
Solar gain encouraged through high transmission glazing

2: ETFE Pillow Roof
Allows transmission of light and allows increased thermal gain in winter months

3: GSHP
Ground source heat pump collects energy from soil.

4: Rainwater Harvesting
Rainwater from roof stored.



10 Regulatory Compliance

Compliance with regulations is an important aspect of design, relevant areas of regulations have been highlighted below.

Part B regulatory Compliance.

- Fire regulations require a minimum of 2 escape routes for up to 600 people.
- Escape route width is to be a minimum of 1050m for up to 220 people.
- Stair width is to be a minimum of 1100mm in an 'assembly and recreation' building and serving an area used for assembly purposes (unless the area is less than 100m^2). This stair size can serve300 people in a 3-storey building and 340 people in a 4-storey building for simultaneous escape
- Buildings containing one or more atria 0.16 A building with an atrium that passes through compartment floors may need special fire safety measures. Guidance is given in Annexes B and C of BS 9999. On further investigation this can be solved through the implementation of sprinklers.
- Inner Rooms (which will apply to the individual pods). This is acceptable in this instance as long as the door or walls of the inner room contain a vision panel (minimum 0.1m2), so people can see if a fire starts in the access room.
- Maximum travel distances of 45m (dual exit route) and 18m (single exit route) have been adhered to. (10)

Health Safety and Welfare Regulations 1992 compliance

- The total volume of the room, when empty, divided by the number of people normally working in it should be at least 11 cubic meters. The figure of 11 cubic meters does not apply to rooms being used for lectures, meetings and similar purposes. (11)
- There is a provision (of approx.) 4 toilets per floor allowing for occupancy of 75 people per floor. (12)

Part M compliance

- A disabled toilet is to be available with 40m of any wheelchair accessible area in the building
- Lift size suitable for disabled users is to be 2000mm by 1400mm minimum (13)

Part K compliance

- Stairs have been designed inline with Part K.
- Disabled ramp width, slope length and angles have been designed inline with part K. (14)

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