



PORTFOLIO

SuperREUSE
SHITING SUN (KRISTY)

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TOWER HAMLETS POVERTY



The site is located in the borough of Tower Hamlets in East London, which is a highly densely populated area, with the population of tower hamlets being one of the fastest growing in the country over the last decade and the most densely populated in the UK according to the 2021 census report. In addition, tower hamlets is also one of the most deprived areas in London, with an estimated 44 per cent of households in Tower Hamlets being income deprived - the highest rate in England and Wales.

FOOD CONCERN

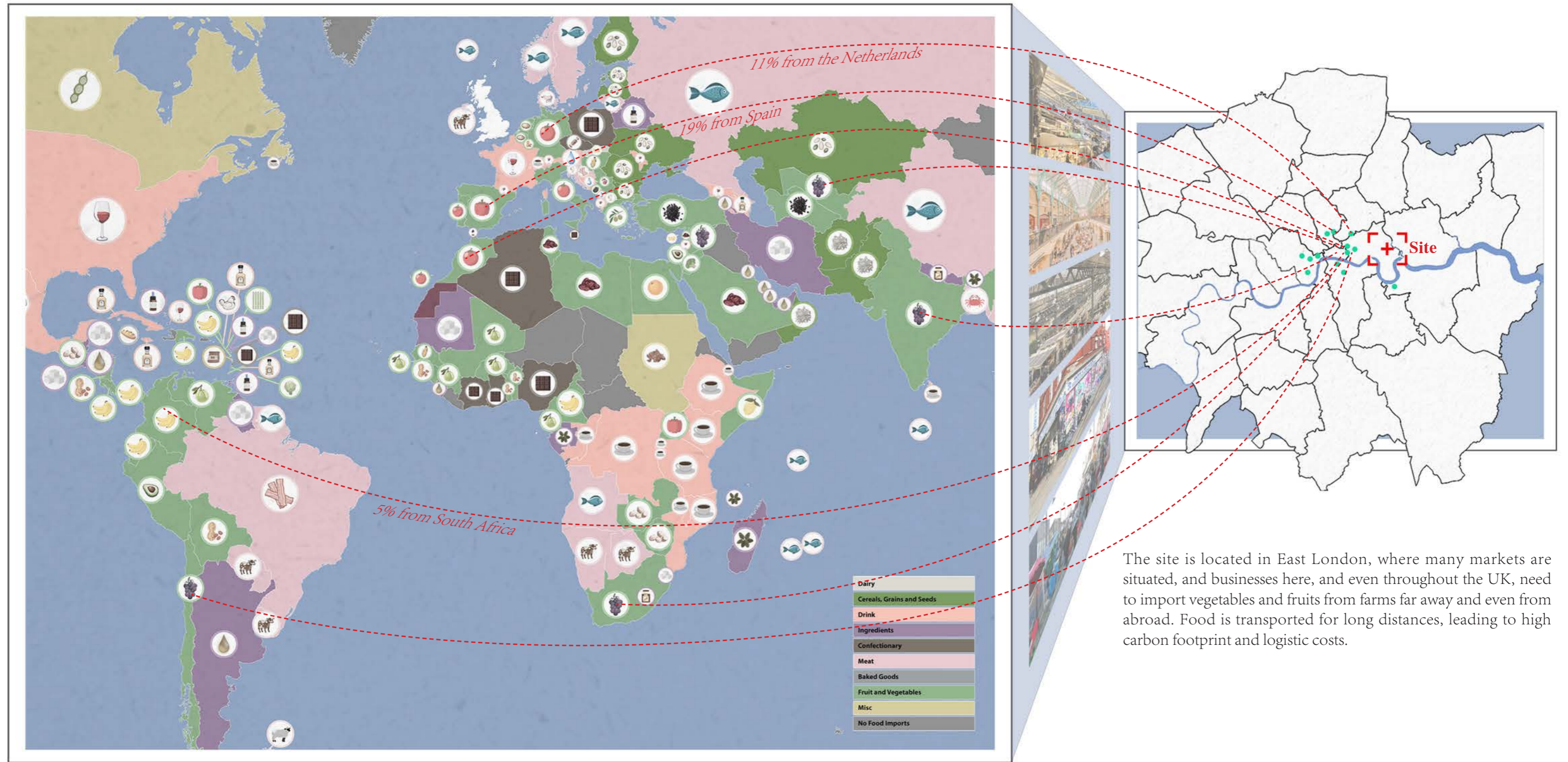


Bacterial Diseases of Vegetable Crops

High-Calorie Food

More than half of all children in Tower Hamlets are suffering from food insecurity, the highest level in London, according to a new report. The risks of food insecurity highlighted by the report are said to lead to “children” eating “either not enough food” or “inexpensive, calorie dense food of low nutritional value, leading to the child having poor health and struggling at school.”

IMPORTATION

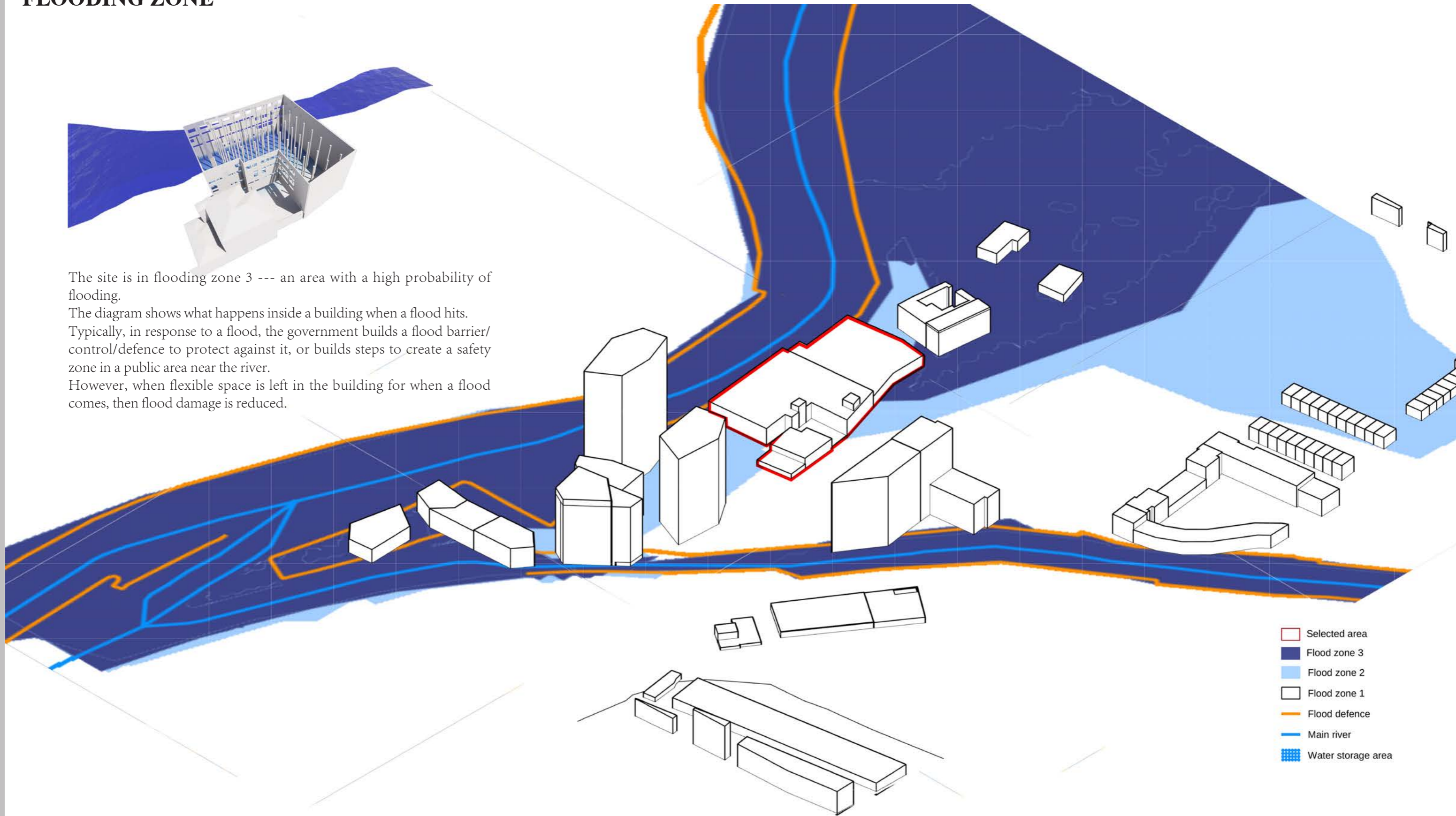


The site is located in East London, where many markets are situated, and businesses here, and even throughout the UK, need to import vegetables and fruits from farms far away and even from abroad. Food is transported for long distances, leading to high carbon footprint and logistic costs.

The UK is highly reliant on imports of fresh produce – sourcing more than 40% of its vegetables and more than 80% of its fruit from abroad each year – so is already vulnerable to supply chain shocks. And climate change is increasing the frequency of extreme weather events. Vegetables and fruit worth £ 5,440,656,736 were imported from abroad in six months. The fruit and vegetables came from all over the world, with nearly a fifth (19%) of UK imports coming from Spain, 11% from the Netherlands and 5% from South Africa.

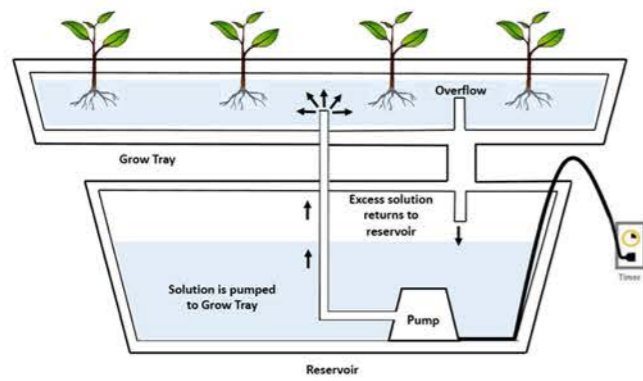
FLOODING ZONE

The site is in flooding zone 3 --- an area with a high probability of flooding.
 The diagram shows what happens inside a building when a flood hits.
 Typically, in response to a flood, the government builds a flood barrier/control/defence to protect against it, or builds steps to create a safety zone in a public area near the river.
 However, when flexible space is left in the building for when a flood comes, then flood damage is reduced.



- Selected area
- Flood zone 3
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

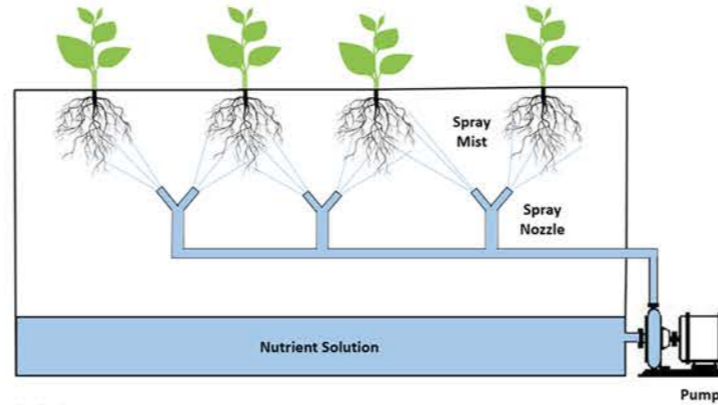
TYPES OF VERTICAL FARMING



Hydroponic vertical farming

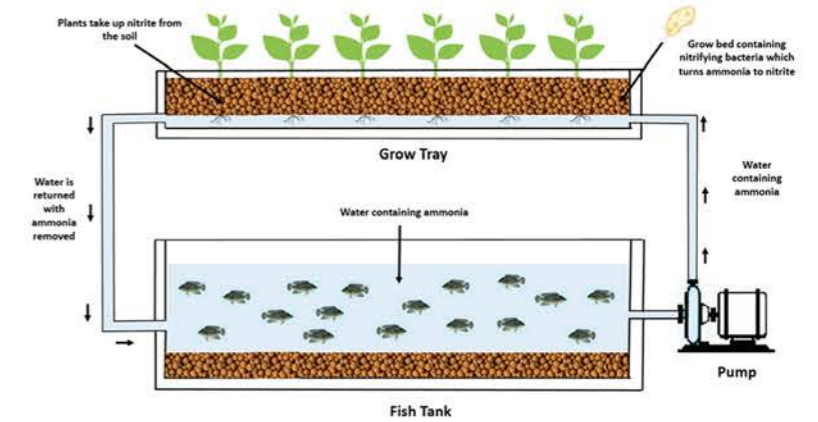
The most commonly used vertical grow system is hydroponics. With this technique, the roots of the plants are not planted in soil but in a water solution rich in the essential nutrients only.

The composition of the nutrient solution is regularly adjusted so that the plant continuously grows under the most optimal composition of nutrition.



Aeroponic vertical farming

Aeroponics, a variant of hydroponics. With this method, plants grow in air or mist, which is sprayed on their roots several times an hour. In other words, the plants are grown without soil and with very little water usage.

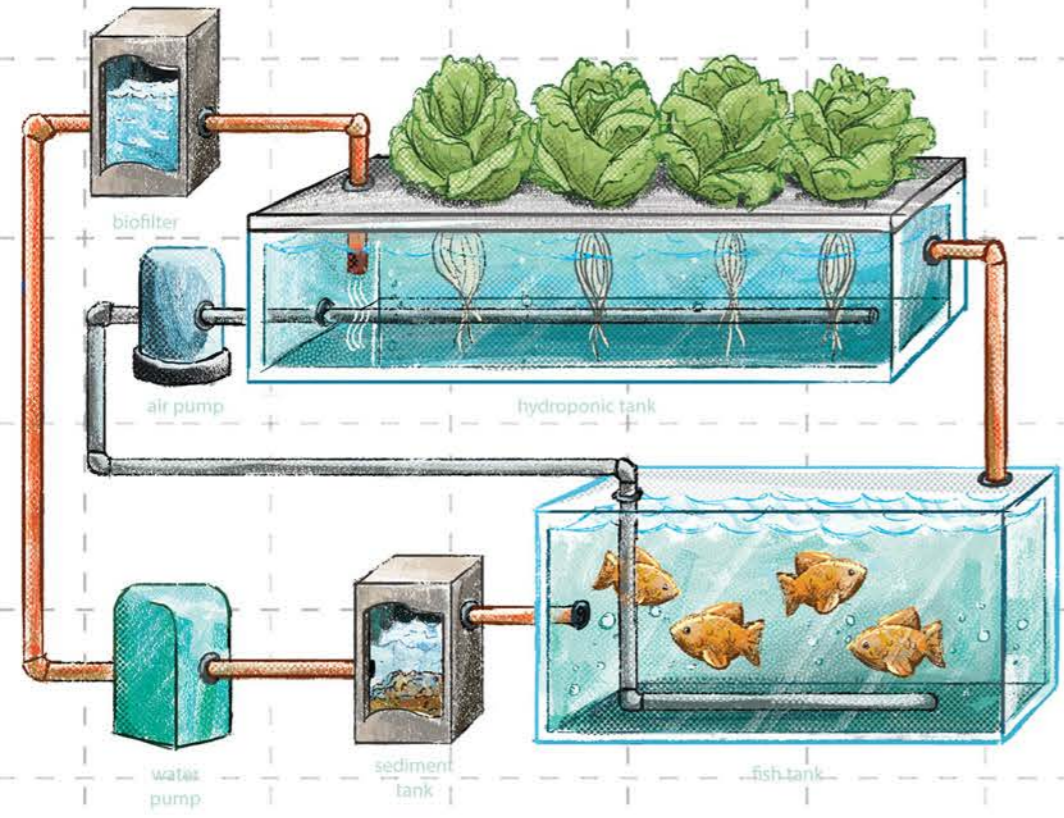


Aquaponic vertical farming

Aquaponics is a combination of aquaculture and hydroponics. In aquaculture, organisms are grown in water, while in hydroponics, plants are grown without soil.


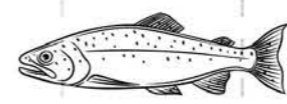

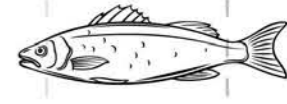
Aquaponics combines these techniques by cultivating fish and feeding the plants with the water the fish swim in. The waste from the fish is converted into food for the plants.

AQUAPONICS VERTICAL FARMING



Aquaponics is a cyclic symbiotic system that utilizes natural biological processes where fish and plants coexist for mutual benefit. In this ecosystem, fish provide the nutrients for plant growth through their waste, while plants help purify the water, thus creating a closed-loop and highly efficient system.

Aquaponics system depends on one crucial decision: choosing the best fish species. Certain fish are better because they are more tolerant to changes.

	Tilapia	Trout	Catfish	Bass
				
pH	6.5-9	6.5-8	7-8.5	6.5-9
Temperature	72° - 86° F	45° - 68° F	75° - 86° F	65° - 80° F
Advantages	<ul style="list-style-type: none"> Fast growth rate Extremely hardy Tasty with a mild flavor Excellent food conversion rates (1.7) They don't require much-dissolved oxygen 	<ul style="list-style-type: none"> Tasty to eat Good in cooler climates Feed on a wide variety of options, including fish, insects, and soft-bodied invertebrates. 	<ul style="list-style-type: none"> Not territorial – can be bred with other equal-sized fish. Good tolerance to water temp variations. (warmer water does encourage growth). Several different species of catfish, ensuring you have the right one for your climate and needs. Taste good, that's a benefit if you're planning on eating them. 	<ul style="list-style-type: none"> Eat almost anything, from insects to worms, or even pellets. Bass are top feeders so you can assess their consumption easily, and adjust accordingly. They don't need a lot of protein, allowing you greater freedom with what you feed them. Taste great!
Disadvantages	<ul style="list-style-type: none"> Although hardy, water below 50°F will make these fish die. Breed very quickly; this can be an issue if you have a small aquaponics system. 	<ul style="list-style-type: none"> Grows slowly Can't be kept with other fish. You'll need to give them plenty of space; to ensure they grow properly Need high dissolved oxygen levels in the water (minimum 10mg/liter) 	<ul style="list-style-type: none"> They require high protein fish food. Very sensitive to being handled; avoid if possible. 	<ul style="list-style-type: none"> You'll need to monitor potassium levels as changes in this can quickly make your bass ill.

VERTICAL FARM PLANTS

Imported products



Banana



Pineapple



Papaya



Tomato



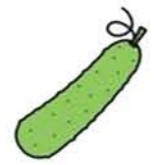
Avocado



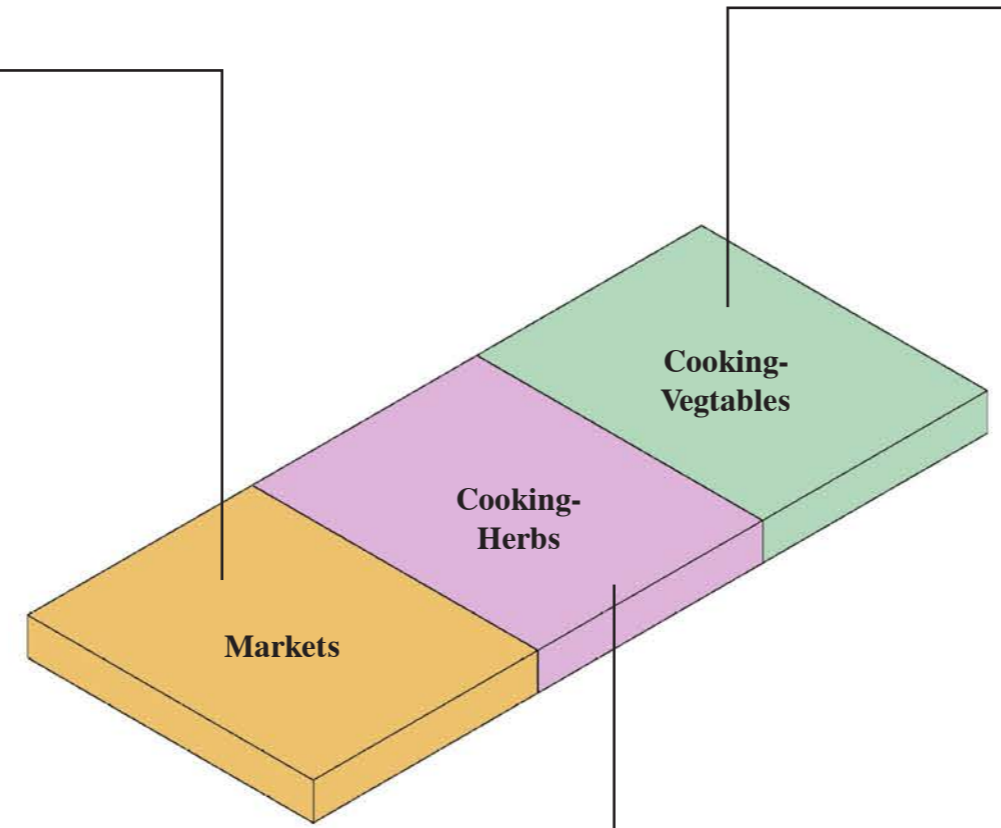
Grape



Mango



Cucumbers



Leafy greens



Red oakleaf



Kale



Frisee



Pak choy



Mini Arugula



Romaine



Swiss chard



Sorrel



Spinach



Iceberg lettuce



Mizuna

Herbs



Rosemary



Mint



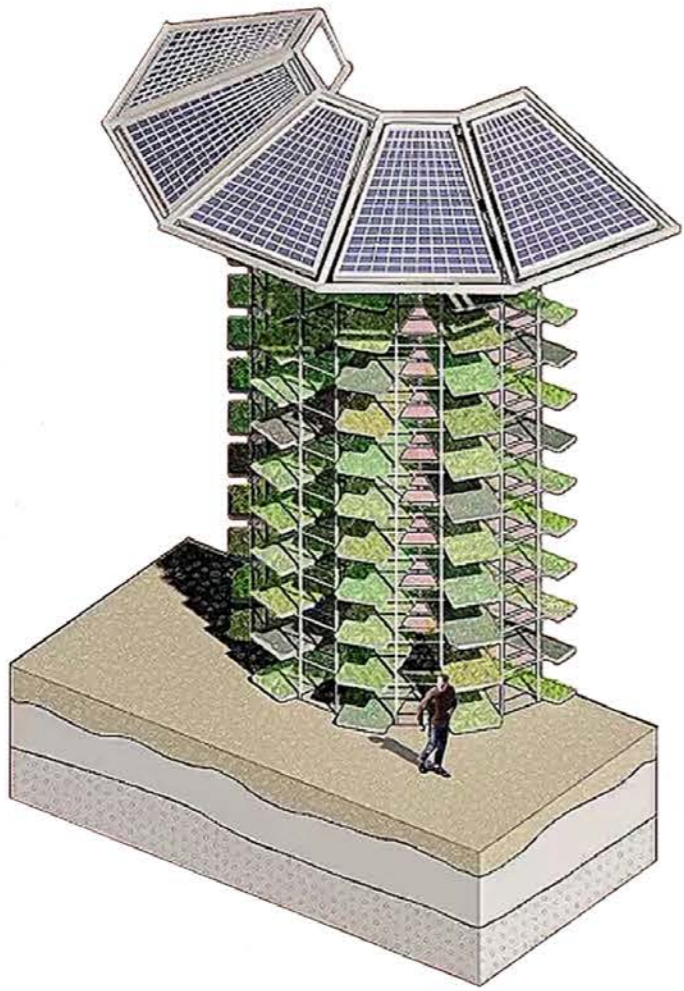
Coriander



Basil

RENEWABLE ENERGY

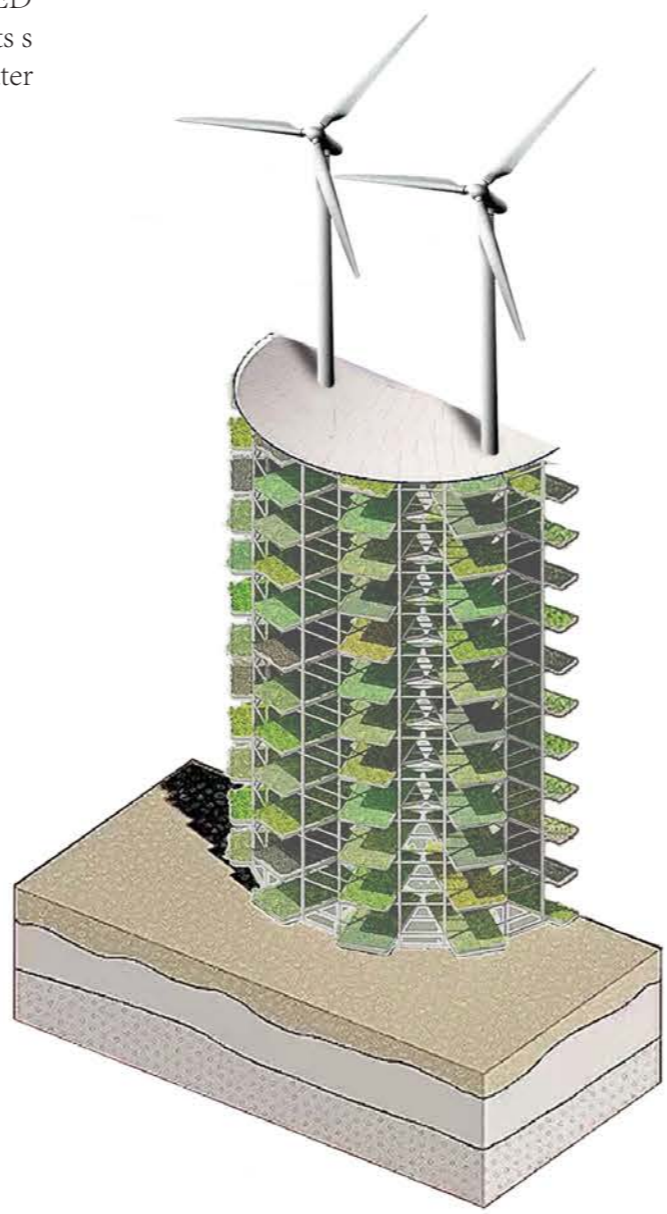
Despite all the benefits, vertical farming has a catch. Vertical farming is done indoors in extensive facilities, and utilizes LED lights to provide the plants with necessary lighting. LED lights which use a lot of energy. Adding to that, the energy consumed by other components is also substantial. This includes the machinery that regulates temperature, humidity and water circulation inside a vertical farm.



Solar panels

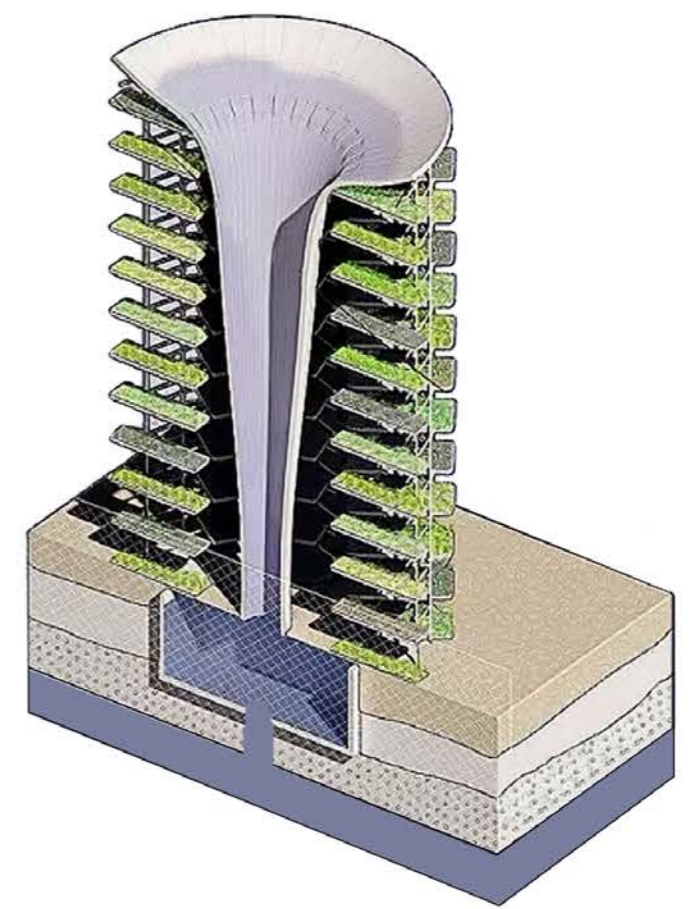
One of the simplest ways to incorporate renewable energy into a vertical farming operation is to install solar panels on the roof of the building or container farm. These panels can be used to generate electricity that can be used to power the lights, fans, and other equipment needed to keep the plants growing.

Solar power is a clean, renewable energy source that does not produce any emissions.



Wind turbines

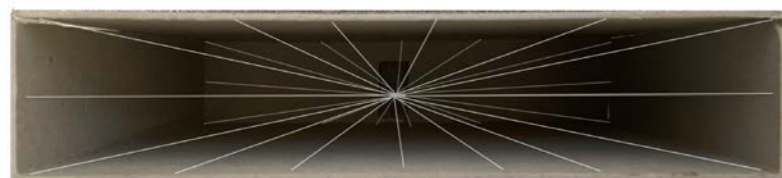
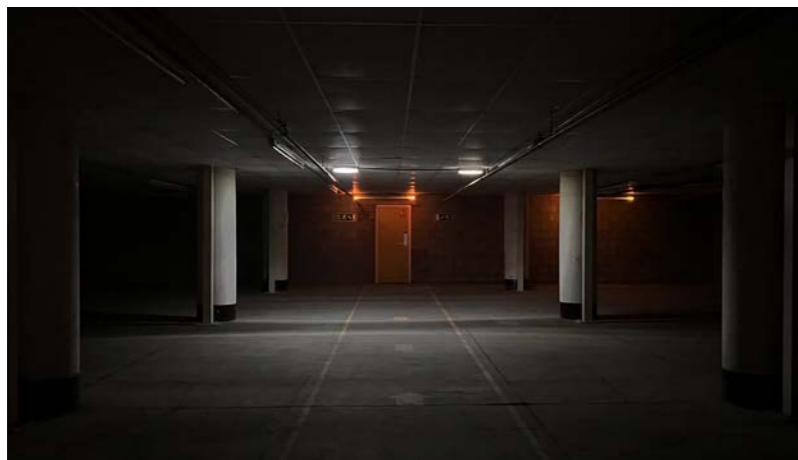
By installing small wind turbines on the roof or top of a building, farmers can use this power to generate electricity. One of the main benefits of using wind power in vertical farming is that it can provide a significant amount of electricity to power the lights, fans, and other equipment needed to keep the plants growing.



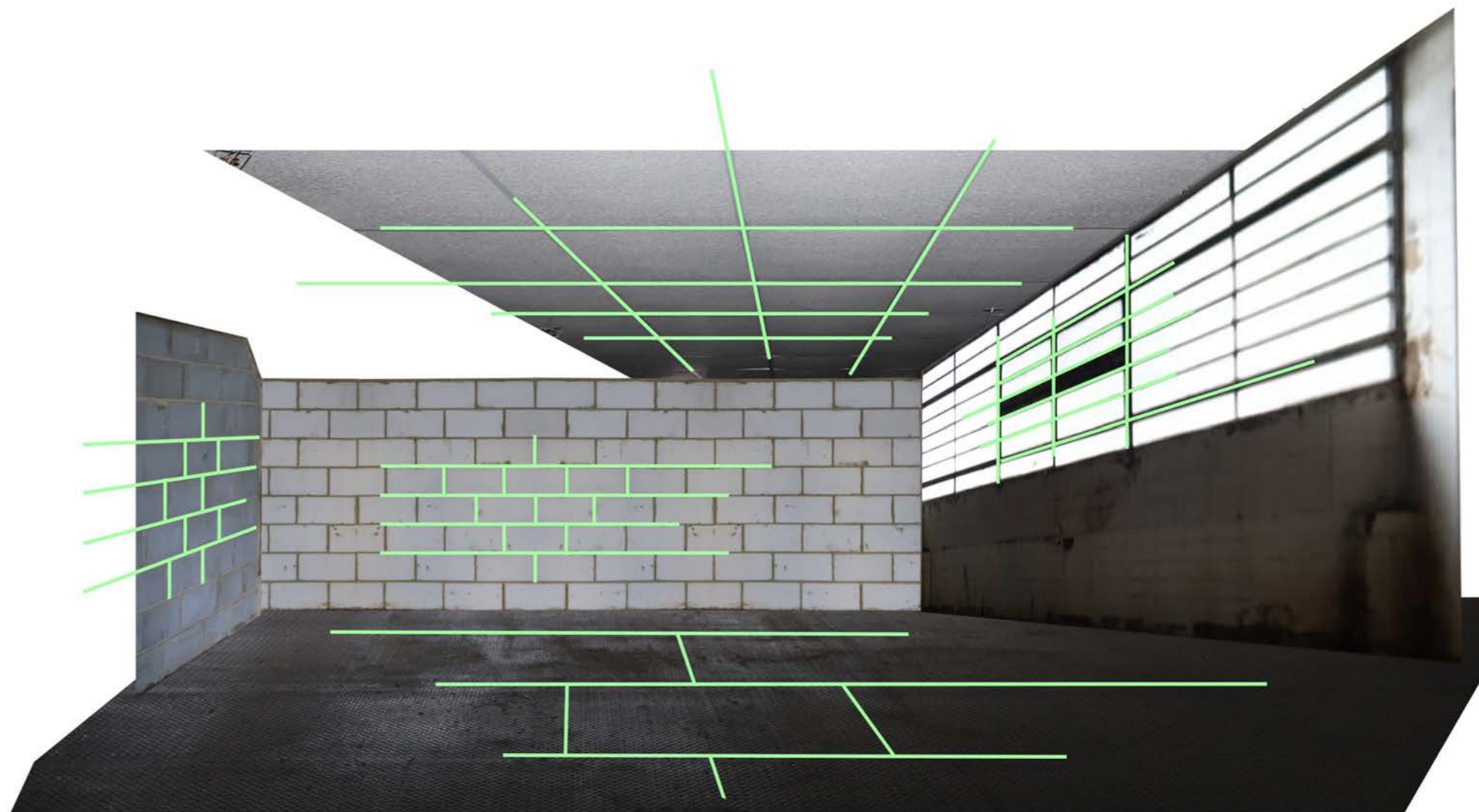
Water cycle

Given that irrigation for agriculture accounts for 70% of the world's total water use, finding more sustainable ways of working are now a must for the industry. To ensure sustainable water usage in vertical farm by harvesting rainwater or using alternative sources of water (river water in this case).

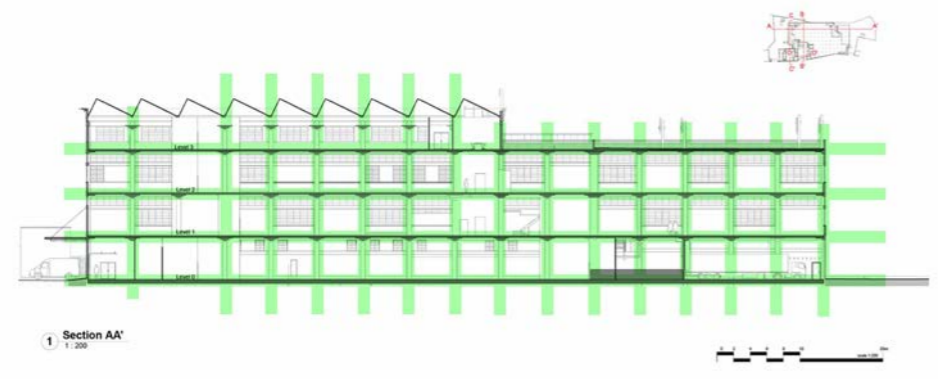
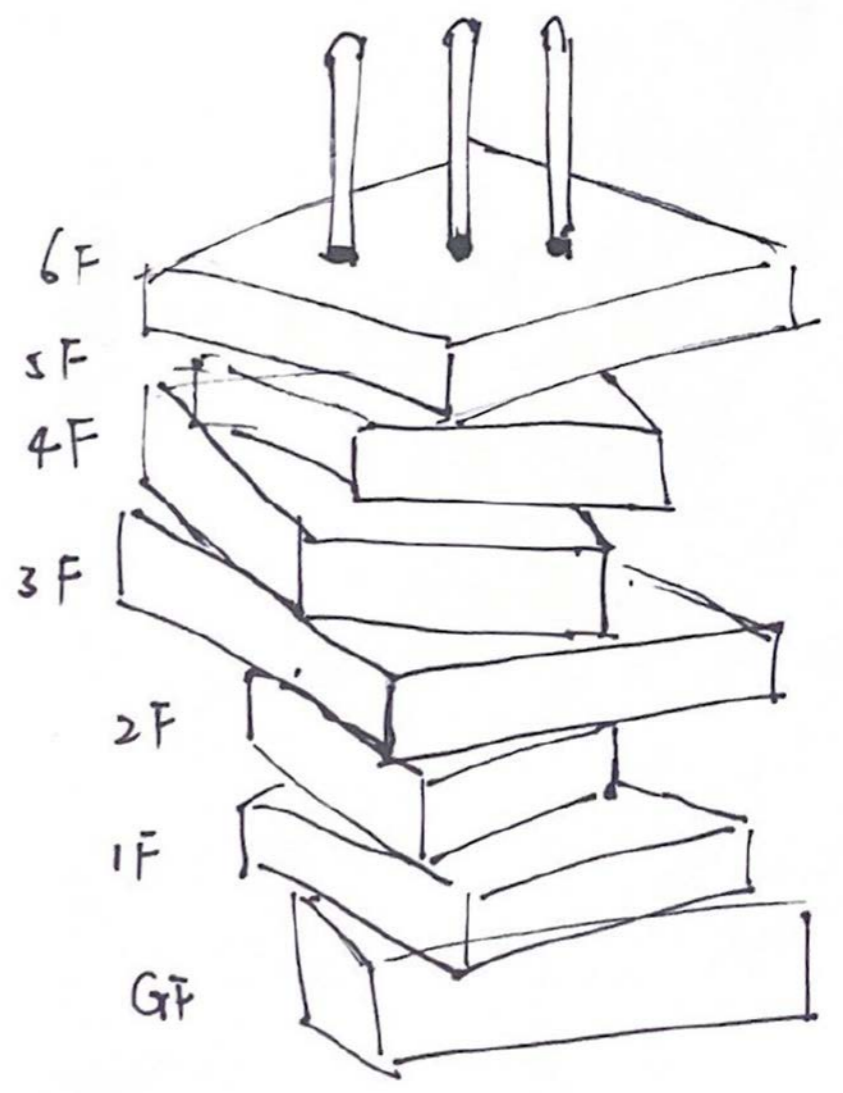
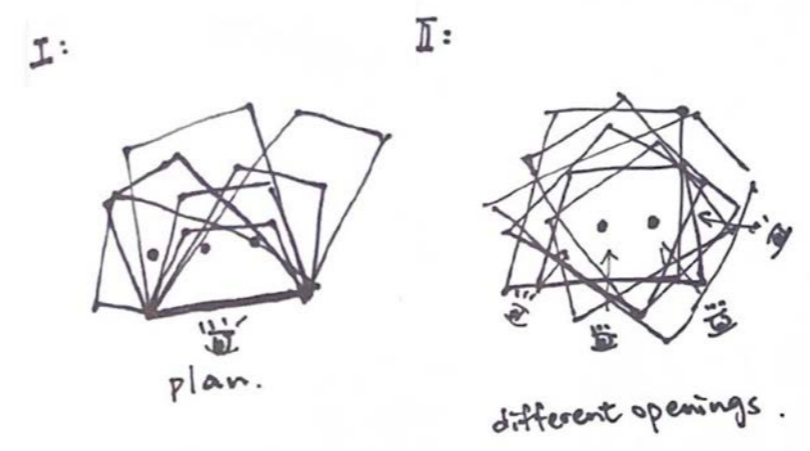
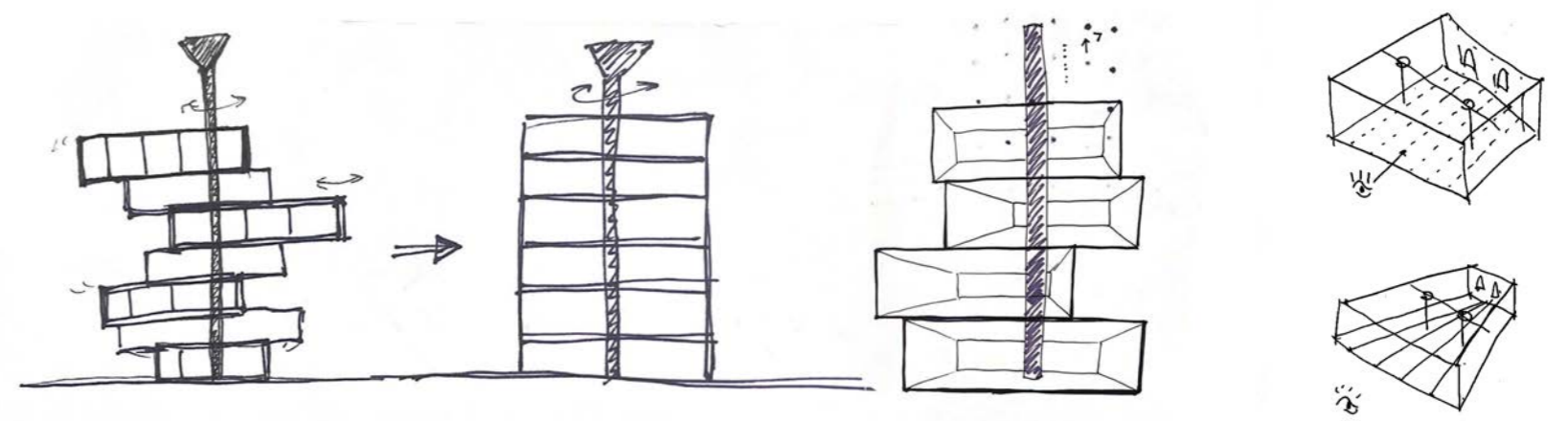
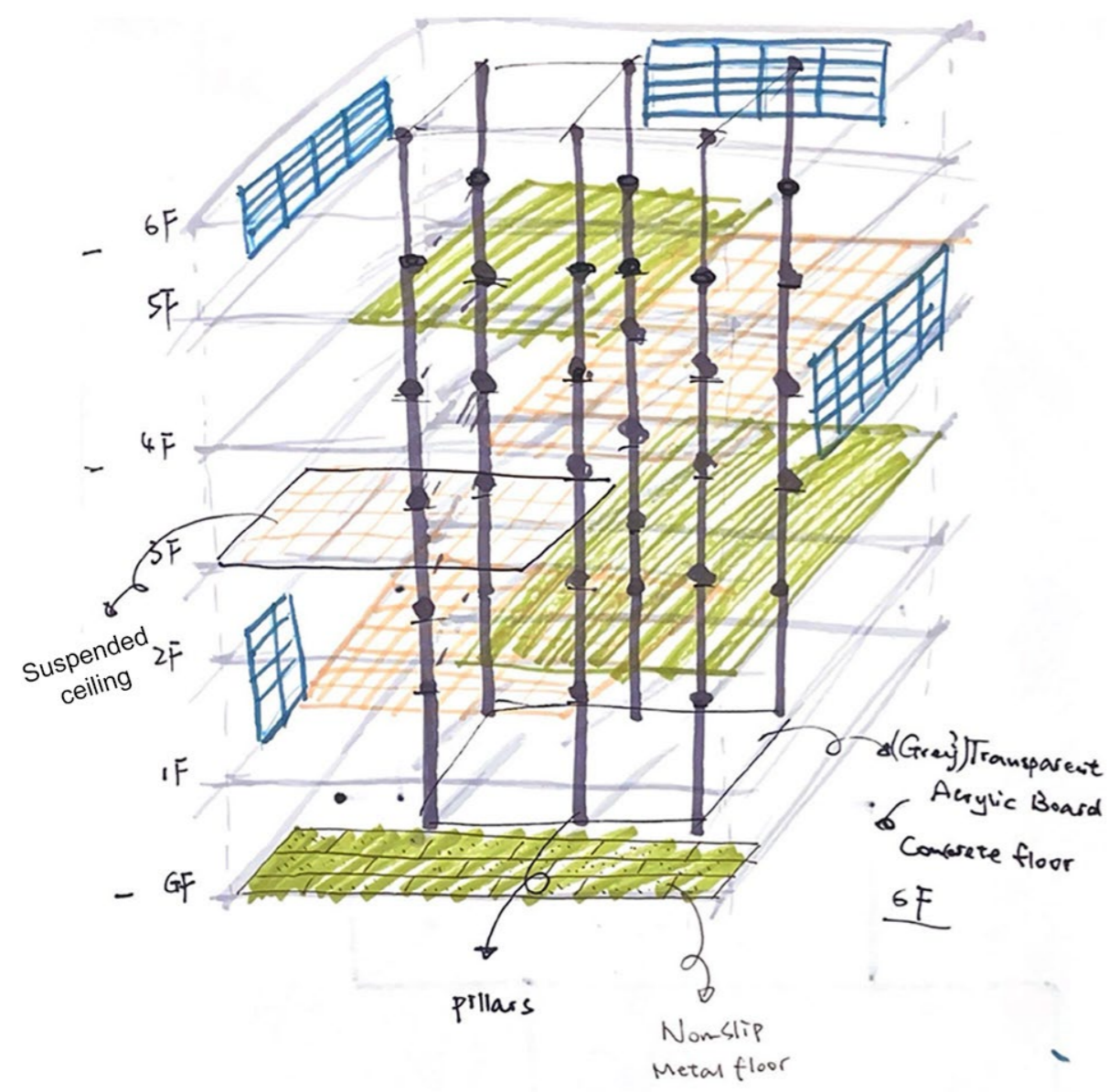
COMPRESSION ARTEFACT



First impression:
Dark, claustrophobic, enclosed, cramped, orderly



The sense of order in the space can be represented by ropes, all of which gathered at the door, which is the focal point for the line of sight in this space. The room is made up of many grids, including suspended ceilings, flooring, wall bricks, and windows. All these grids communicate with each other to form the orderliness of the space.



Grids communication

After extracting all the grids a room, I drew all the grids on different colour papers and placed them on a transparent board to highlight the relationship between the grids. The transparent panels allow me to realize that the grids not only influence each other in one space, but also have connections in the vertical building. When presenting each floor in a vertical dimension, the rooms can be combined and presented in a number of attempts at angles. The rooms are supposed to be square, but I made them trapezoidal, or triangular, to exaggerate the effect of perspective.



Ground Floor



First Floor



Second Floor



Third Floor



Forth Floor



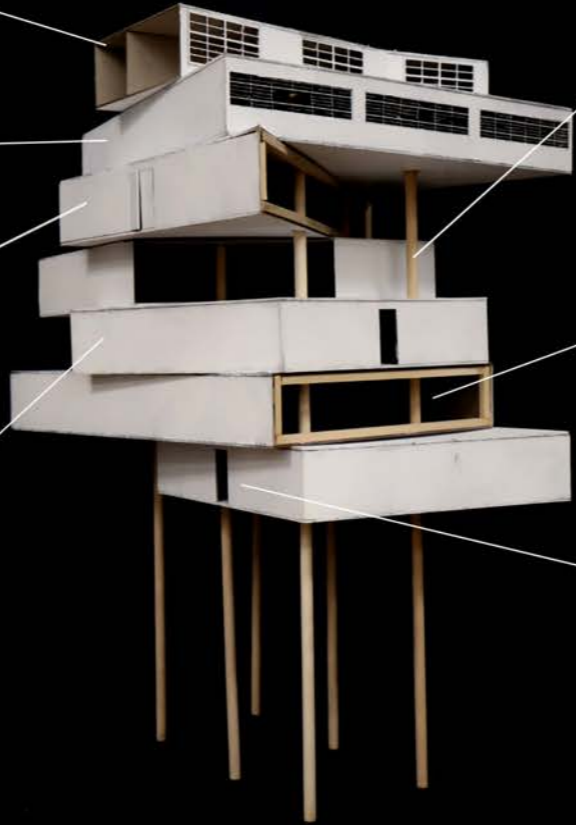
Fifth Floor

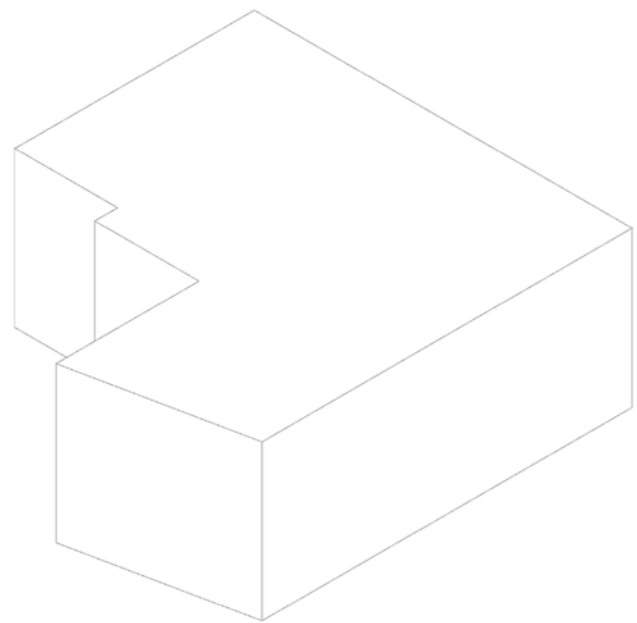


Sixth Floor

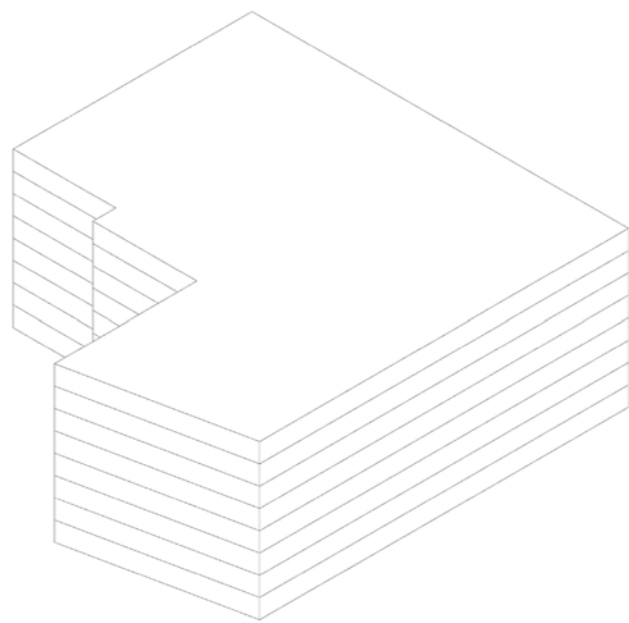
On the other floors, there's always a point that attracts me first. It might be a window or a door or a fire scape light. I made each floor a box with a point at the very back. Then when I looking for a common thing of these floors, I found the floors are connected by columns, so are the boxes. So I string the boxes together with wood sticks. You can see different views if you look inside each boxes.



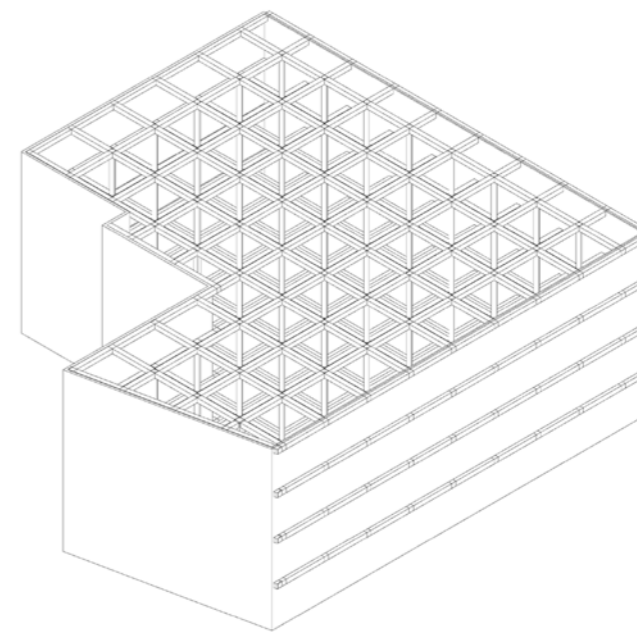




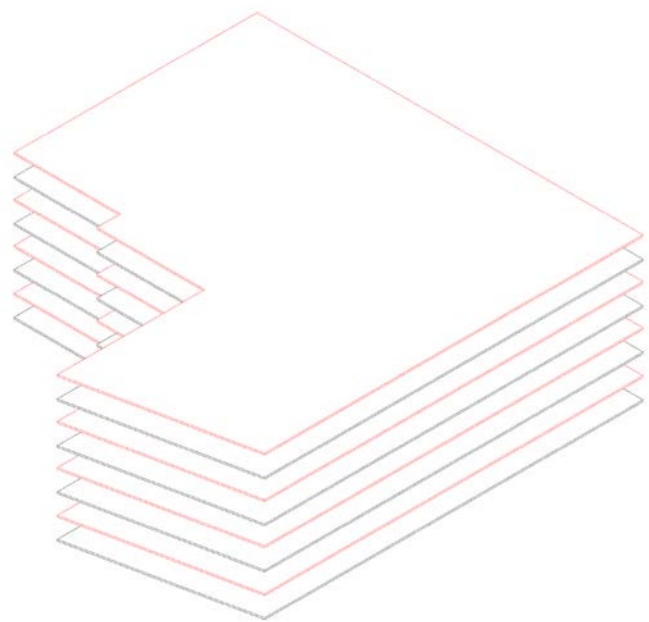
Original building



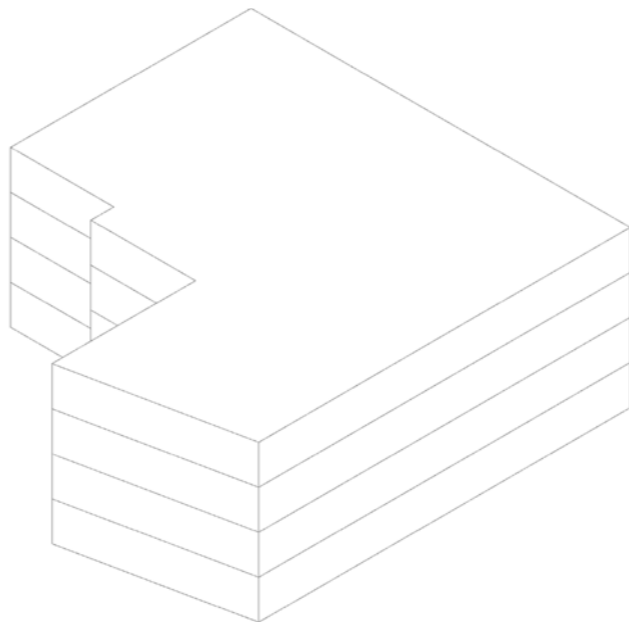
Original flooring



Original columns and beams

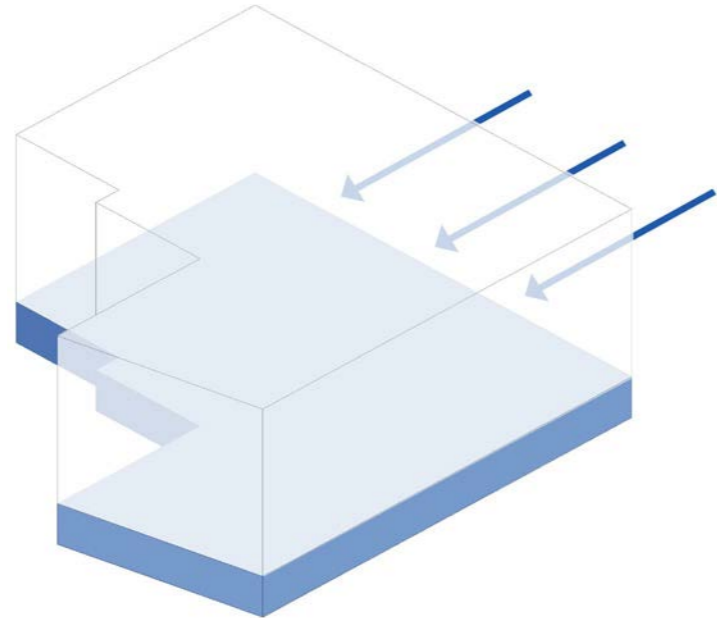


Remove mezzanine

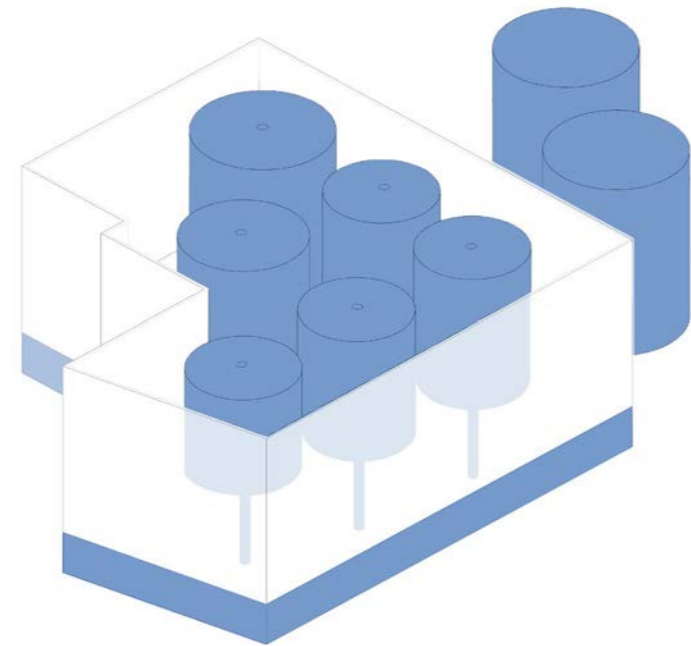


High story height

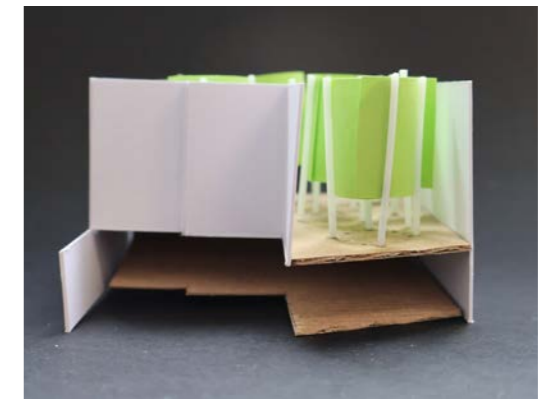
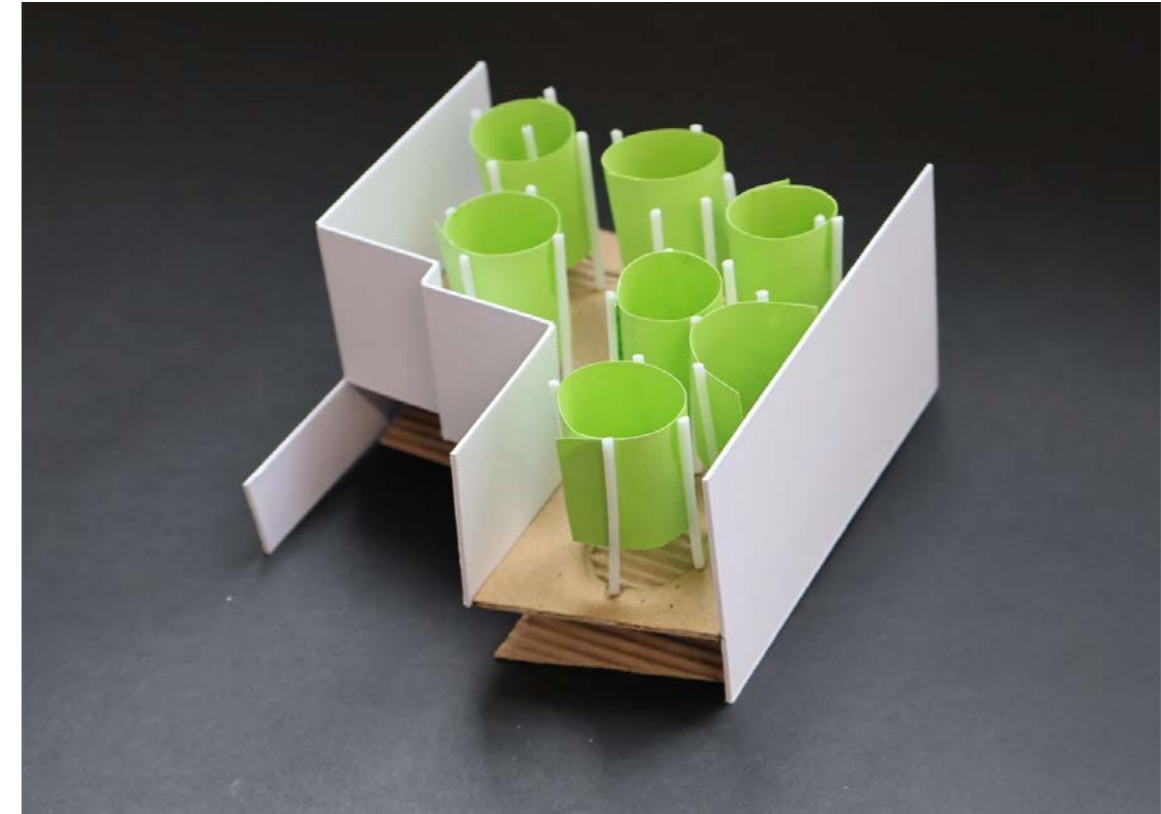
Compression Artefact made me understand the building, which is made up of a lot of tiers stacked on top of each other. And the beams and columns are emphasized.



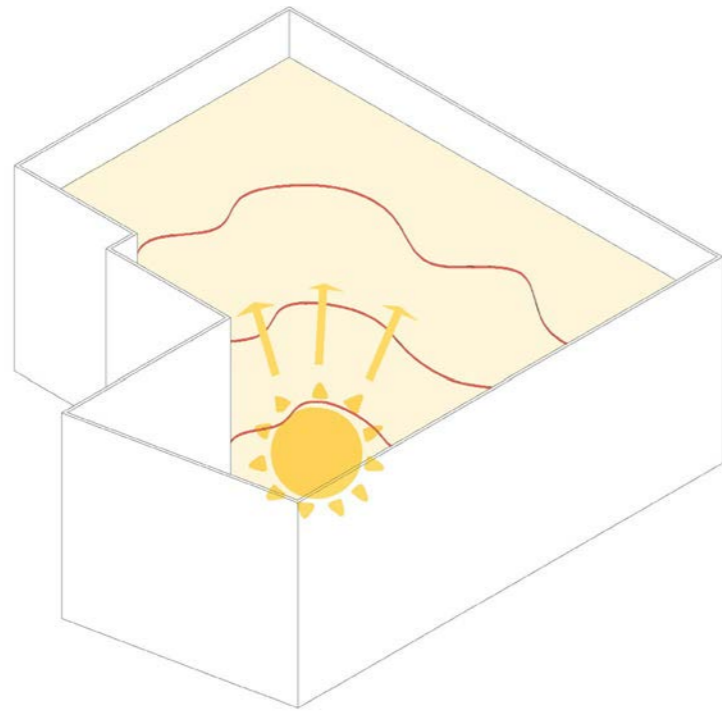
Let the river in



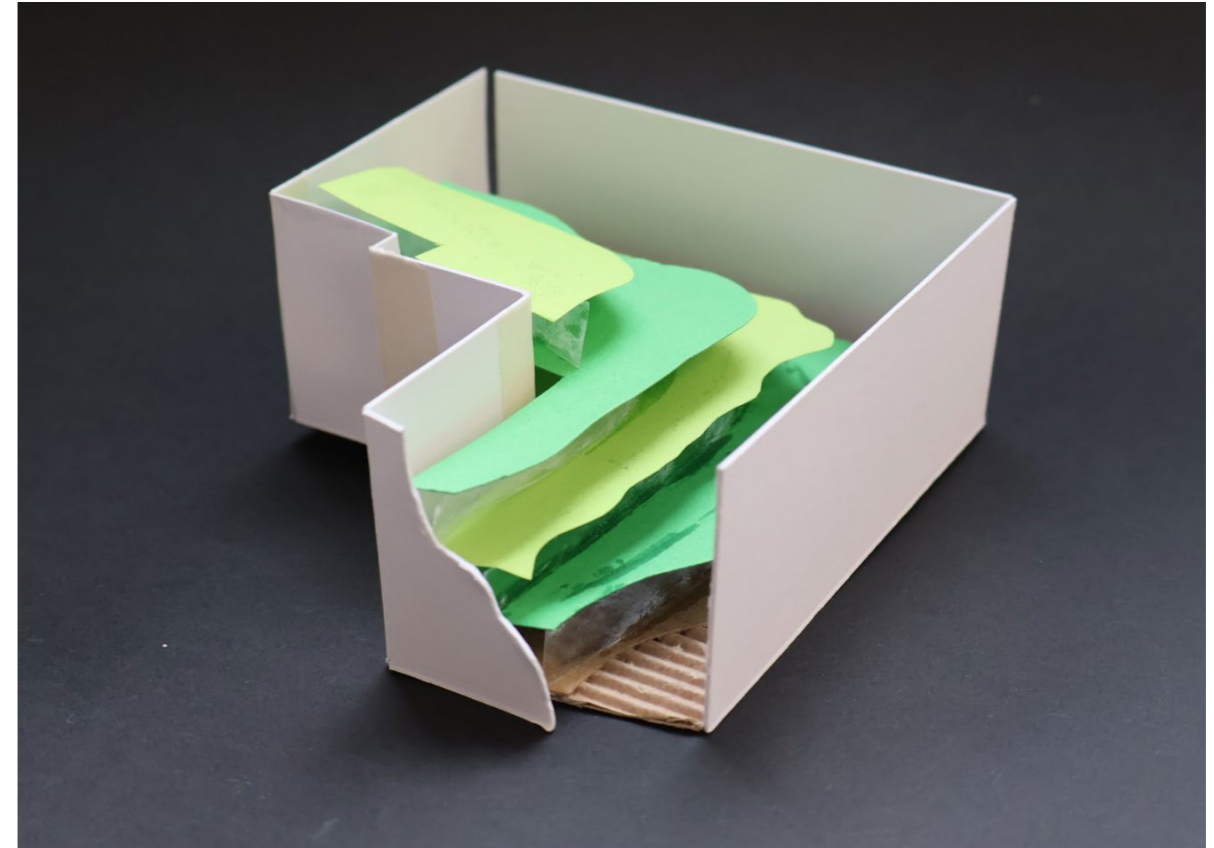
Raise the water level to higher farm



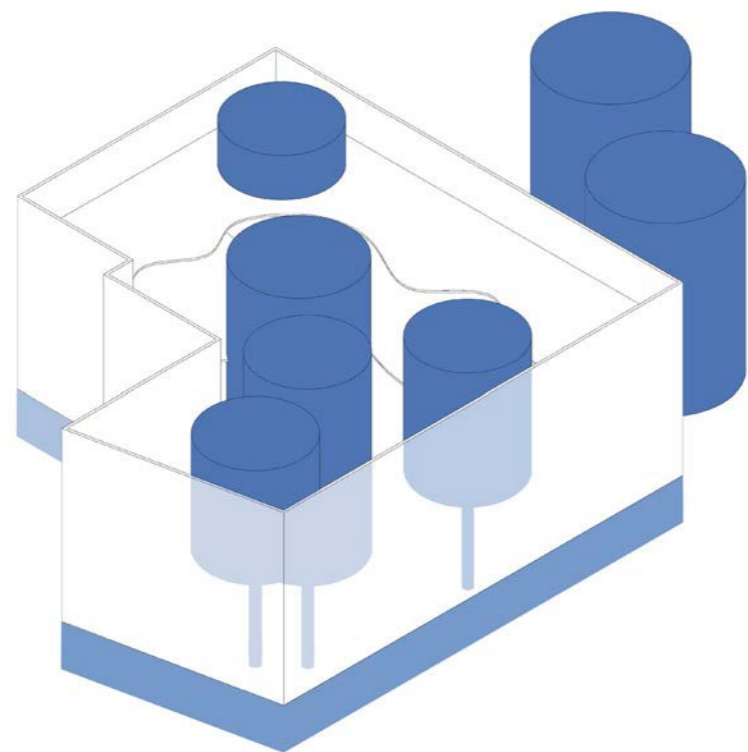
Because the Vertical Farm will be using the river as a freshwater resource, the river will be brought into the site and the water level will be raised upwards to supply the farm with water. Try to boldly remove all the floors and restore an empty building. This approach allowed me to experiment with more large farms and fish farms lined up. In response to flooding, all spaces were supported to a certain height by columns, which responded to the compression artefact.



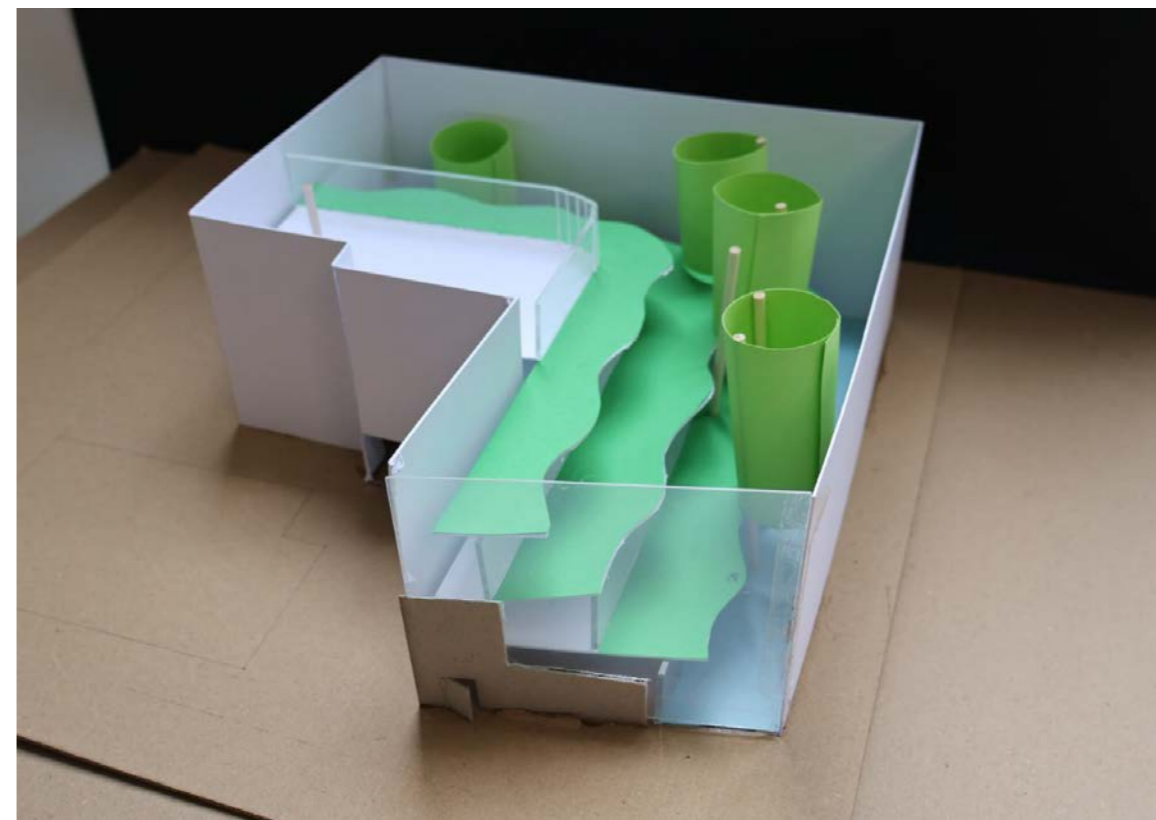
Cut the floor to bring sunlight in



The farm still needs a lot of sunlight, opening up the roof and front side facade to bring in more natural light. Exposed areas on each level serve as allotment, and inside are environmentally controlled growing areas that don't need natural light.

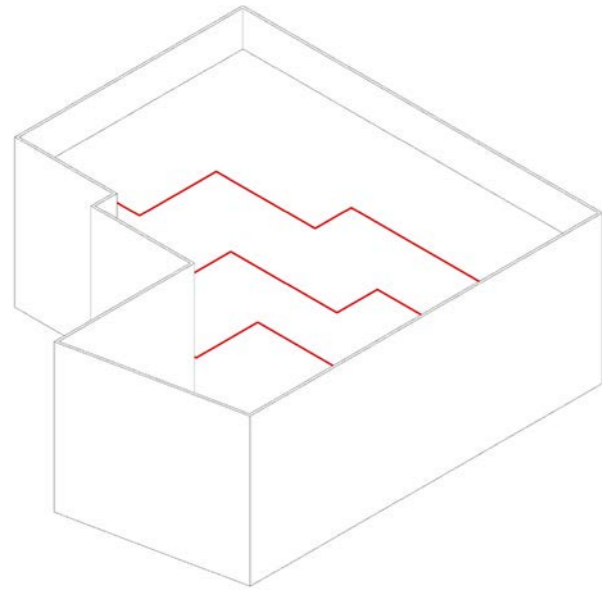


Arrange cylinders around the floor

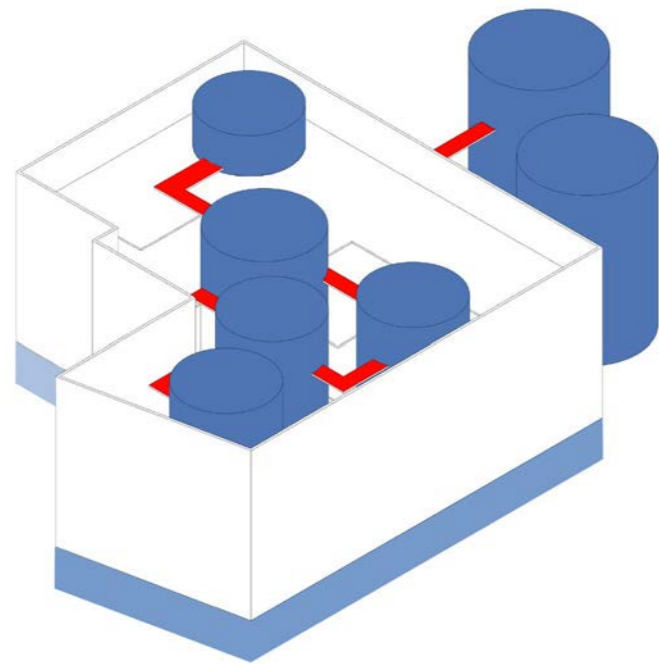


Beginning to experiment the communication between the floor and cylinder farms in a larger scale, i.e. 1:200.

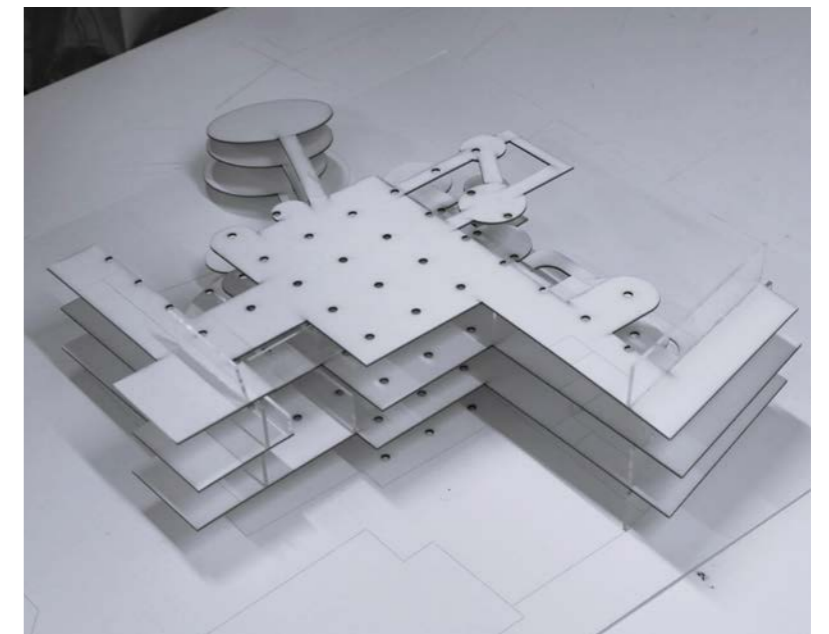
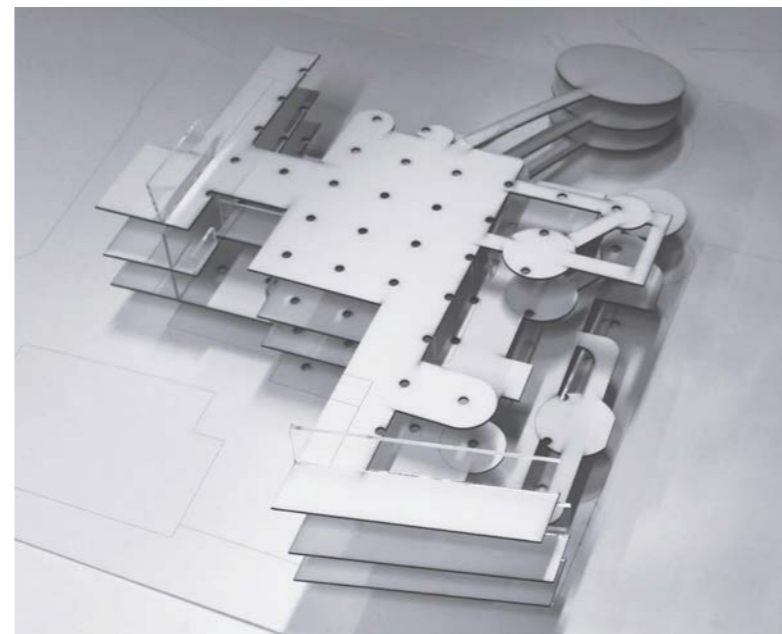
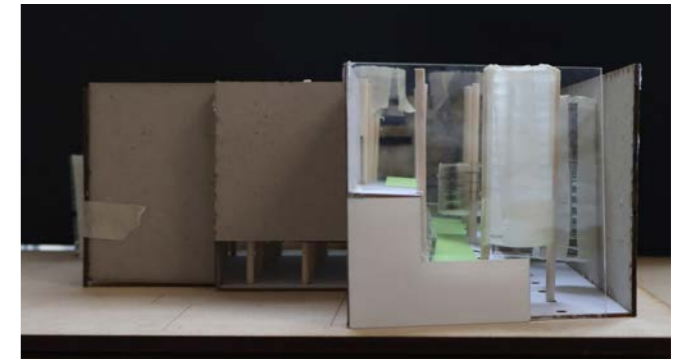
In order to attract people, I made the facade along the street transparent so that people can see the huge vertical farm inside, and I opened the entrance for vehicles on the street-facing facade, which is a way to incorporate the street into the space.



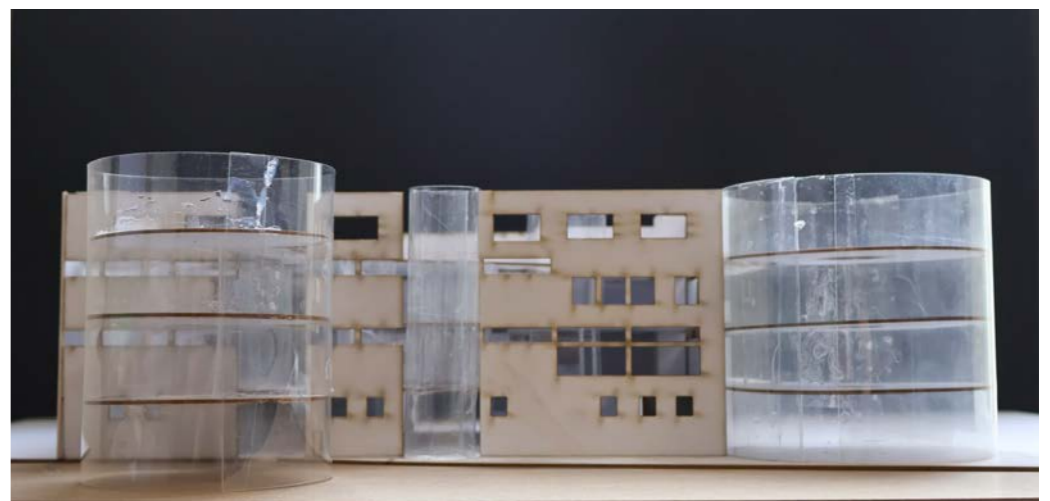
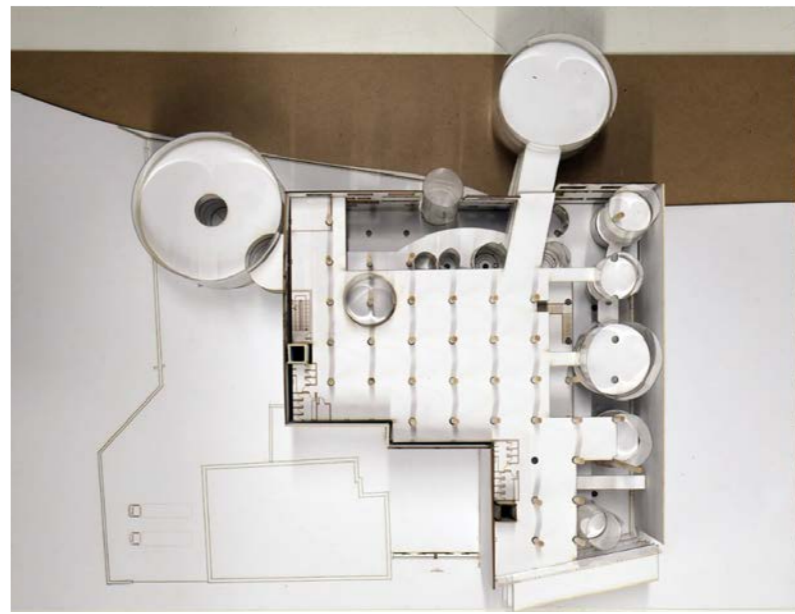
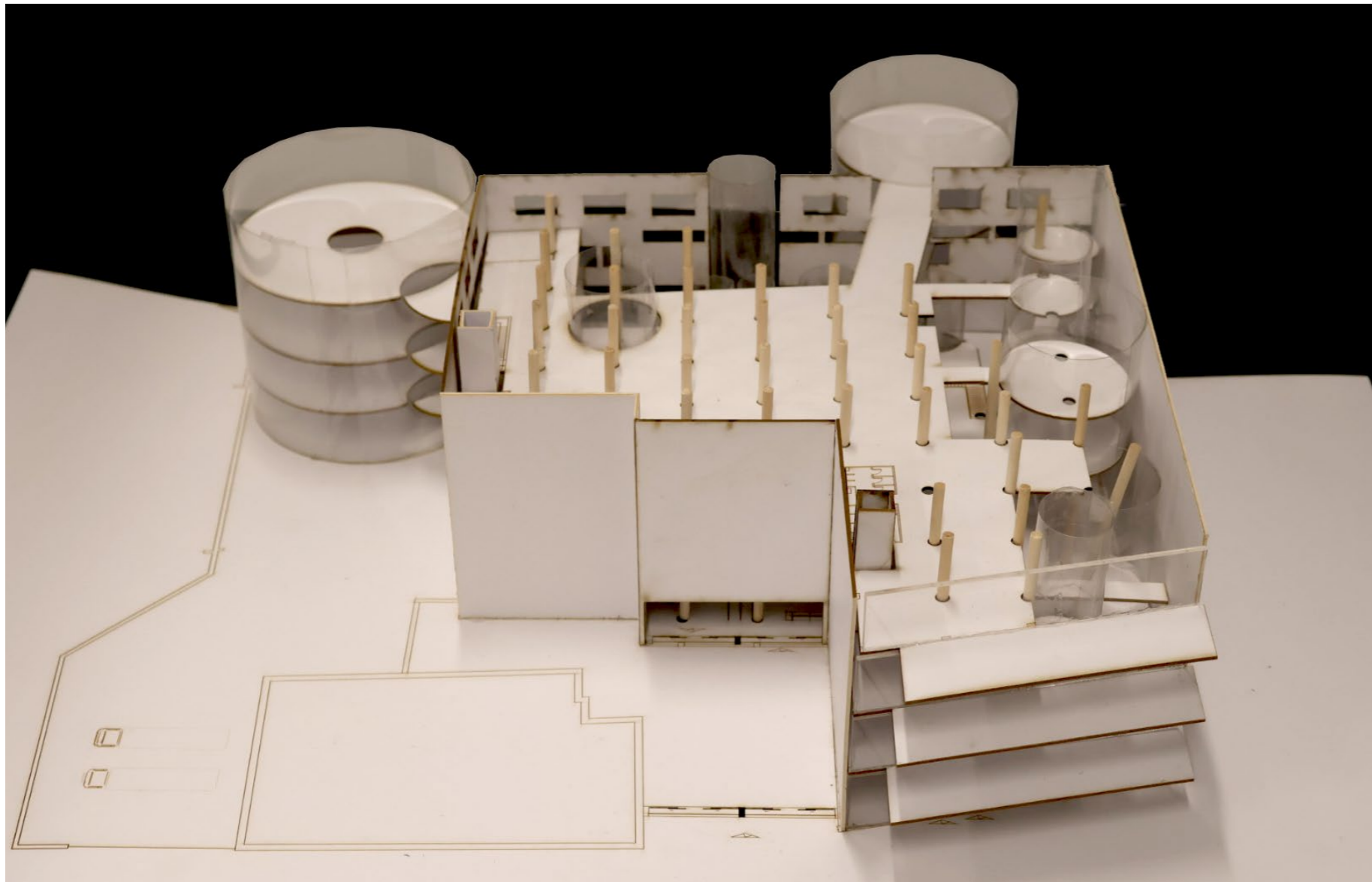
Manage the edge of floor



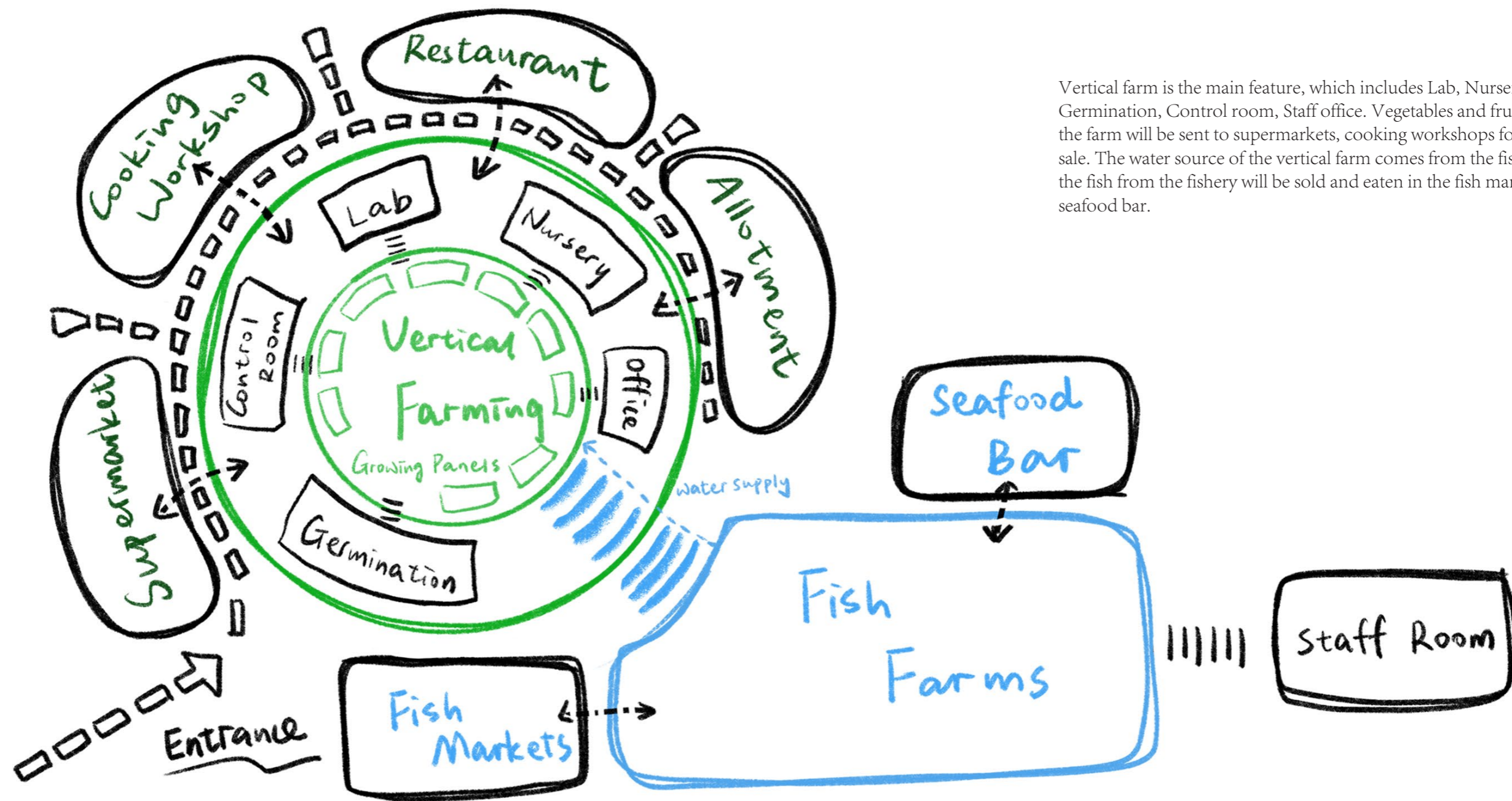
Connect floor and cylinders



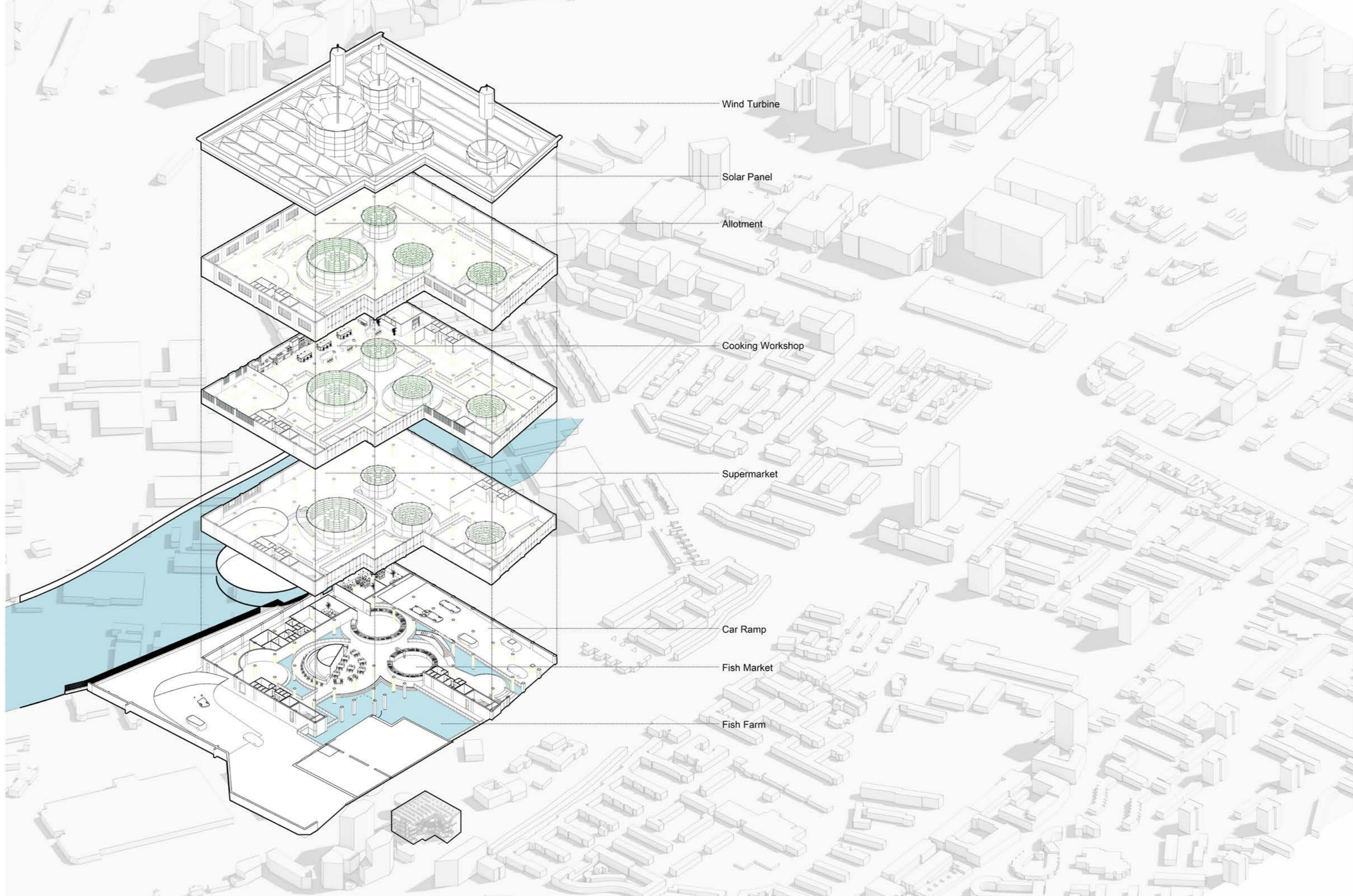
Layered acrylic panels were used to reflect the volume of the cylinder. Gradually refining the edges of the terrace. Try to explore the connections between the cylinder, between the cylinder and the column, between the cylinder and the building, and between the interior and the exterior.



FUNCTIONAL DIAGRAM



Vertical farm is the main feature, which includes Lab, Nursery, Germination, Control room, Staff office. Vegetables and fruits grown in the farm will be sent to supermarkets, cooking workshops for use and sale. The water source of the vertical farm comes from the fishery, and the fish from the fishery will be sold and eaten in the fish market and seafood bar.



Wind Turbine

Solar Panel

Allotment

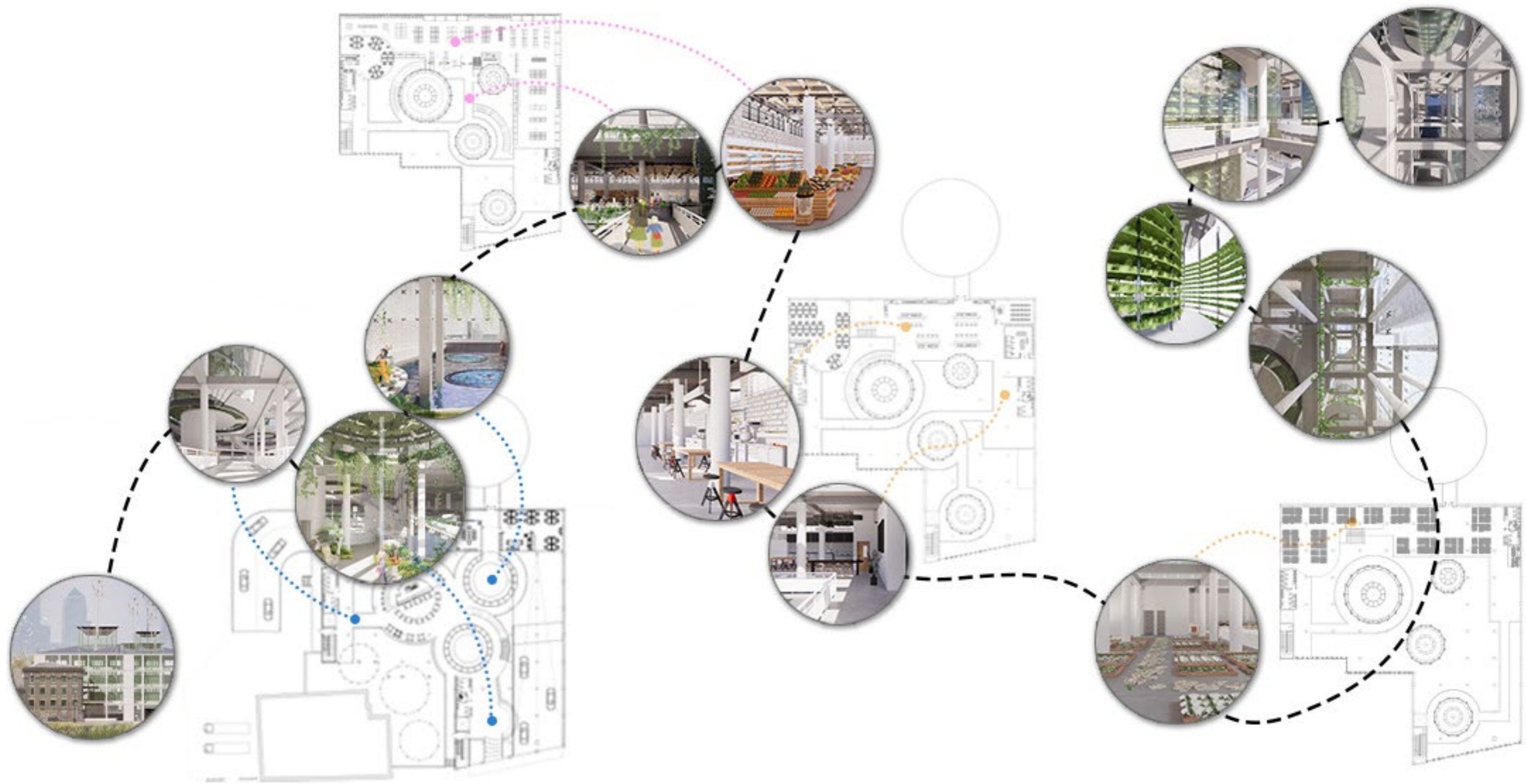
Cooking Workshop

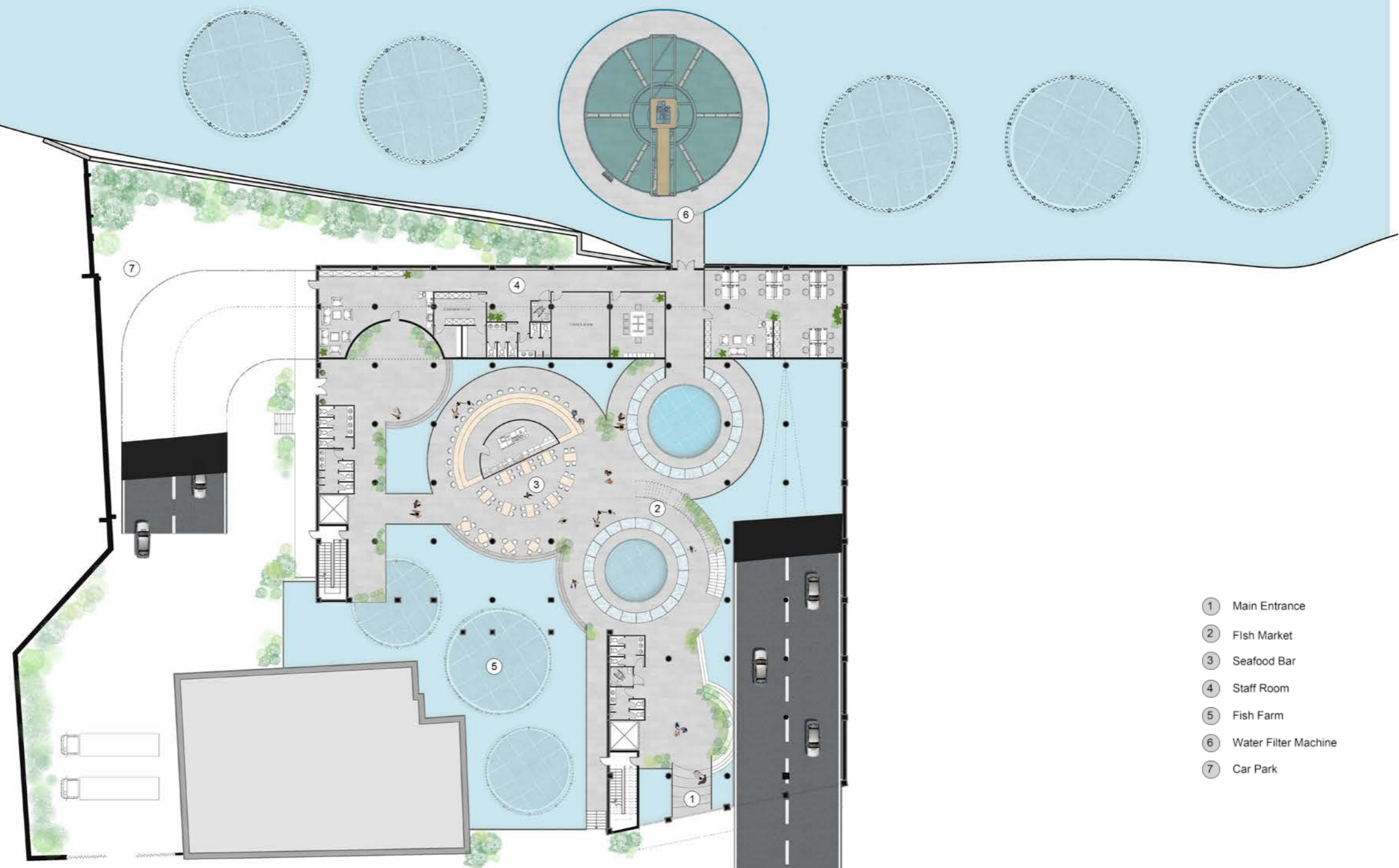
Supermarket

Car Ramp

Fish Market

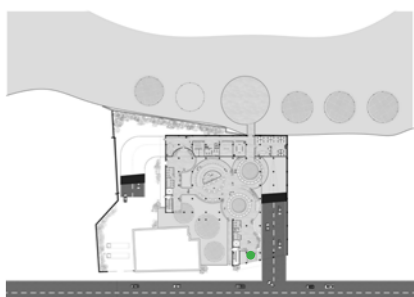
Fish Farm





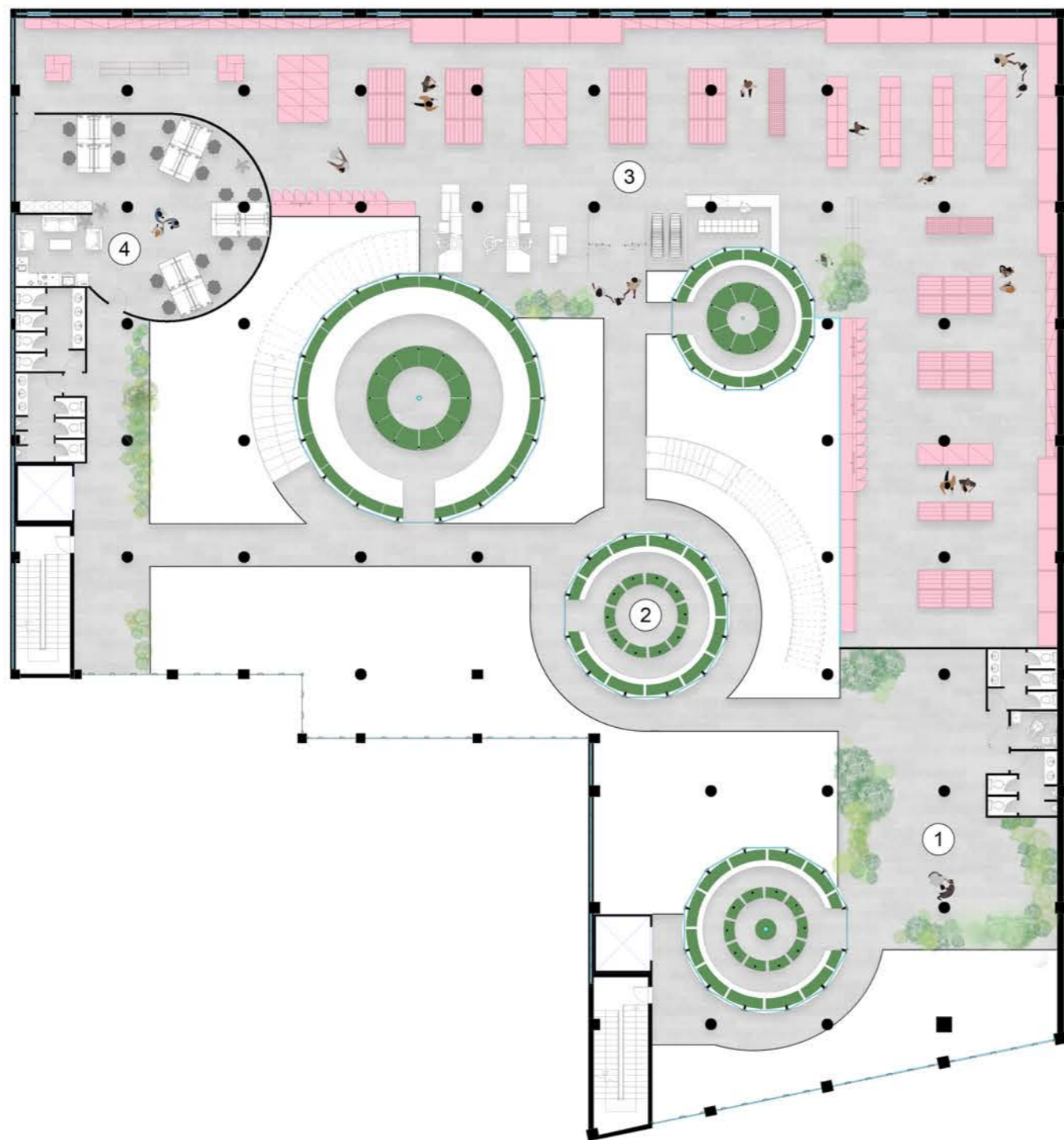
- ① Main Entrance
- ② Fish Market
- ③ Seafood Bar
- ④ Staff Room
- ⑤ Fish Farm
- ⑥ Water Filter Machine
- ⑦ Car Park



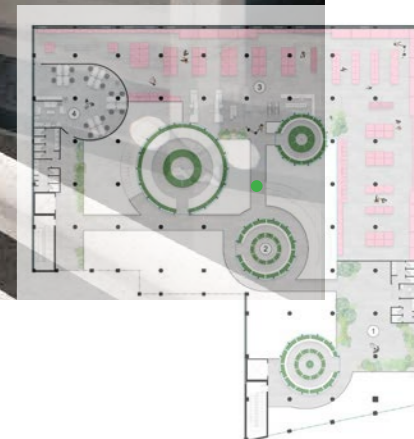


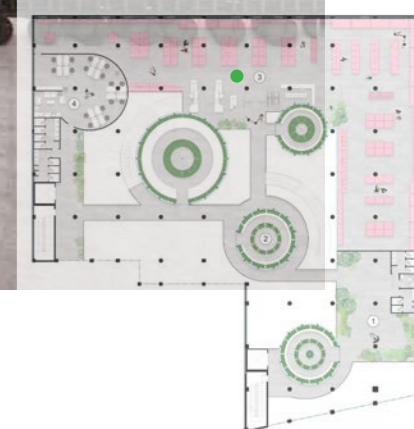


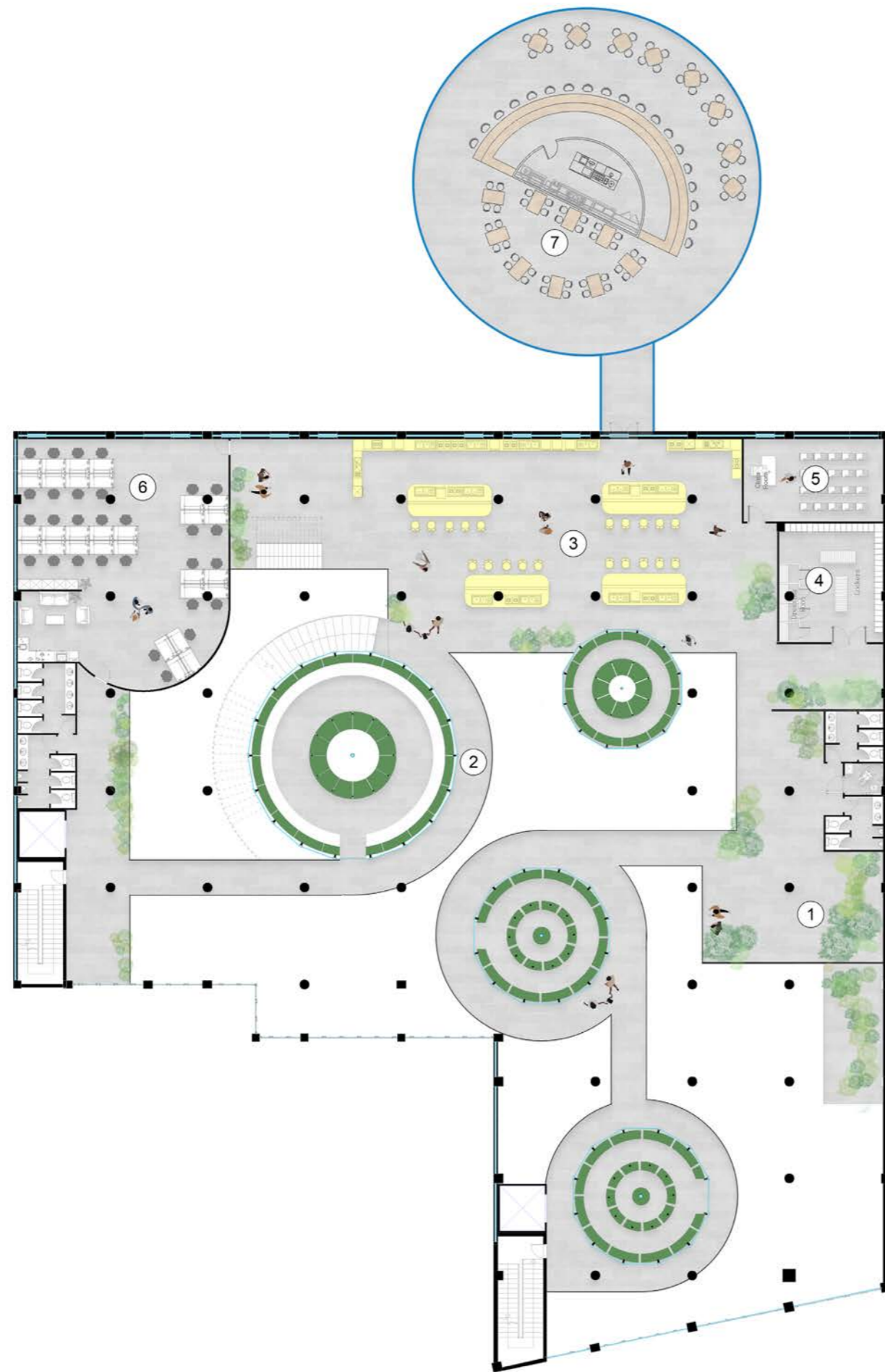




- ① Terrace Garden
- ② Vertical Farm
- ③ Supermarket
- ④ Staff Office

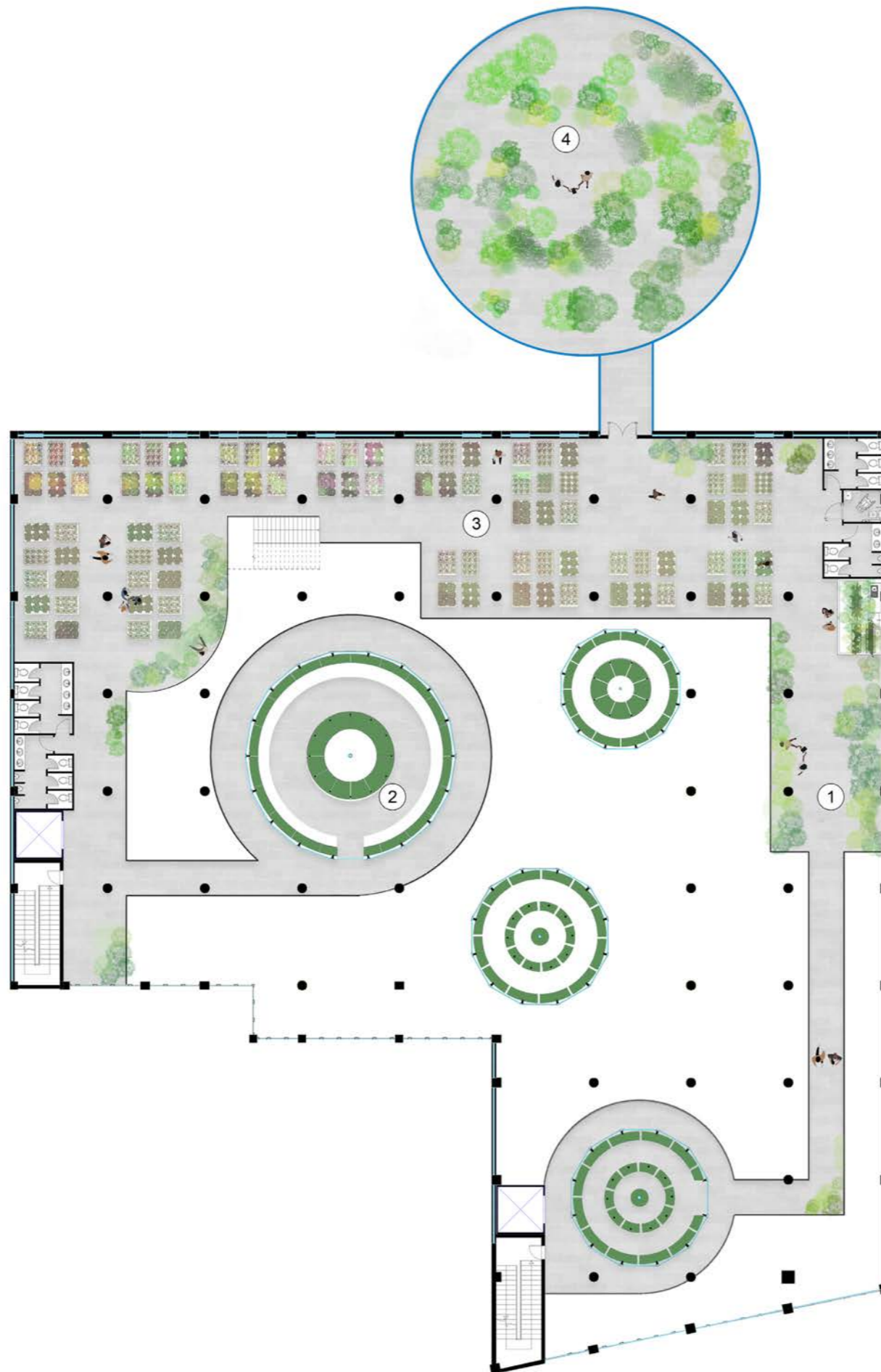






- ① Terrace Garden
- ② Vertical Farm
- ③ Cooking Workshop
- ④ Changing Room
- ⑤ Classroom
- ⑥ Staff Office
- ⑦ Restaurant





- ① Terrace Garden
- ② Vertical Farm
- ③ Allotment
- ④ Roof Garden



