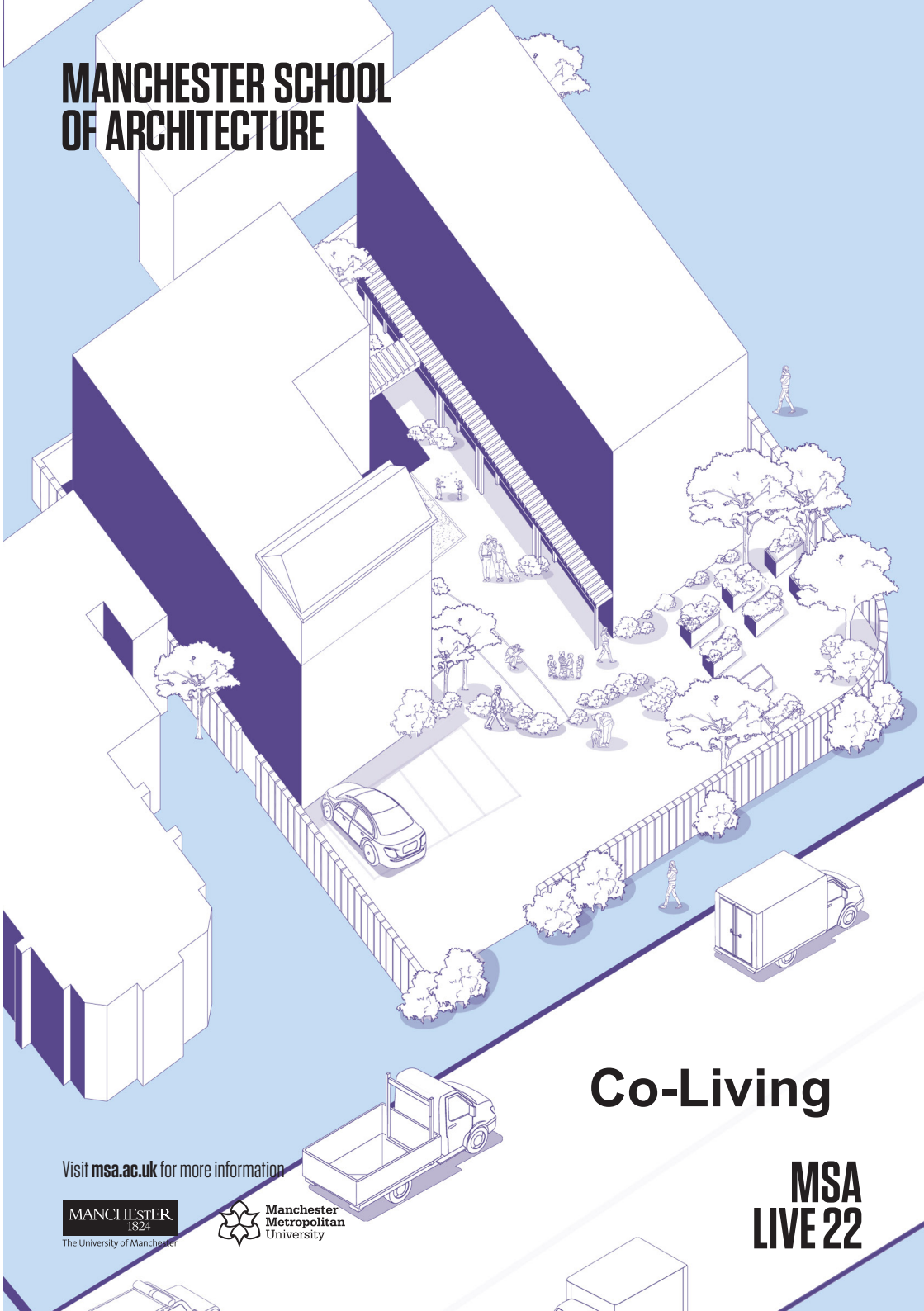


MANCHESTER SCHOOL OF ARCHITECTURE



Co-Living

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MSA LIVE 22

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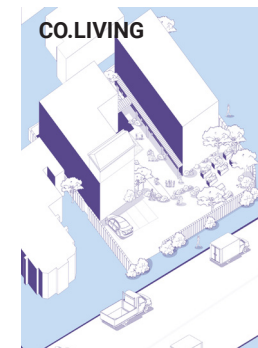
Co-Living Agenda

In the two-week intensive research study period, our goal was to design and promote a net positive vibrant community hub within the large scale of the neighbourhood. Keeping that in mind, the key was to consider a dynamic network of elements within the ecosystem that exchange resources, energy, and materials. Through adherence to the principles of permaculture we aimed to develop a living community that yields food and fibre for the locals; generates and captures energy, treats water, and most importantly integrates rather than segregate by embracing diversity. We began by first identifying and interpreting client objects and requirements, then defining the terms net positive, net zero, permaculture, regeneration, and sustainability. Later brainstormed ideas and conducted a collective precedence analysis as a large group. We broke down into six smaller groups each assigned with a separate task including: sustainable material study, affordable housing strategies, biodiversity enhancement, smart technology and systems, energy advancement and lastly, spatial planning. In the smaller groups we explored a variety of design solutions that are most suitable for the project supported by relative facts and figures conveyed through diagrams, texts, sketches, renders and axonometric views. The sustainable material study introduces different alternatives, with a focus on CLT as the primary structure. Balancing out costing and environmentalist agendas they further discuss assembly methods and domestic manufacturer locations. The second group investigated affordable policies, marketing techniques and incorporating digitalization through adopting smart features such as smart contracts. The third group looked into greening strategies enhancing mental wellbeing through contact with nature. But their goal was to envision an eco-centric design that steps away from the anthropogenic habits of the capitalist era considering the larger ecosystem as one unit. The two groups focused on smart technologies, systems and energy discuss the different ways of developing a smart building community that runs on renewable energy sources and appropriate water recycling systems. Finally, the spatial planning team brought together all of the collected data and produced a master plan while also discussing their iterative process work and providing unit typologies. Overall, we focused our efforts on encouraging social regeneration, aspiring local engagement, providing multifunctional spaces that can be developed incrementally based on the changing needs and desires of the inhabitants and adopting circular approaches that enhance mental and physical societal wellbeing.

Poster Design Evolution



Before



After

Sustainable Materials Study

Sustainable materials are materials which have a limited negative impact on natural resources and people. Examples of sustainable materials:



Bamboo: is known for its strength, hardness, and rate of growth.



Adobe: has high thermal insulation and energy efficiency. Excess exposure to wet conditions can lead to damage.



Hempcrete: Lightweight and durable and has a carbon negative footprint.



Natural clay: known for its high plasticity, easy availability, low cost, thermal insulation, robustness, durability, and fire resistance.

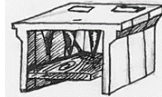


CLT: It owes its sustainability to the rapid construction and renewability of the material.

Cross laminated timber - Process of making:



Timber is selected



Timber is dried and defects are removed



Trimming and jointing, assembling of the panels adhesive

CLT cost:

CLT has long been considered cost-neutral compared with concrete framed alternatives, with its sustainable credentials and programmed benefits.

Timbercrete is a sustainable alternative to concrete made from recycled wood

Advantages of Timbercrete:

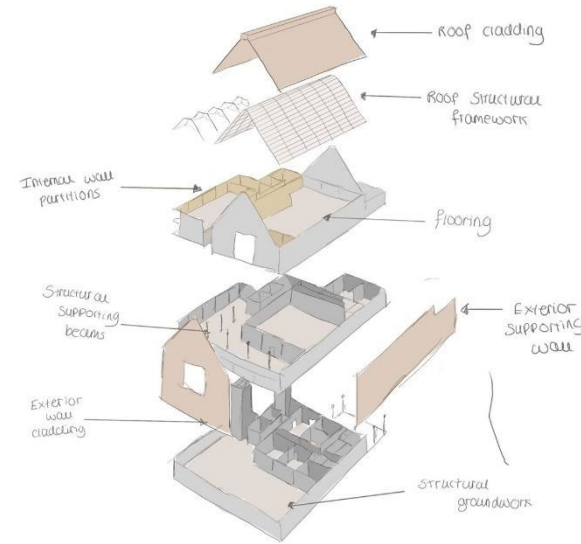
- Environmentally friendly – replaces some of the more energy intensive components of normal concrete with recycled wood.
- Cost effective- involves a low energy manufacturing process, much cheaper to produce than other building materials.
- Durable – shown to have a better versatility than concrete.

Disadvantages of Timbercrete:

- Uncommon – is less known building material, some constructors intend to stay away from timbercrete as they haven't worked with it before.
 - Upfront cost – the upfront cost may be more than materials like concrete.
- Strength – The strength of Timbercrete is not yet established and needs further testing.

Timbercrete cost:

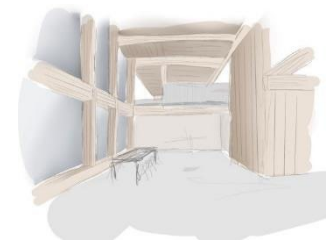
Timbercrete is cost effective as it is simple to make and involves a low energy manufacturing process. Thoroughly blend the sawdust and the sand together.



Due to the lack of CLT suppliers in the UK, use of this material on a large scale can become quite expensive so we looked at alternative materials that could be used in particularly for the flooring, walls and roof.

Transport: Timbercrete is much lighter than other common building materials, this means that it can be easily transported as blocks on trucks and through shipping. This will dramatically reduce transport costs, therefore adding to the reasons why it is a more cost-effective material than CLT in this aspect. timbercrete is 250% lighter than concrete or clay.

Timbercrete has many benefits when it comes to its use in construction, not only is it lightweight, so easy to work with, it can be cut and also nailed.



This cabin is located in Norway. The structural frame is made from a form of timber called Glulam which is glued laminated timber and other aspects of the building such as the walls and roof are made from cross laminated timber

This is a concept design for a high rise building in Portland, USA. This links to ideas expressed in the project as it uses both CLT and glulam (glued laminated timber) for the structural frame of the building.



This is a map showing the distribution of companies across Britain, the ones highlighted in red represent CLT suppliers and the ones blue represent timbercrete suppliers.

- B&K structures
- KLH UK LTD
- Glulam Solutions LTD
- Eurban
- G-frame
- Durisoluk
- Resi
- The Eco Build Store

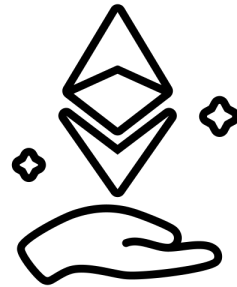
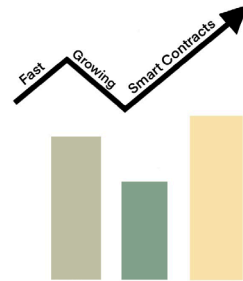
Affordable Housing Strategies

Smart Contract

A smart contract is essentially a computer code that can execute the terms and conditions of a legal agreement on its own as well as enforce them. Blockchain technology has supported smart contracts in many ways. The viability and security of smart contracts are dependent on the blockchain. Blockchains provide the data necessary to inform the terms of an agreement.

Smart contracts have fewer or no middlemen involved, so for both parties (buyer and seller), not paying expensive intermediary fees is a great way to save money. 63% of professionals disagree with this statement.

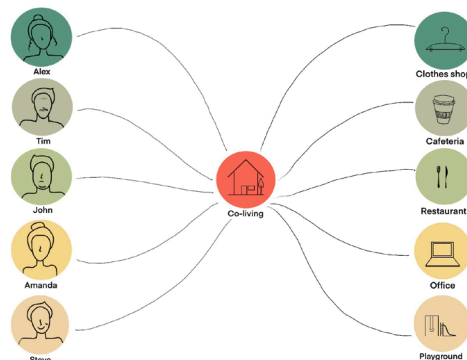
A smart contract is created for each party through Ethereum when a lease is being renewed, replacing the traditional method of leasing. Once an Ethereum Smart Contract is created, it can never be recalculated. Both the lessee and the landlord are protected by the



Commercial Space Rent

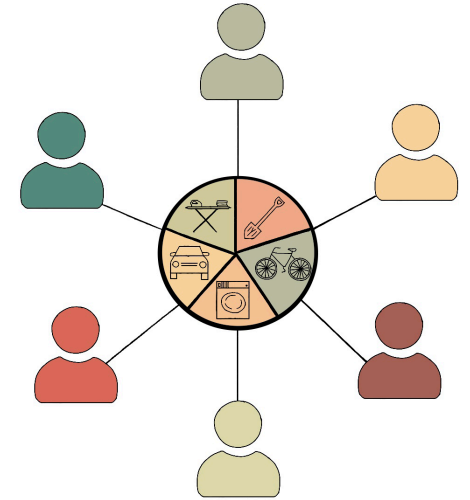
Renting property could be a better option for business than buying property as it requires long-term commitment. The advantages are:

- Flexibility: business could be relocated to a different place after being developed at a rented place since there is no fixed commitment to the previous location.
- Financial benefits: Rental cost is lower than purchasing land; money saved from renting could be used for other purposes within the business;
- Maintenance: Tenants might have the responsibility to maintain the interior of their property but the external part is usually not their responsibility, so there might be service charge, however it would not be high and it would not require the tenant's time to repair/maintain.



Sharing Daily Utilities

We may only need one rarely used pasta maker, ironing board, cargo bike, or shovel among our 12 families. Having less stuff to store saves families money, because they don't have to buy anything. As a result, cohousers usually have smaller houses than their friends. When you can live comfortably in a smaller space in a pricey city like Vancouver, your housing costs will be lower.

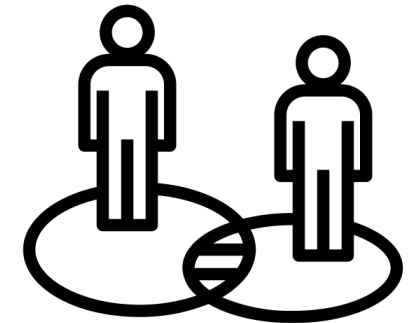


Cohousers Shares More Spaces

It is not necessary to have the second bedroom if you live in a cohousing community that offers a guest room. At least \$150,000 of savings can be achieved by reducing the number of bedrooms in our city. We plan to share a kitchen, a dining and activity room, a laundry room, a workshop and ample storage for bikes at this small urban community. Birthday parties, large gatherings, and celebrations you would have usually had to hold in rented venues can now be performed in the community's common spaces.

Cohousers Take Advantage of Purchasing Power

In our complex, we are exploring the possibility of installing a WiFi network that would considerably reduce internet costs for every family member. Families could also share parking spaces resulting in lower overall ownership and maintenance costs.

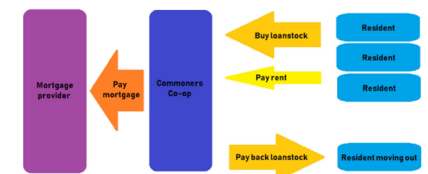


Cohousers Share Talents and Services

Herbs and vegetables grown in the garden are all share. Many members of the neighbour are also up for occasional babysitting. Saving money is no longer the aim drive to share, but one may find that his/ her daily costs are reduced by the neighbours' generosity.

An innovative financial model for Commoners Co-op

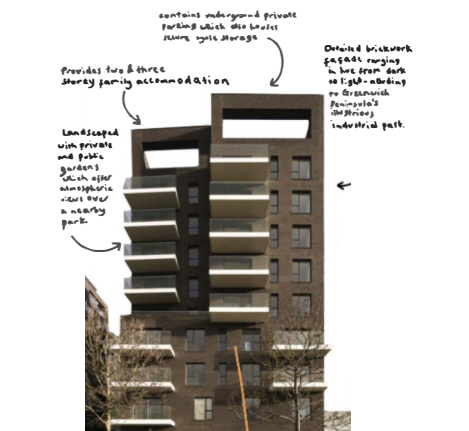
Our co-operative takes inspiration from LILAC's scheme, but we are pioneering a new variant which we call a Loanstock Mutual Home Ownership Scheme (LMHOS).



Cohousers Tend To Self-Manage Instead of Hiring A Building Manager

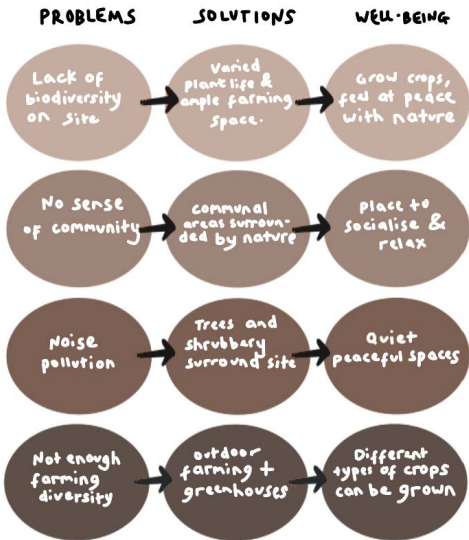
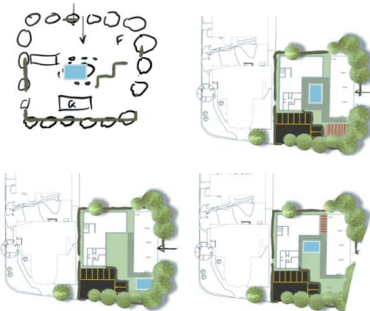
This makes monthly maintenance cost of each condo reduce. Each member has the responsibility to keep their sharing facilities in the good condition.

Biodiversity Enhancement

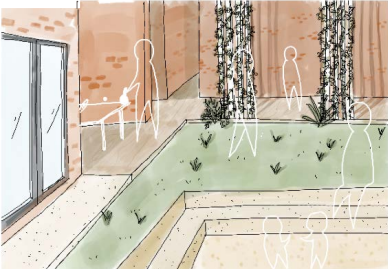


PRECEDENT: GREENWICH PENINSULA RIVER-SIDE

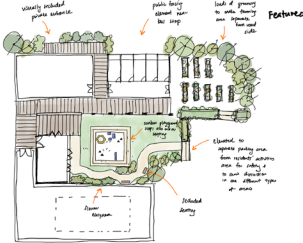
- 56% of the residences are considered 'affordable'
- Biodiverse green roof and connection to local peninsula- wide heating network
- Parkside site influences orientation abundance of natural light
- Open plan living areas with oak timber flooring



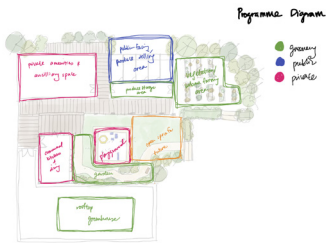
Visualisation of Public Space



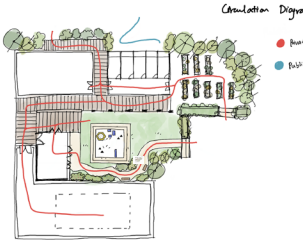
Visualisation of Outdoor Farming Area



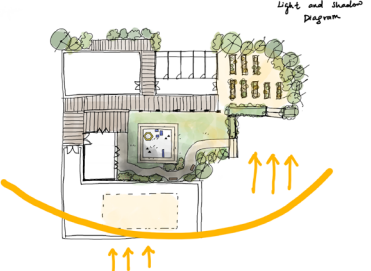
Initial Landscaping Plan



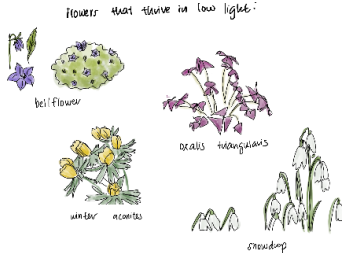
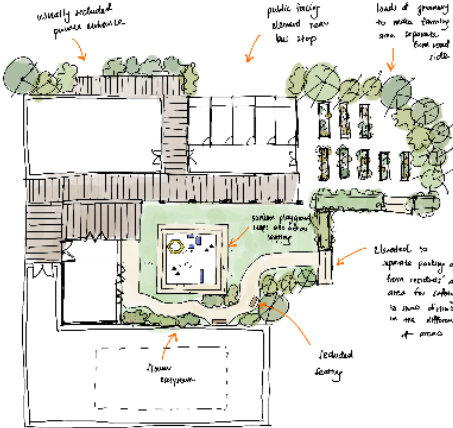
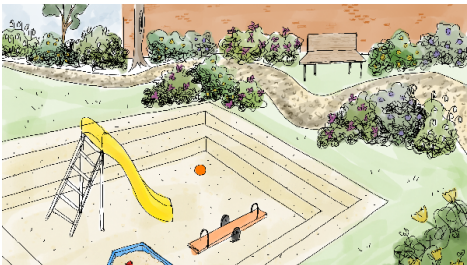
Programme



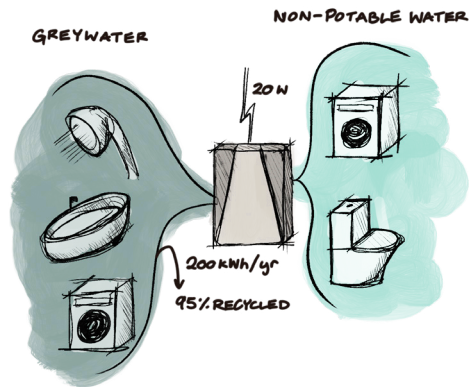
Circulation



Sunpath Diagram



Smart Technology & Systems



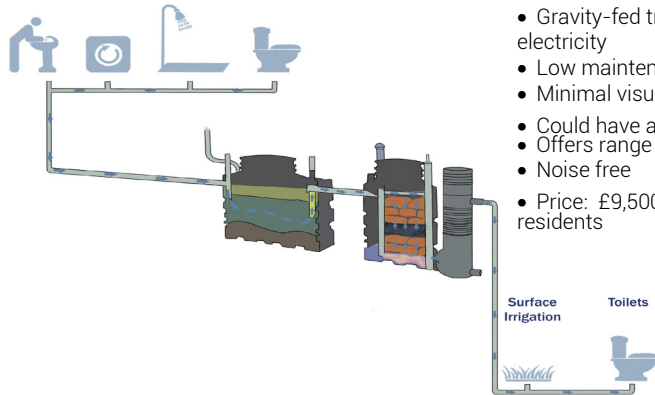
Process

1. Greywater from washbasins, showers, sinks, washing machines
2. Fed into the system to filter (20W per use)
3. Stored in a tank
4. Pumped out for reuse in toilet flushing, irrigation, washing machines etc.

Manufacturers - Hydraloop

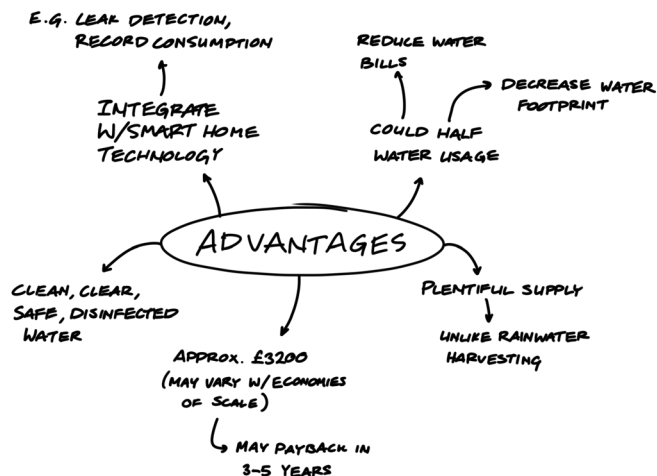
- Hydraloop smart water recycling systems
- Offer scalable services for larger buildings/ residential units
- Linked to an app
- Low maintenance, self cleaning
- Price: £4,500 individual installation

Blackwater Recycling Process



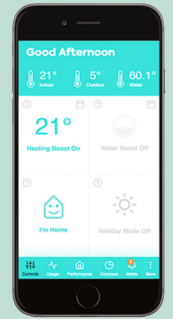
Manufacturers - Biorock

- Gravity-fed treatment process; requires no electricity
- Low maintenance + operational costs
- Minimal visual impact; stored underground
- Could have a collective **community** unit
- Offers range of treatment systems
- Noise free
- Price: £9,500 shared for approx 30 residents



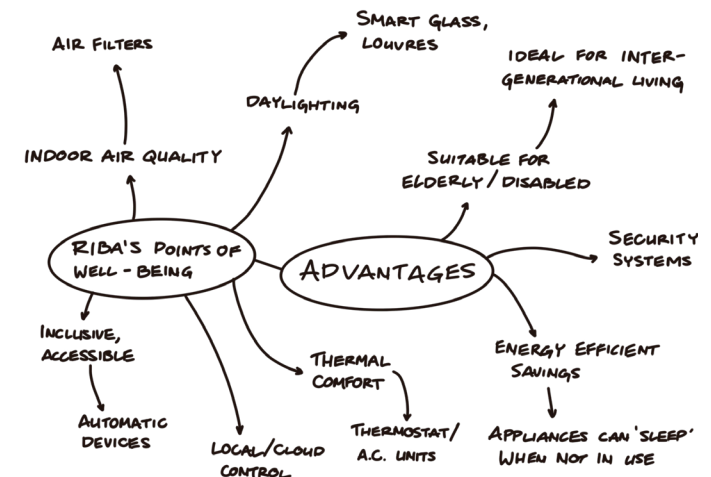
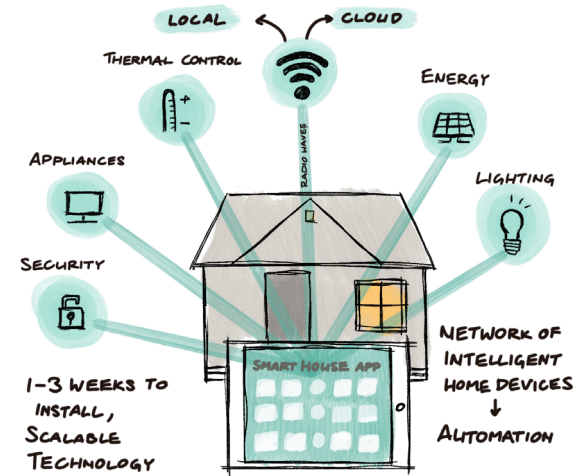
Solar Avenue - Actuate app

- Control pre-installed smart energy system
- Set heating schedules to maximize comfort
- Control hot water
- Turns off all non-essential appliances (home & away switch)
- Tracks energy and water usage
- Residents can track and reduce their consumption
- Allows you to compare with other residents anonymously
- Community effort to reduce consumption
- Can also set reminders to take trash out, store policy documents

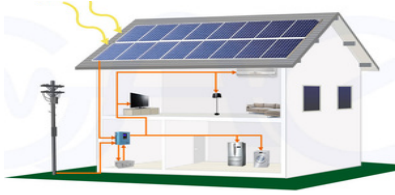


Cost

- (lighting, heating, security controls)
- Scalable nature allows additional services to be added according to specific needs.
- Cost may depend on:
 - Local control - does not use wifi, requires close proximity
 - Cloud control - uses wifi, can be operated from afar
- Excess energy from the community grid can be sold to the national grid or be used for other communal purposes in the neighborhood.
- Security cameras: approx. £1.5
- For 24/7 use per year Lighting: approx. £5.9 for 24/7 use at max brightness per year



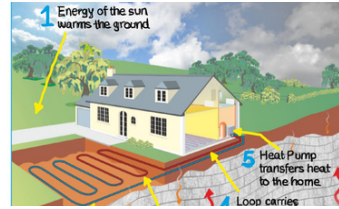
Energy Advancement



1. Solar energy

Pros: Abundant, cheap, easy to capture, best for our site

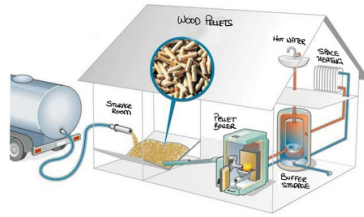
Cons: could weather dependent, uses a lot of space, expensive storage



2. Geothermal energy

Pros: A reliable source, accurate prediction of energy

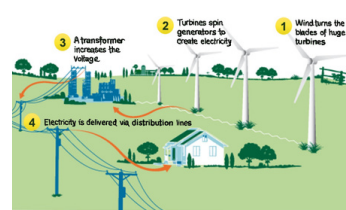
Cons: A lot of management is required to maintain the sustainability.



3. Biomass energy

Pros: Waste reduction, Reliability, quick return energy

Cons: High costs, space requirements, some adverse environmental impact



4. Wind energy

Pros: wind dependent, One of the Cleanest Forms of Energy

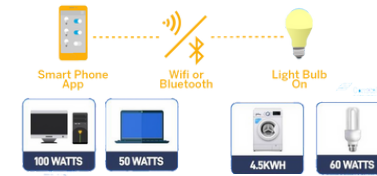
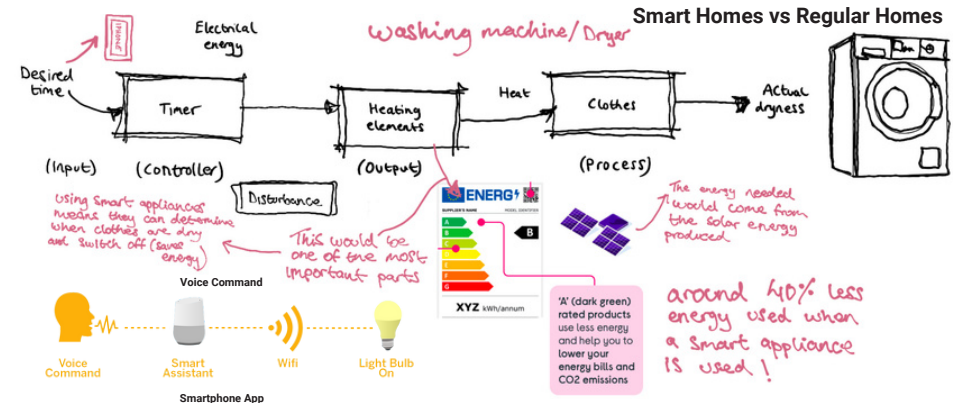
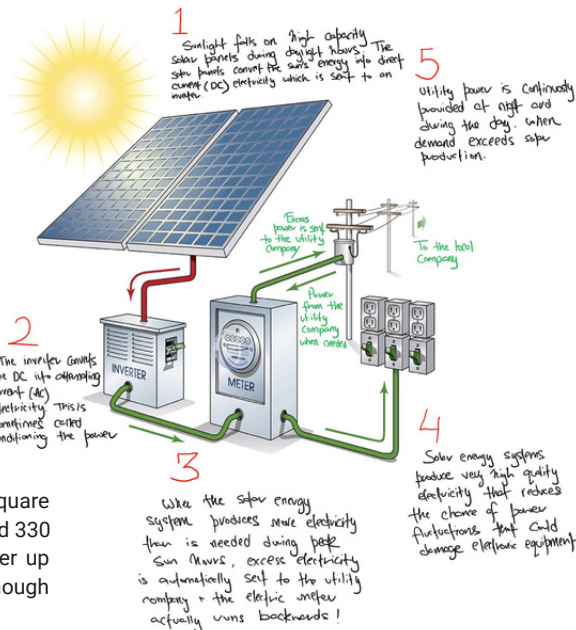
Cons: noisy, dangerous to some wildlife, expensive Upfront Cost

Solar Energy Analysis

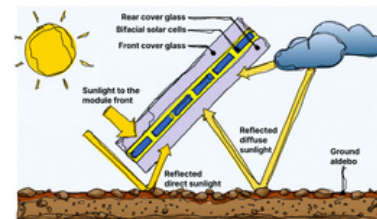


Number of 250W panels	Estimated surface area
12	19.2 m ²
16	25.6 m ²
20	32.0 m ²
24	38.4 m ²

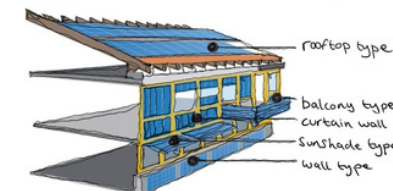
With an estimated roof size of 585 square meters in our building proposal, around 330 solar panels would be needed to cover up around 570 square meters, leaving enough space for the green house.



Solar Panel Technology



(BIPV) are photovoltaic materials that are used to replace conventional building materials in parts of the building envelope such as the roof, skylights, or facades.

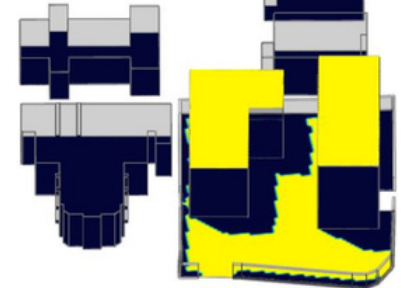


The benefits of using these systems is that they would provide and utilize spaces that can sometimes be overlooked to generate energy.

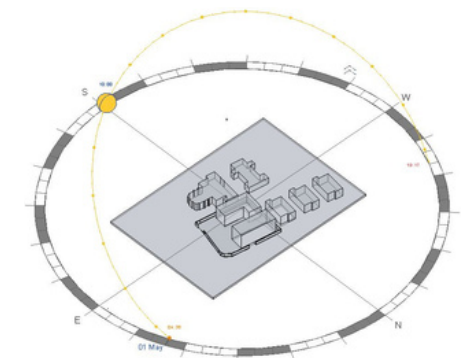
All of this seems great in a theoretical aspect, but when it actually comes to the real world and our client, it would not be something that would be feasible.

Sefaira Analysis

Underlit (dark blue), Overlit (yellow)



The site is well lit all year round, with only certain spaces being shaded. The sizes of the surrounding buildings is a key factor in this. The roof space is the place that would receive the most amount of light due to it not having anything over shadowing it.

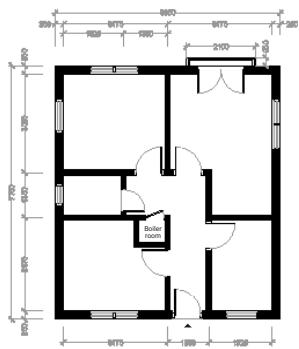


Spatial Planning

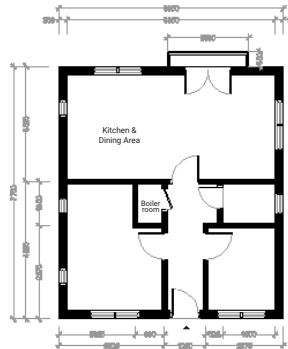
We have come up with four different typologies. Each typology corresponds to a different set of needs and requirements of various households.

2-BEDROOM FLAT UNITS

TYPOLOGY A1



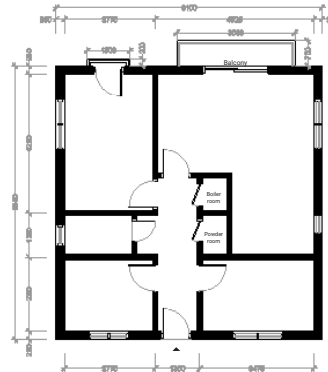
TYPOLOGY A2



Both of these units are of similar size, comprising of two bedrooms and a bathroom, and will be able to roughly fit from 3 up to 5 people comfortably.

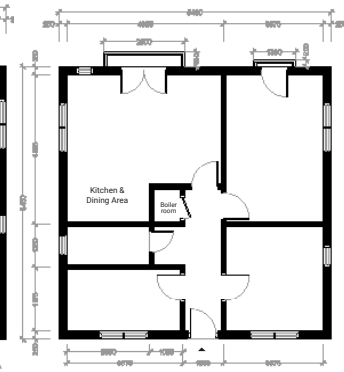
3-BEDROOM FLAT UNITS

TYPOLOGY B1



Total size (sqm) : 67.64

TYPOLOGY B2



Total size (sqm) : 70.98

These typologies come in different sizes. Typology B1 comprises of three bedrooms, one bathroom and a powder room. While Typology B2 comprises of three bedrooms and one bathroom.

HM GOVERNMENT THE BUILDING REGULATIONS 2010

PART A : STRUCTURE

Minimum thickness of external walls, for building exceeding 3.5m but not exceeding 9m :
• 190mm for whole its height

Minimum thickness of external walls, for building exceeding 9m but not exceeding 12m :
• 290mm from the base for the height of 2-storeys & 190mm for the rest of its height.

PART B : FIRE SAFETY

- 60 mins fire-rated walls.
- All entrance doors into the apartment block & each units are fire-rated door.
- Fire resisting construction for kitchen area and internal hallway of the units to provide escape way.

PART F : VENTILATION

1.17 Extract ventilation to the outside should be provided in all kitchen and bathrooms.

1.23 Supply air for the units should be delivered through one of the following means.
a. Continuous supply fans.
b. Background ventilators

PART M : ACCESS TO & USE OF BUILDING

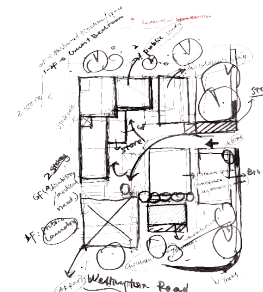
1.9 (a) Doors in units has a clear opening width of 900mm (minimum 775mm).

1.15 (a) Doors to a habitable room and the room containing the WC has a minimum clear opening width of 900mm & 750mm respectively.

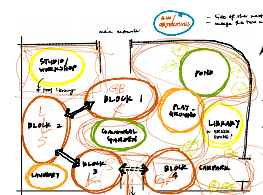
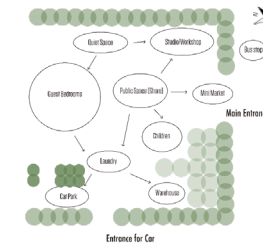
1.15 (b) Any obstruction (i.e. radiator), does not occur opposite or close to a doorway, and is no longer than 2m in length; and the corridor is not reduced below a minimum 750mm width at any point.

1.17 (d) All doors to the bathrooms open outwards and has a clear opening of 750mm.

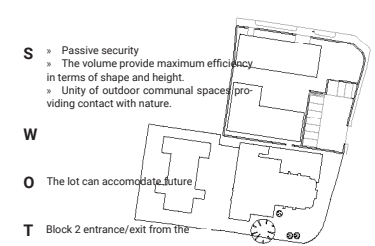
SITE ITERATION 1



SITE ITERATION 2



SITE ITERATION 3



- S
 - » Passive security
 - » The volume provide maximum efficiency in terms of shape and height.
 - » Unity of outdoor communal spaces providing contact with nature.
- W
 - » The lot can accommodate future
- T
 - » Block 2 entrance/exit from the
- S
 - » The extra block provides space
- W
 - » Less cost efficient to erect three entirely separate blocks rather than two.
- O
 - » The scheme enhances the provision of more indoor amenities.
 - » Lack of outdoor communal spaces.
 - » Less opportunity for future developments.
 - » Lack of adequate sunlight for the entirety of the community.



3D Visualisations



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ABOUT

Each year the MSA LIVE programme unites M Arch. year 01 with B Arch. year 01 and 02 and M Land. Arch 01 in mixed-year teams to undertake live projects with external partners to create social impact.

LIVE PROJECTS

All MSA LIVE projects are live. A live project is where an educational organisation and an external partner develop a brief, timescale, and outcome for their mutual benefit.

SOCIAL IMPACT

All MSA LIVE projects have social impact. Social impact is the effect an organization's actions have on the well-being of a community. Our agendas are set by our external collaborators.

EXTERNAL PARTNERS

MSA LIVE projects work with many organisations: charities, community groups, social enterprises, community interest companies, researchers, practitioners and educators.

STUDENT-LED

Our MSA masters students take the lead in the project conception, brief development, delivery and co-ordination of a small project. Other cohorts joined for an eventful 2 weeks of activities at the end of the academic year.

KNOWLEDGE TRANSFER

Working in teams within and across year groups and courses; MSA students participate in peer to peer learning. In addition, collaborators, participants and students engage in the transfer of tangible and intellectual property, expertise, learning and skills.

LARGE SCALE

This year approximately 550 students from 4 cohorts in MSA have worked on 35 projects with partners.

QUESTIONS

For questions about MSA LIVE please contact the MSA LIVE team:

msalive@mmu.ac.uk

BLOG

live.msa.ac.uk/2022

SOCIAL

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