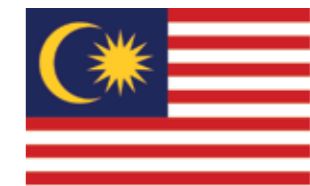


# Viikki - The Edu-Buoyancity



**SAINT GOBAIN ARCHITECTURE STUDENT CONTEST**

YEAR 2023/24



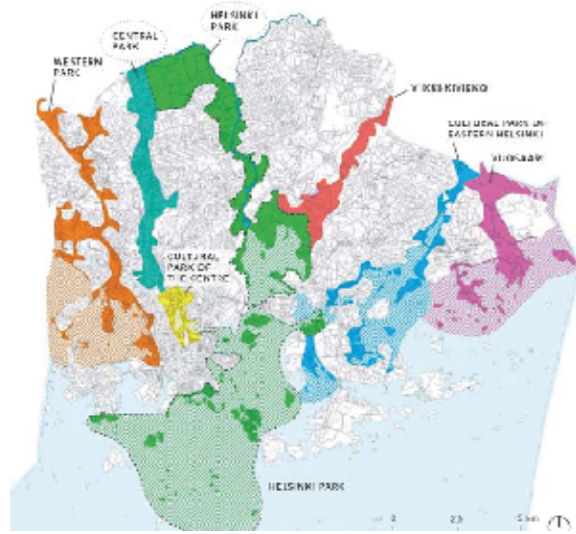
**Eunice Lim Min Yee**  
Team 20236  
Presentation Number 27  
Malaysia

# Educational Living

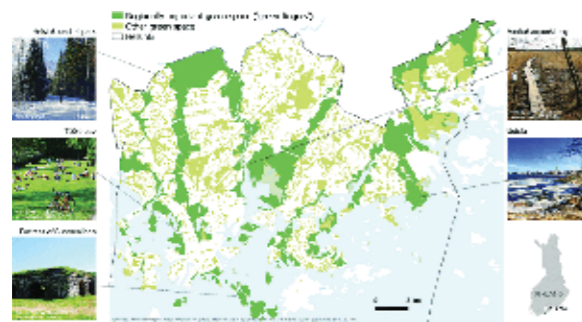
## The Green City The city of Viikki

Helsinki's green structure network

Helsinki is a green city by the sea. Green areas currently cover about 40 percent of Helsinki city's land area, offering residents recreation, exercise opportunities, interesting natural sites, and pleasant places to rest. They also maintain the diversity of nature and the cultural environments of different eras.



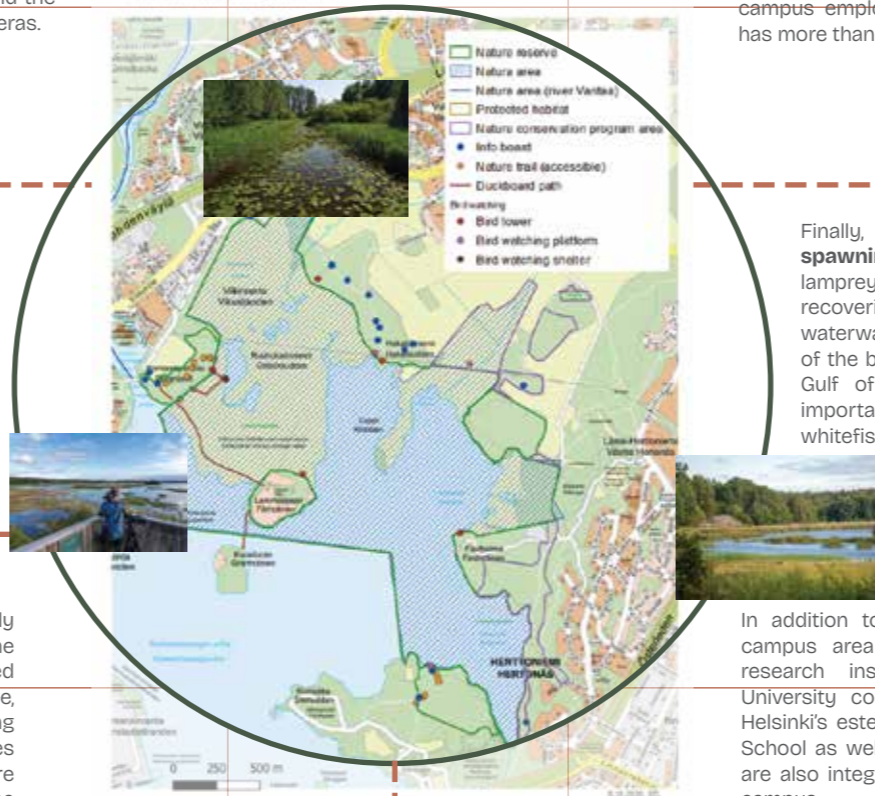
### Eko-Viikki



Eko-Viikki is the first ecologically planned district in Finland. The planning of the area has been based on the principle of a sustainable, healthy and adaptable living environment. The same principles will continue to guide the future planning of the area: despite the construction, Viikki will remain as it is now: a nature paradise open to everyone, where the entire story of the city began.

## Viikki-Vanhankaupunginlahti nature reserve The Green Reserve

Vanhankaupunginlahti



The reserve lies around Vanhankaupunginlahti Bay, a reed-fringed sea inlet, and consists of the mouth of the river Vantaa with its accompanying floodplain forests, alder marsh and coastal meadows. Its value is in its birdlife: 2,500 pairs, representing 110 different species, breed here.

The Viikki Campus is the home base for four university faculties operating in the field of agriculture, forestry, bio- and veterinary sciences and pharmacy, as well as several independent research institutes. The campus employs nearly 1,900 people and has more than 6,000 students.

Finally, it is an important spawning area for fish like lamprey. After years of recovering of river Vantaa waterway, it has become one of the best trout rivers in the Gulf of Finland area other important species being whitefish and salmon.

In addition to the University's units, the campus area hosts several government research institutions with which the University cooperates. The University of Helsinki's esteemed Viikki Teacher Training School as well as Helsinki Think Company are also integral parts of life and work on campus.

## The Green Campus University of Helsinki Viikki Campus

Viikki's green campus

### Faculties and units

- Faculty of Biological and Environmental Sciences
- Faculty of Agriculture and Forestry
- Faculty of Pharmacy
- Faculty of Veterinary Medicine
- Veterinary Teaching Hospital
- HILIFE - Institute of Biotechnology
- Viikki Research Farm

### Organizations at the Campus

- Finnish Food Authority
- Viikki Teacher Training School
- Natural Resources Institute Finland
- Finnish Environment Institute
- Helsinki Think Company

# The Edu-Buoyancity A Living Education

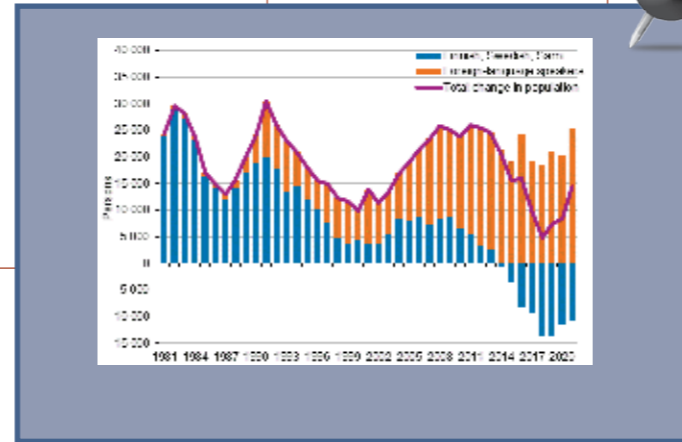


Viikki (Swedish: Vik) is a neighbourhood of about 15,000 inhabitants in Helsinki, Finland.

It is located at the bottom of Vanhankaupunginlahti bay, some 7-10 km from the city centre.

Most of Finland's groundwater is of good quality, since it is better protected against contamination than surface water.

Finland is particularly rich in surface waters, with a total of 187,888 lakes and large ponds, as well as rivers totalling 25,000km in length. As a result, more than 10% of the country is covered by water, and water resources are abundant.



### economy

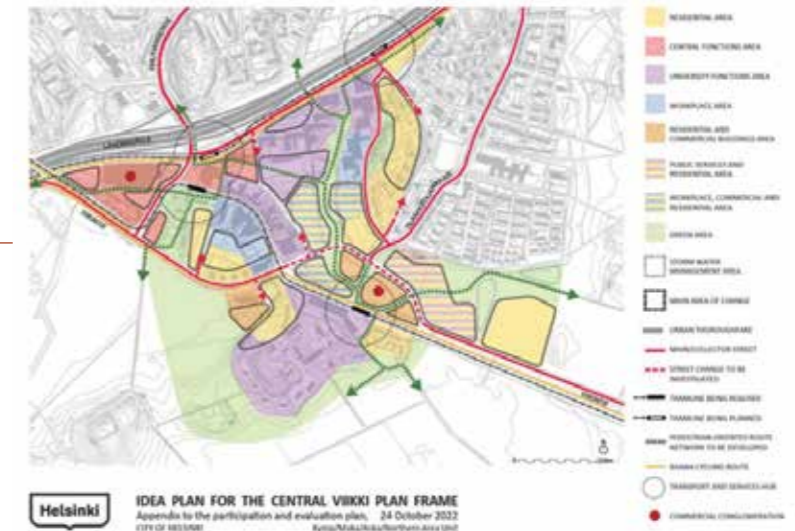
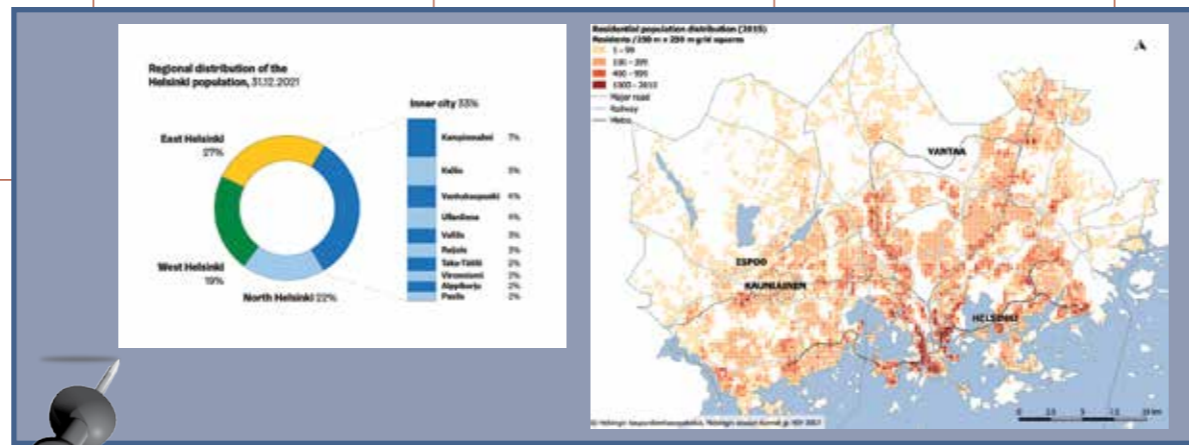
- tourism
- keropok
- salted fish
- handicrafts
- batik
- timber industry
- fishing industry
- trade
- commerce
- administrative
- commercial capital
- petrochemical industries
- ECER Special Economic Zone (ECER SEZ)

### climate

Viikki is known for its natural environment. The conservation area of Vanhankaupunginlahti is an important place of nesting and migration for birds. Large fields and farmlands are cultivated by a teaching farm that is part of the university's agricultural faculty.

Southernmost part of the Latokartano residential zone is known as an "ecological housing" area. Many apartment buildings there have, for instance, experimental solar and wind energy systems installed.

# Viikki



### geography

Viikki is divided into the sub-areas of Viikki science park, Latokartano, Viikinranta and Viikinmäki. In the 2000s the population of the district has increased steadily. This is because some areas of Viikki – especially in Latokartano and Viikinmäki – have been among the most important sites in Helsinki for the construction of new apartments

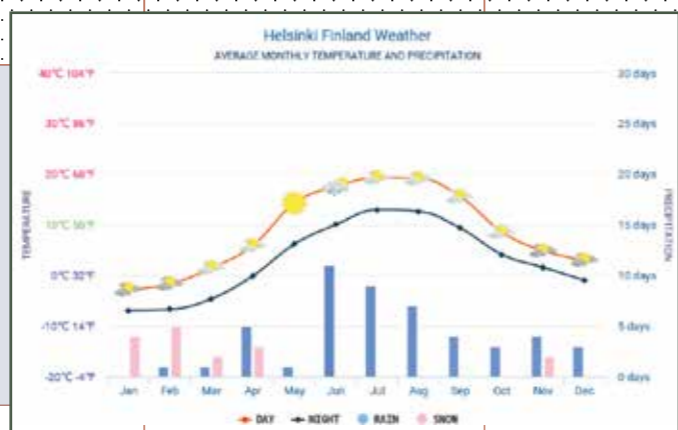
A single-track non-passenger municipal railway line ran through the district, connecting to the state railways main-line at Oulunkylä railway station. This line runs to the Helsinki Metro depot in Roihupelto, but was originally the former Herttoniemi Harbour railway. The depot link features street running along the roads through Viikki. This line has been broken up during the summer of 2014.

The Raide-Jokeri also known as Jokeri Light Rail is a Passenger Light Rail Line that begun construction near the start of 2019 and is estimated to finish around 2024, where it will begin operation between Itäkeskus and Keilaniemi that replaces the Current Trunk Bus Route 550. It will run through central viikki, passing the University and the Viikki Science Park.



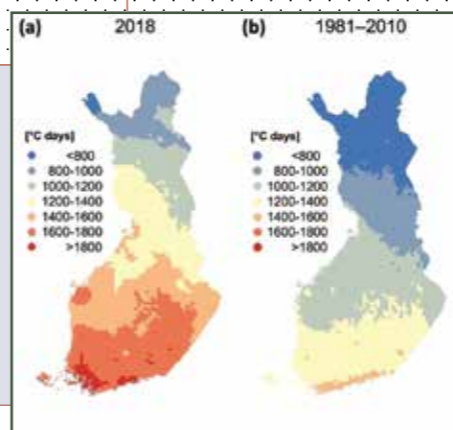
# Viikki Data Bank

CLIMATE

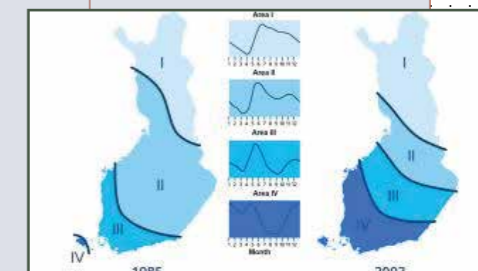


+ The rains are evenly distributed throughout the year, although in the winter season it often doesn't rain, but there is snow or sleet.

## The separation of layers infiltration of flood

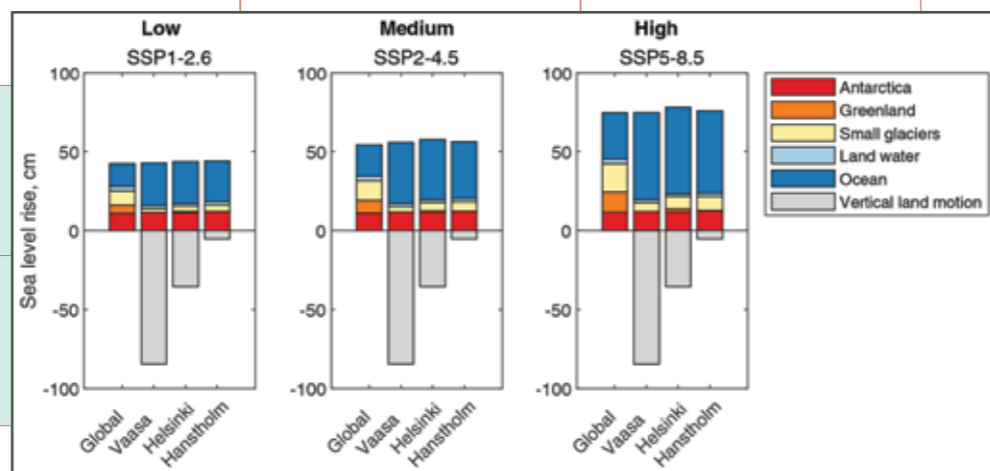


+ Exceptionally warm thermal growing season in Finland

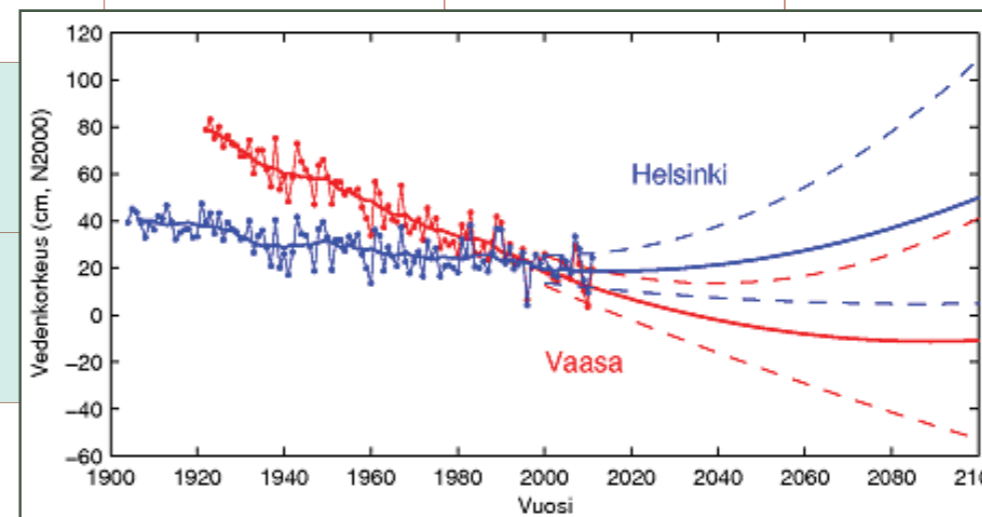


Climate change is already visible in Finland's nature

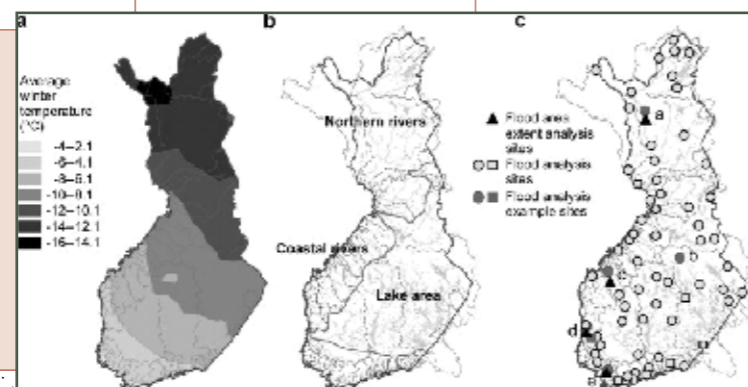
LAND



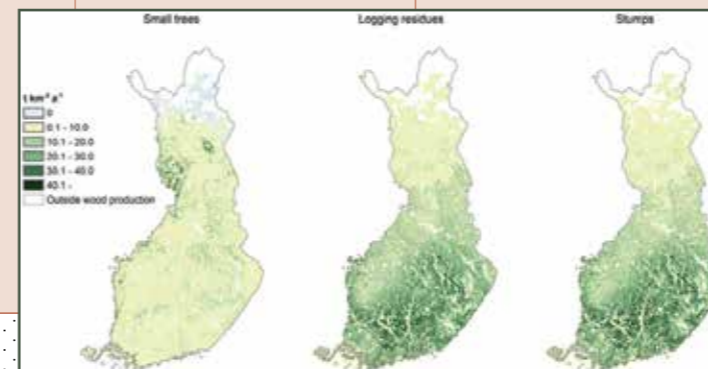
Land uplift protects the Finnish coast from rising sea levels, but not endlessly



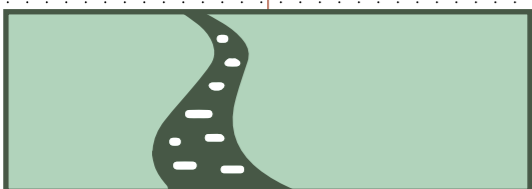
SOIL



+ National scale assessment of climate change impacts on flooding in Finland



+ Deforestation across Finland for forest chip supply



# The Floodprone Riverbanks

## a communal adaptation to annual floods

### THE PHENOMENON OF FLOOD

#### Causes identified

- 1 rain
- 2 snow
- 3 climate change
- 4 coastal winds



2005, downtown Helsinki



### THE CURRENT SITUATION



Nothing dramatic is anticipated in Finland in the next few decades. Climate change will nonetheless spell the melting of the glaciers and rising sea levels, maybe even by several metres in the 22nd century. According to research, within the span of thousands of years, the complete exhaustion of fossil fuels will lead to a sea level rise of ten metres.

In the long run, the sea level rise is going to change the world as we know it. What matters is the pace of change. The rate at which the water level rises is more vital for adaptation than its eventual height. We can protect ourselves from floods if there is time and money. Slowing down climate change is the best form of adaptation. The more it's mitigated, the less we have to adapt.

But adaptation is needed because change can no longer be avoided. Finland has already experienced flash floods.

### GOVERNMENTAL ACTIONS

Finland is quite adept at risk management, according to Pilli-Sihvola, at least when compared to many other countries. It is prohibited by law to build on flood plains and the laws are usually followed. Neither of which is the norm on the global scale.

Moreover, many preventive measures have been taken to stop flooding. For example, in the Jätkäsaari development in southern Helsinki, the ground level was raised before construction began. In East Helsinki landscaped flood barriers have been built and the Vauhtitie wetlands behind the opera house provide protection from stormwater.

Finland was the first European country to make a national adaptation plan in 2005. The plan is comprehensive and has been updated since, which means that, when compared to other EU countries, Finland is well prepared for climate change.

### TO EACH HIS OWN?

Yet the division of responsibilities is still quite unclear in Finland as well. A research group conducted a survey of all of Finland's municipalities, to determine their strategies for adapting to climate change. It turned out that preparations had not been fully developed anywhere else than in the big cities. Municipalities have great autonomy, and whether any strategies are implemented is dependent on their willingness to prepare and available resources. Since 2014, the government no longer offers compensation for damage caused by floods. Instead, it is the responsibility of the residents. Home insurance usually covers the expenses.

According to Finland's National Adaptation Plan, preparation is everybody's responsibility. However, the plan does not clearly state what should be done. It is doubtful that companies or citizens are fully informed about the situation.



2019, Helsinki Railway Station



2018, Rauma



2023, downtown Helsinki

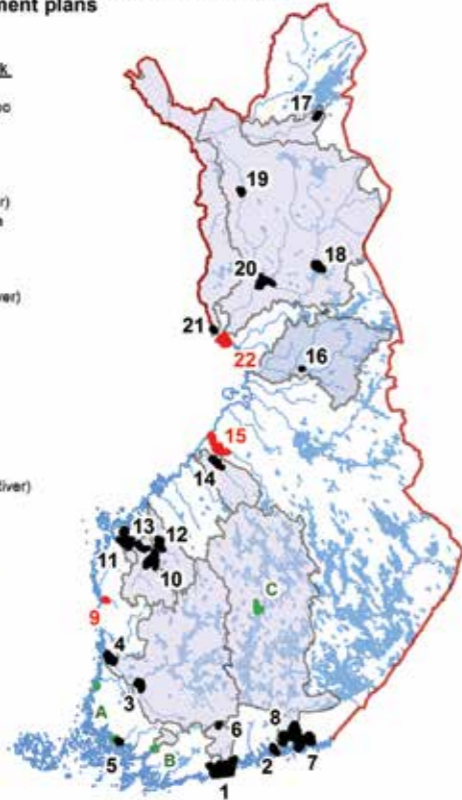
#### Areas of significant coastal and sea water floods 2018-2024 and current areas for management plans

##### Existing and new significant flood risk areas

- 1 Coastal districts of Helsinki and Espoo
- 2 Coastal district of Loviisa
- 3 Huttinen (Kokemäenjoki River)
- 4 Pori (Kokemäenjoki River)
- 5 Coastal district of Turku
- 6 Centre of Riihimäki (Vantaanjoki River)
- 7 Coastal districts of Hamina and Kotka
- 8 Lower part of Kymi River
- 9 Lapväärti (Lapväärtinjoki River)
- 10 Ilmajoki-Seinäjoki (Kyrönjoki River)
- 11 Laihia-Tuovila-Runsor (Laihanjoki River)
- 12 Lapua (Lapuanjoki River)
- 13 Ylistaro-Koivulahti (Kyrönjoki River)
- 14 Alavieska-Ylivieska (Kalajoki River)
- 15 Lower part of Pyhäjoki River
- 16 Centre of Pudasjärvi (Iijoki River)
- 17 Ivalo urban area (Ivalojoki River)
- 18 Centre of Kemijärvi (Kemijoki River)
- 19 Kittilä village (Kemijoki River)
- 20 City of Rovaniemi (Kemijoki River)
- 21 City of Tornio (Tornion-Muonionjoki River)
- 22 Coastal district of Kemi

##### Areas that were left out

- Coastal districts of Turku,
- A Raaisio,Naantali and Rauma
- B Centre of Salo (Uusikylänjoki River)
- C Jyväskylä (Kymijoki River)



Maaremittustalouden maastietokanta 2018  
BYKE:n vesienhoitoalueet ja valuma-alueet 2019

### THE FLOOD ACTIONS

#### ECONOMIC DIRECTIVES

The Panel is currently examining how various means of adaptation used in other countries could be applied in Finland. In addition to regulation, directives and information, several countries use economic incentives. In some cities citizens can get reduced water bills if they cultivate green areas on their property to absorb urban runoff.

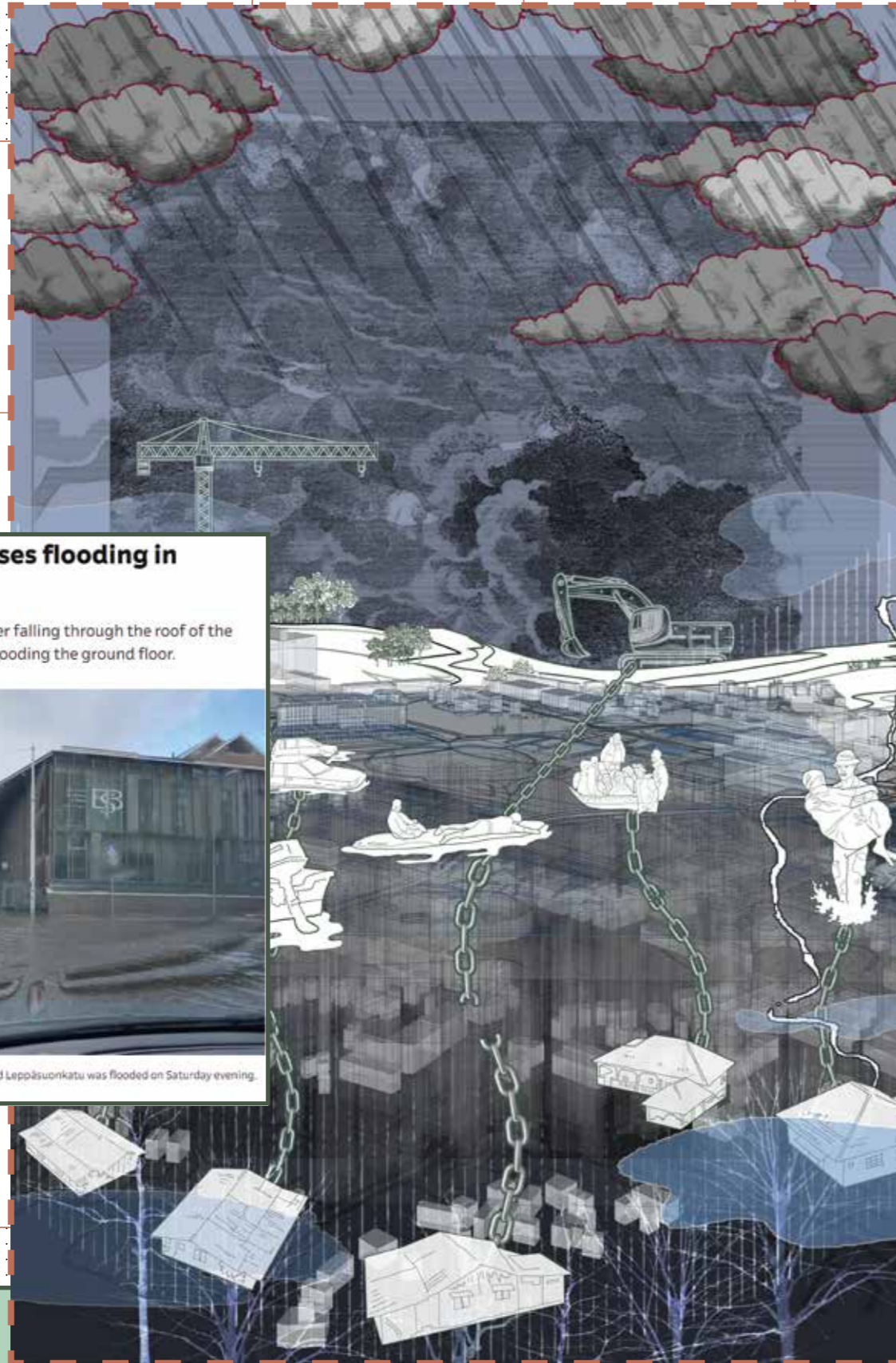
#### TO MOVE OUT/TO DAM

In the worst-case scenario, people will have to move out, but an average rise in water levels can already be confined. Discussion as to whether some flood zones should simply be emptied took place in Central Europe and Britain.

#### POST-FLOOD EVACUATION

It's difficult to determine whether it is more efficient to prepare for the risks in advance or just deal with the situation as it arises. If a weather event occurs very rarely it is cheaper to just fix the damage. On the other hand, taking the risks into account during construction is usually cheaper than doing so after the fact.





### Heavy rainfall causes flooding in Helsinki

The downpours led to rain water falling through the roof of the Kamppi shopping centre and flooding the ground floor.



The crossroads between Mechelininkatu and Leppäsuonkatu was flooded on Saturday evening. Image: Linda Tammela

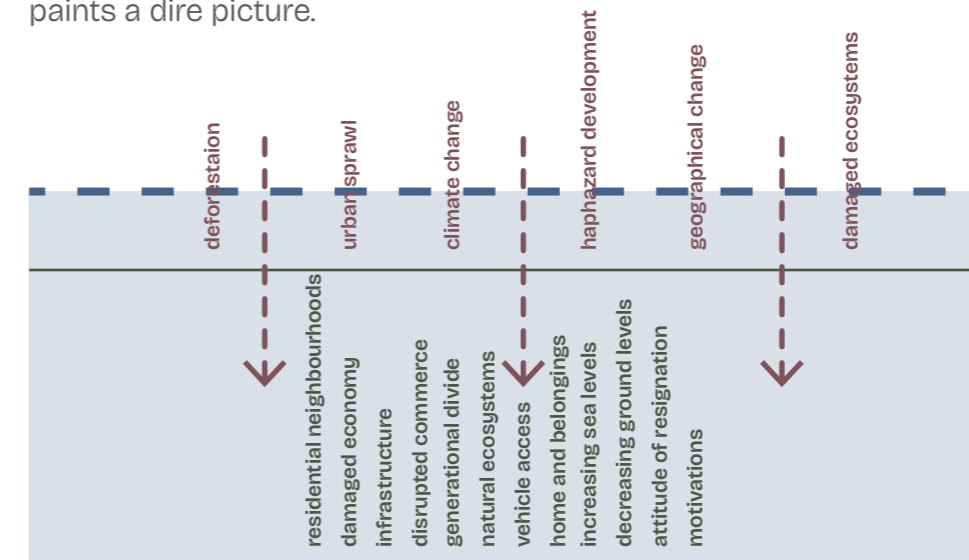


## Uncovering the Old Town

Position taking

# The Sinking Settlement

In the face of rising floods, the city is sinking. It confronts the unsettling reality of increasing flood levels, intensifying climate change impacts, and a shifting geographical landscape. However, equally concerning is the prevailing attitude of resignation among its citizens, which compels them to accept the status quo of recurrent flooding. This, combined with the growing chasm between old and new generations, the ever-widening divide between manmade technological livelihoods and natural ecosystems, and the protracted transition from pre-flood to post-flood urban contexts, paints a dire picture.



# Reconstructing urban buoyancy

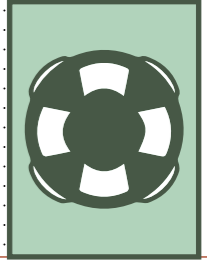
Position taking

## The Convertible BuoyanCity

An innovative urban planning concept that harnesses the principles of equilibrium of buoyancy to reinvigorate the city as a resilient, adaptable, and harmonious urban oasis. Through amphibious architecture, natural ecosystems, permeable design, disaster preparedness, intergenerational connections, smart technology, and sustainable mobility, the city will not only confront its flooding challenges but will thrive as a model of resilience, ready to rise above adversity and combat disaster and crisis. Recovery times will be minimized through resilient infrastructure, and the city will bounce back swiftly from disasters of flood.

thriving community   healthy families   unceasing economy   intact infrastructure   resilient city

buoyant structures   elevated spaces   amphibious architecture   inflatable assembly



Helsinki is planting trees to prepare for floods, heatwaves and other effects of climate crisis

FINLAND / 07 AUGUST 2023

DOMESTIC



People with umbrellas and in rain gear in Helsinki on Wednesday, 7 August 2023. Floods and downpours are, along with lengthy heatwaves, among the most significant climate challenges faced by the Finnish capital. (Eelis Berglund - Lehtikuva)



# Sinking creates displacement & distance

The aftermath of submergence

This diagram illustrates the concept of 'A distance of Time'. It features a large vertical oval with a dashed border. Inside, two circular images are stacked vertically. The top circle, labeled 'Non-flood times', shows a clear, sunny day with a green lawn and a building. The bottom circle, labeled 'During flood times', shows the same scene under heavy rain with water rising. A clock icon is positioned at the bottom left of the oval.

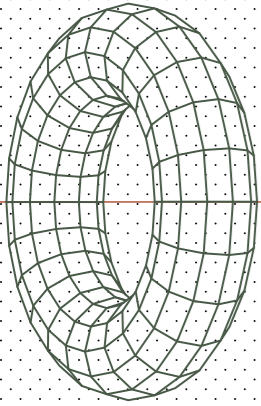
A distance of  
**Time**

This diagram illustrates the concept of 'A distance of Place'. It features a large vertical oval with a dashed border. Inside, three circular images are stacked vertically. The top circle shows a flooded residential area with houses partially submerged. The middle circle shows a muddy river with a person and a dog on the bank. The bottom circle shows a desolate, muddy landscape with sparse vegetation. A compass rose is positioned to the right of the middle circle.

A distance of  
**Place**

This diagram illustrates the concept of 'A distance of Beings'. It features a large vertical oval with a dashed border. Inside, three circular images are stacked vertically. The top circle shows an elderly woman wearing a hat made of twigs, labeled 'Viikki's old generation'. The middle circle shows a group of young people sitting at a table, labeled 'Viikki's young generation'. The bottom circle shows a stylized illustration of trees, labeled 'Viikki's flora', and a group of birds and fish, labeled 'Viikki's fauna'.

A distance of  
**Beings**

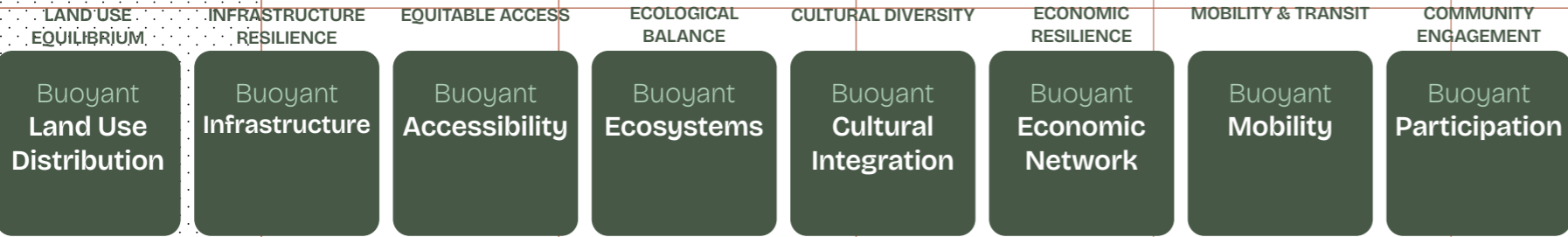
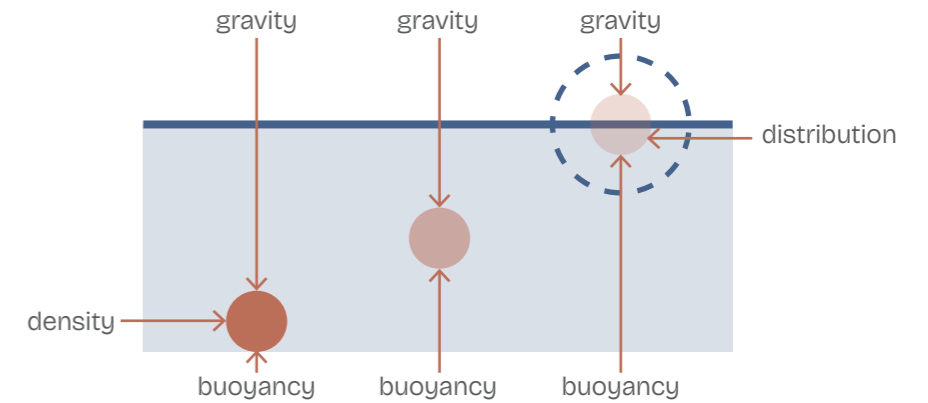


# Urban Buoyancy

the principle of buoyancy can be metaphorically applied to urban planning to achieve equilibrium and balance among different urban components. By considering the distribution of land uses, promoting mixed-use development, ensuring equitable access to infrastructure and services, and enhancing resilience, urban planners can create more sustainable and livable cities. Balancing these components is essential for the well-being and functionality of urban environments.

## A Theory of Balanced Urban Design

A state of equilibrium



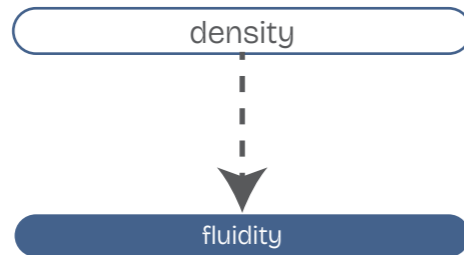
## A Bounce-Back Response

towards disaster and crisis

TIME

### Convergence

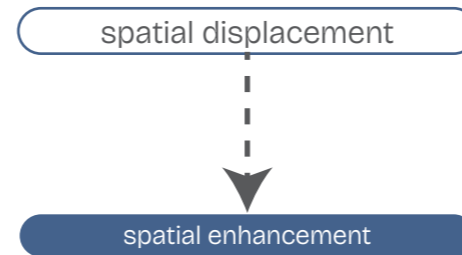
recovery time  
operation delay



PLACE

### Confluence

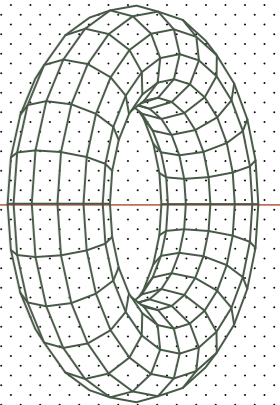
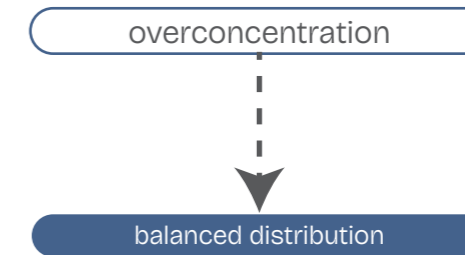
water and land levels  
occupancy  
submergence



BEING

### Coexistence

old and new generations  
technology and nature  
humans and the environment



## Vision Statement

In summary, Buoyant Urbanism is an urban design theory inspired by the principles of buoyancy. It seeks to create balanced, resilient, and sustainable cities by applying these principles to land use, infrastructure, accessibility, ecology, culture, economics, mobility, and community engagement. By integrating these principles into urban planning and design practices, cities can strive for equilibrium and buoyancy in their development, leading to more livable and harmonious urban environments.



## Precedent studies relevant theories

# Balanced Urban Development

Reference: Balanced Urban Development: Is It a Myth or Reality?

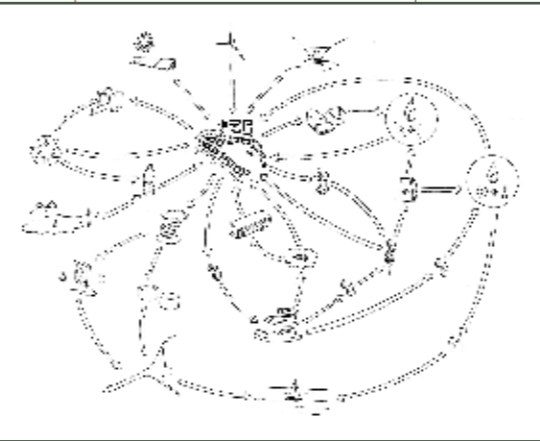
Basant Maheshwari, Vijay P. Singh & Bhadrani Thoradeniya

### Key concept

The main purpose of balanced urban development is to improve liveability. When urban development is well balanced with different needs, it will provide opportunities for businesses and commerce to grow, create jobs and facilitate affordable housing and living for different levels of society. Furthermore, such development will result in access to surroundings that appeal to local residents, provide ample opportunities for strong social and cultural networks, and foster a sense of place and belonging.

### Applied principles:

+ peri-urban policies that will make cities liveable and sustainable  
+ to bring community together for healthy living, enhance their interaction among themselves and surrounding environment and promote their productivity and wellbeing in a sustainable way.



### Key concept

Designing a new piece of the city should start by analyzing how a pristine ecosystem in that part of the world functions (or would have functioned): how much carbon it would sequester, how much wildlife it would accommodate, how much oxygen it would produce, how much water it would store, filter, or evaporate.

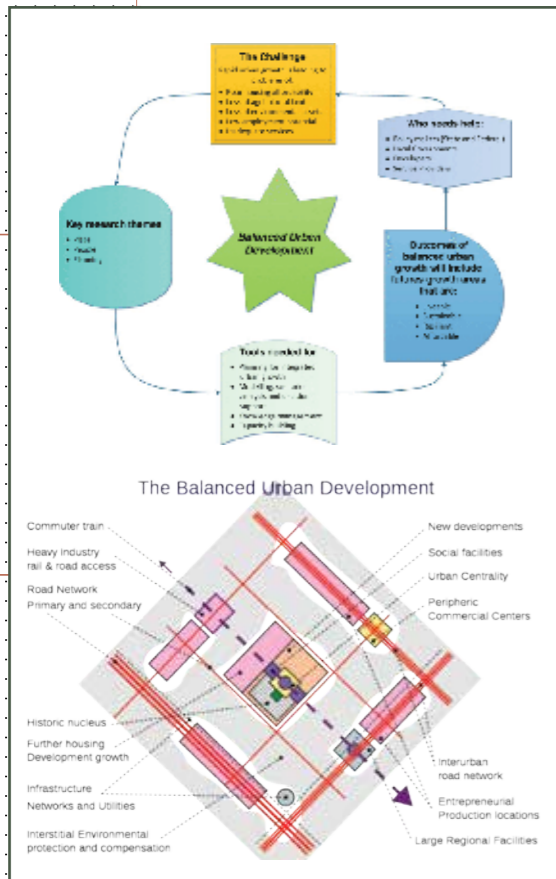
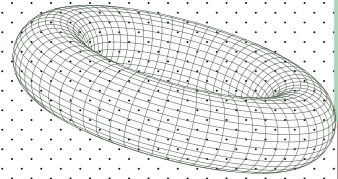
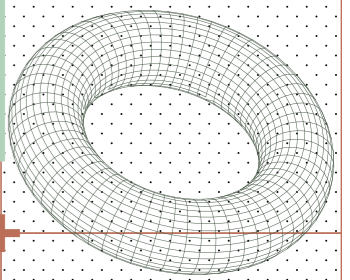
Buildings will need to be radically rethought in terms of the materials they use, how they adapt to the weather, and how they are integrated into their ecological context. Buildings could behave like generous neighbours in a like-minded community, cleaning the air, moderating the microclimate, offering food, accommodating wildlife, and much more.

### Applied principles

+ a regenerative system with balanced levels of growth, decay and renewal  
+ regenerative materials integrated into comprehensive cyclical systems modelled on ecosystems  
+ growth of carbon sequestration, economic resilience, community cohesion, and wildlife habitats  
+ rethinking the materials we use in our buildings to allow for full cyclical use  
+ reimagining infrastructure to optimise synergies between cycles of food, energy, water and waste

Michael Pawlyn

# Dynamic Equilibrium



## Key objectives

+ Strategic land use and zoning management

+ Establish food and clean water security

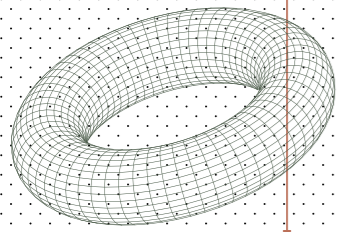
+ Water sensitive urban design

+ Reflecting ecological behaviour in built environment

+ Architectural response to ecosystems and environment

+ Regenerative, green growth

+ from linear to cyclical flow of resources



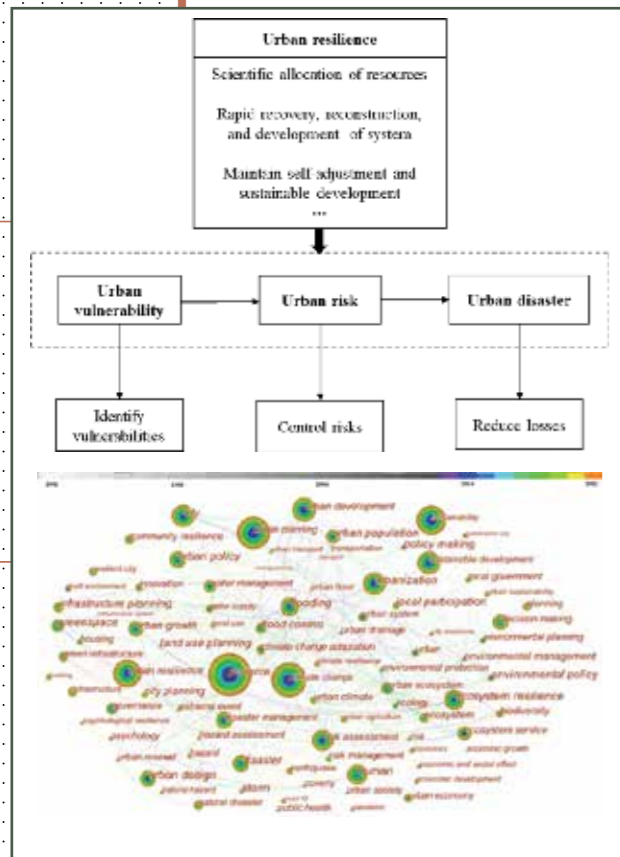
# Precedent studies relevant theories



## Urban resilience

Reference: The application of resilience theory in urban development: a literature review

Li Kong, Xianzhong Mu, Guangwen Hu & Zheng Zhang



### Key concept

- Urban resilience is based on four basic pillars: resisting, recovering, adapting and transforming.
- Urban resilience can be divided in five dimensions: natural, economic, social, physical and institutional.
- The five most relevant urban resilience characteristics are: redundancy, robustness, adaptation, resources and innovation.
- There are a lack of tools and methods to evaluate and improve resilience of urban systems.

### Applied principles:

- + Resilience originally meant “bounce back” or “recover and return to the original state,” and the concept was first used in engineering and psychology
- + In the context of social-ecological systems, resilience is related to the system's ability to self-organize, learn, and adapt

+ Constantly adjusting economic, social and political structure

+ Maintaining main structural, functional and identity elements

+ Speed of recovery to equilibrium state

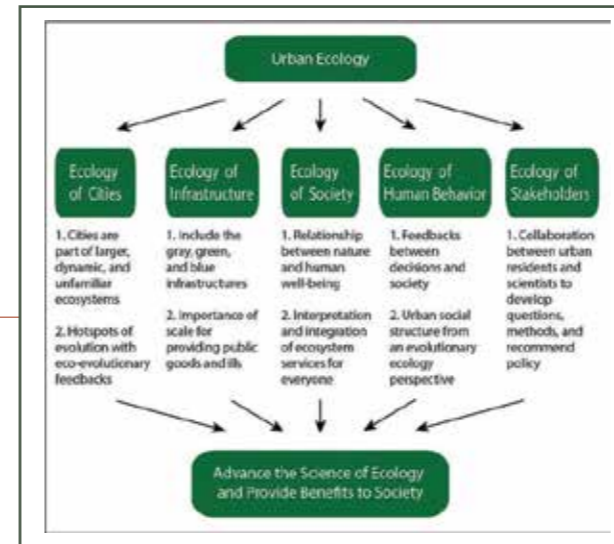
+ Collaboration to develop methods and policies

+ Multi-scale and multi-layer infrastructure

+ Interpretation and integration of ecosystem services

+ Urban social structure from an evolutionary ecology perspective

## Key objectives



### Key concept

The theory notes the dualism of large city formations at the present time. Cities, on the one hand, have a large and diverse potential, and on the other hand, they must ensure the implementation of their population numerous needs. Achieving a balance between these two components will ensure the stable development of the urban and surrounding territories, as well as the interests of economic entities and society. However, cities are part of the world, along with nature, which means they have an impact on it. The larger the city, the more intense it is in the world around it. Therefore, it is also important to ensure a balance between the constantly ongoing various processes of the city and the environment, which urban ecology may contribute to.

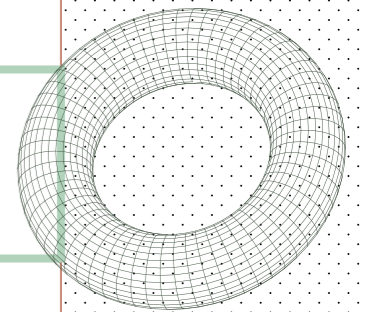
### Applied principles

- + The concept of biophilic cities emphasizes integrating nature to enhance human well-being and create sustainable cities
- + recognizing the multiple ways in which urban inhabitants can engage with nature
- + assess how different combinations of man-made and biologically derived infrastructure affect various aspects of urban ecosystems

Colby Tanner, Frederick R. Adler, Nancy B Grimm, William G Wilson

Reference: Urban Ecology: Advancing Science and Society

## Urban ecology



# Urban BuoyanScapes

To Bypass/ Highway



## TIME



- + Minimizing operational delays
- + Reducing rescue wait times
- + Shortening water subsidization periods

## PLACE



- + Creating spaces for safe evacuation
- + Self-protecting/ self-elevating built structures
- + Levelling areas of flood with water levels

## BEING

- + Regulating the growth of natural ecosystems
- + Coordinating movement of people during crisis
- + Intersecting paths of diverse demographic groups

Transect Urbanism

## SOCIAL



To cultivate mature response towards crisis through interdependent relationships

## ENVIRONMENT



To reshape built and natural environments

## ECONOMY



To reform local economic structures/ organizations with an underlying resilient network of resources through concepts of circular economy

A unifying theory and zoning principle that cuts across different typologies and communities to form urban connections.

**Bouncing**  
Mechanisms of Resilience

**Balancing**  
Areas of development

# Interlacing a Lattice through Layers of Infrastructure

Blue-green  
roofing systems

Rainwater  
Collecting facades

Bioretention  
ponds



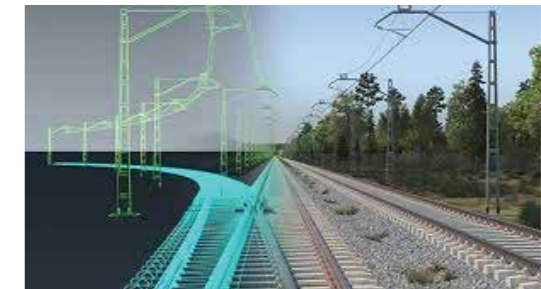
## Balanced Water Circulations

BLUE

Curbside safety  
barrier

Absorbent  
roadside  
protection

Stormwater  
pump  
integrated drainage



## Vehicular and Drainage Infrastructure

GREY

## Self-sustaining Ecosystems

GREEN



Self-irrigating  
planters

Curbside  
terrarium

Natural EcoParks

## Ecopuncture

## A Blueprint for Urban Buoyancy

## People Walkability and Access to Safety

RED



Emergency  
Communications  
Kiosk

Inflatable  
Pedestrian  
Crossing

Weather-resistant  
Walkways & Bridges

The design of insertions in the built environment to enhance the connectedness of social and ecological systems.

1

### Balanced Urban Development

Providing equitable opportunities for urban development at different regions throughout social, economical and environmental aspects.

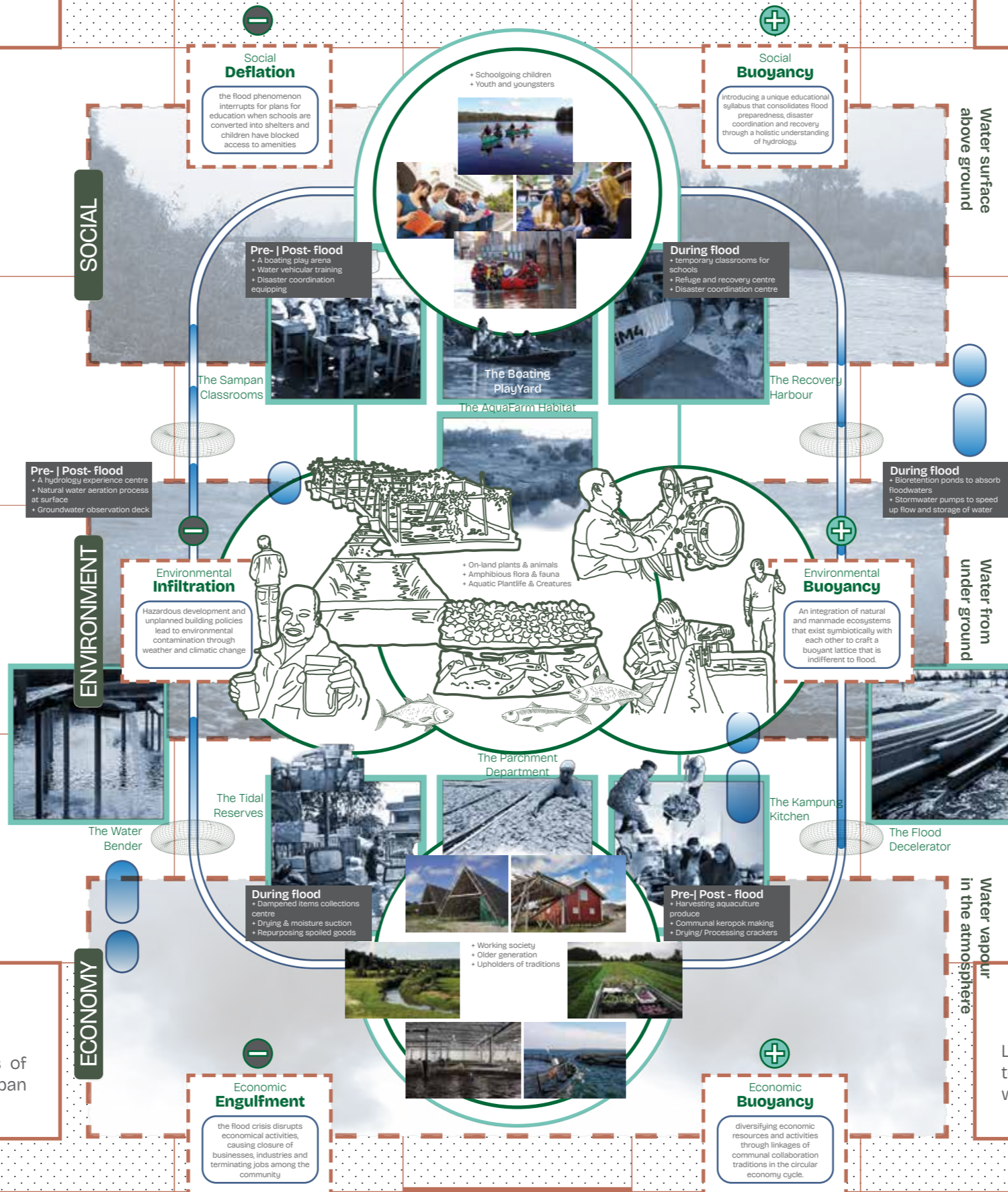
2

### Urban resilience

Building a strong and resilient urban community that is immune to disaster and crisis.

# Urban Program structure

## A Social Hydrology Educational Hub



3

### Dynamic equilibrium

Regulating earth's resources and byproducts of development to reach 'net negative' in urban architecture.

4

### Urban ecology

Leading human populations in the urban context toward a harmonious coexistence and relationship with nature.

# Transformation to Urban Buoyancy

## Social Deflation

the flood phenomenon interrupts for plans for education when schools are converted into shelters and children have blocked access to amenities

## Social Buoyancy

introducing a unique educational syllabus that consolidates flood preparedness, disaster coordination and recovery through a holistic understanding of hydrology.

## Environmental Infiltration

Hazardous development and unplanned building policies lead to environmental contamination through weather and climatic change

## Environmental Buoyancy

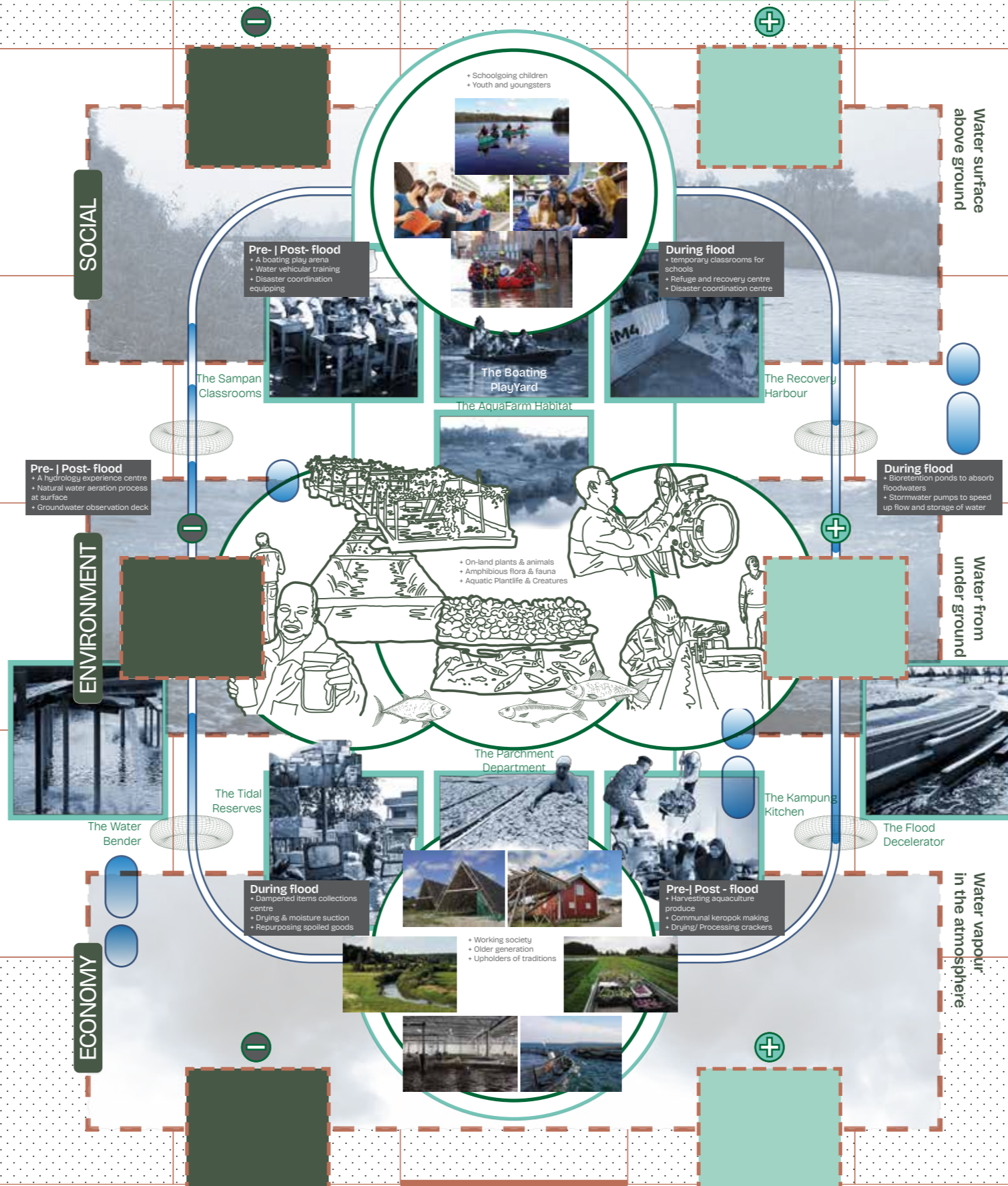
An integration of natural and manmade ecosystems that exist symbiotically with each other to craft a buoyant lattice that is indifferent to flood.

## Economic Engulfment

the flood crisis disrupts economical activities, causing closure of businesses, industries and terminating jobs among the community

## Economic Buoyancy

diversifying economic resources and activities through linkages of communal collaboration traditions in the circular economy cycle.



1

### Balanced Urban Development

Providing equitable opportunities for urban development at different regions throughout social, economical and environmental aspects.

#### Dissecting the City:

Circular Microgrid  
Buoyanscapes

2

# Urban Strategies

### Urban resilience

Building a strong and resilient urban community that is immune to disaster and crisis.

#### Stringing a Buoyant Lattice:

Connecting interdependent communities



### Urban Resources Planning

Water & Carbon Usage  
Net Negative City

#### Dynamic equilibrium

Regulating earth's resources and byproducts of development to reach 'net negative' in urban architecture.

3

### Circulating people & nature:

Landscape-integrated  
elevated walkways

### Urban ecology

Leading human populations in the urban context toward a harmonious coexistence and relationship with nature.

4

# Buoyancy Planning

## Through The Phases

### Key Objective

**Uplifting Place & People:**

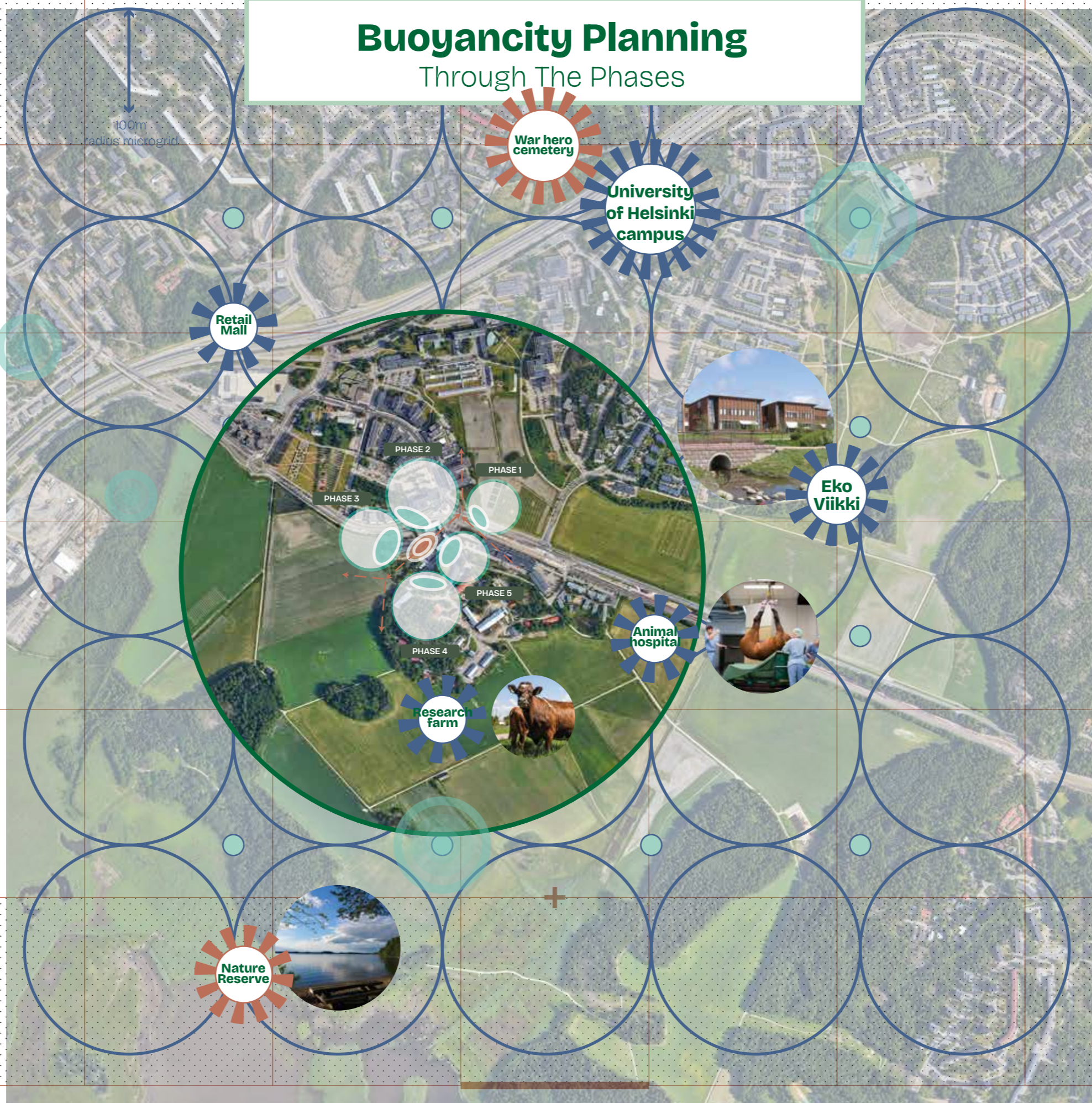
Aerating responsive  
interphasing pockets

### Key Component

#### The Flood Parliament

The Water Bender  
The Submersible Observatory  
The Flood Decelerator

A public coliseum for research conferencing and for the community to debate local and municipal issues enclosed within an underground water purification and stormwater retention pond, to which the public can observe through submersible walkways underwater.



### Monumental EcoPark

Congregation Point  
Stormwater Sprinklers  
The Flood Memorial

Due to its strategic location, the park will become a key social node that will bring in members of the community to congregate, while establishing a monumental site that will commemorate flood levels of the city.

### Rescue & Resilience (R&R) Centre

The Sampan Classrooms  
The Boating PlayYard  
The Recovery Harbour

The Park becomes a catalyst towards bringing youth and youngsters into a wetland arena and canal that also acts as a disaster coordination and vehicular training centre, as well as a recovery hub during flood.

### River's AquaFarm

Spawning Stations  
Aquaponic Weed Gardens  
Seedling Incubators

The canal opens up into an agricultural bioswale to cultivate edible weed plants such as lemongrass and kangkung, and a spawning facility breeds selected prawn and fish that will be transported to the river to be re-harvested.

### The Dry Market

The Tidal Reserves  
The Kampung Keropokery  
The Parchment Department

Fresh produce from the aquafarm, especially fish and prawns are processed and dried as crackers through communal keropok-making activities. The same drying facility restores the floodwater-soaked home items from the community to be reused again. The goods are then sold in the communal bazaar.

### Higher Ground

The Guarded Garage  
The Floodproof Vaults  
Digital Popbox (Market goods)

This phase of the masterplan is strategically elevated to a safe level in order to safeguard the community's personal belongings and vehicles during flood, while functioning as a digital popbox to release market goods sold online.

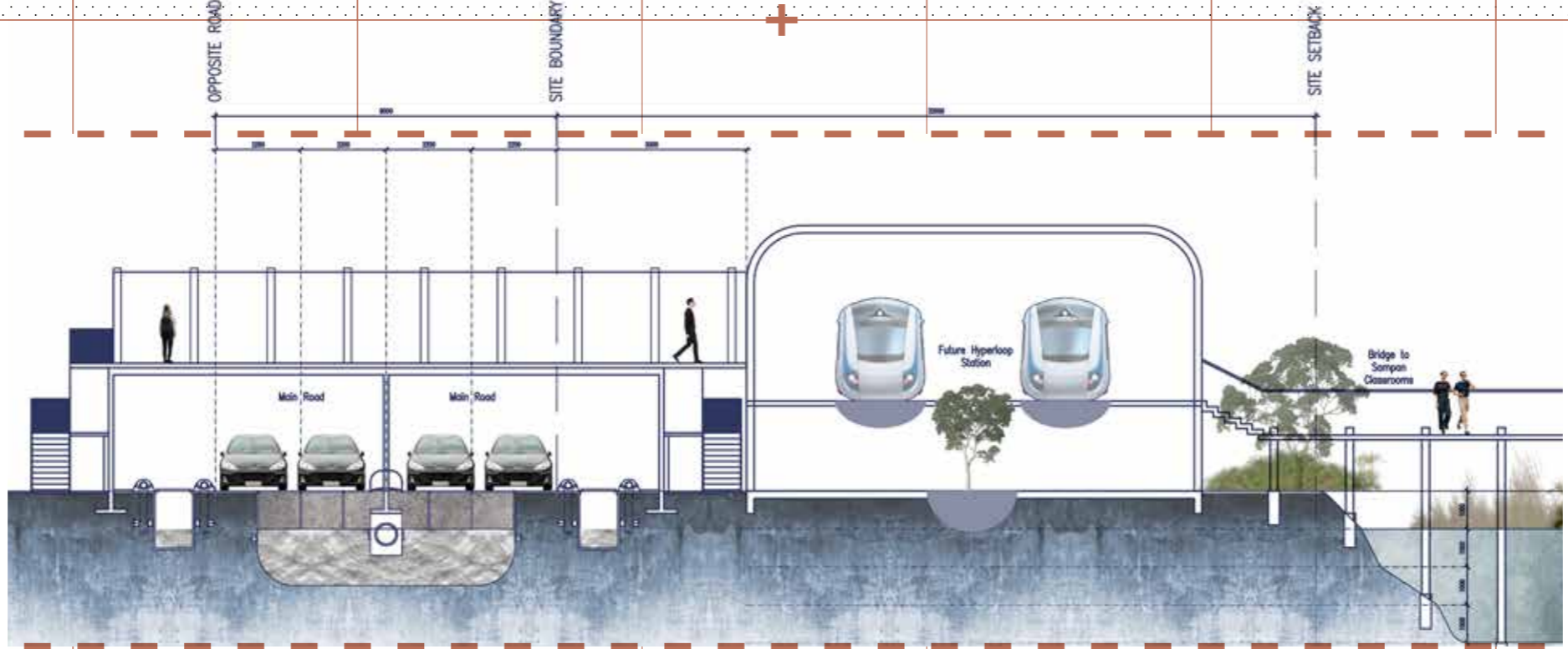
# Buoyant StreetScapes

Enhancing Connectivity & Walkability

Flood crisis immune community

Balanced Urban Development

Urban resilience



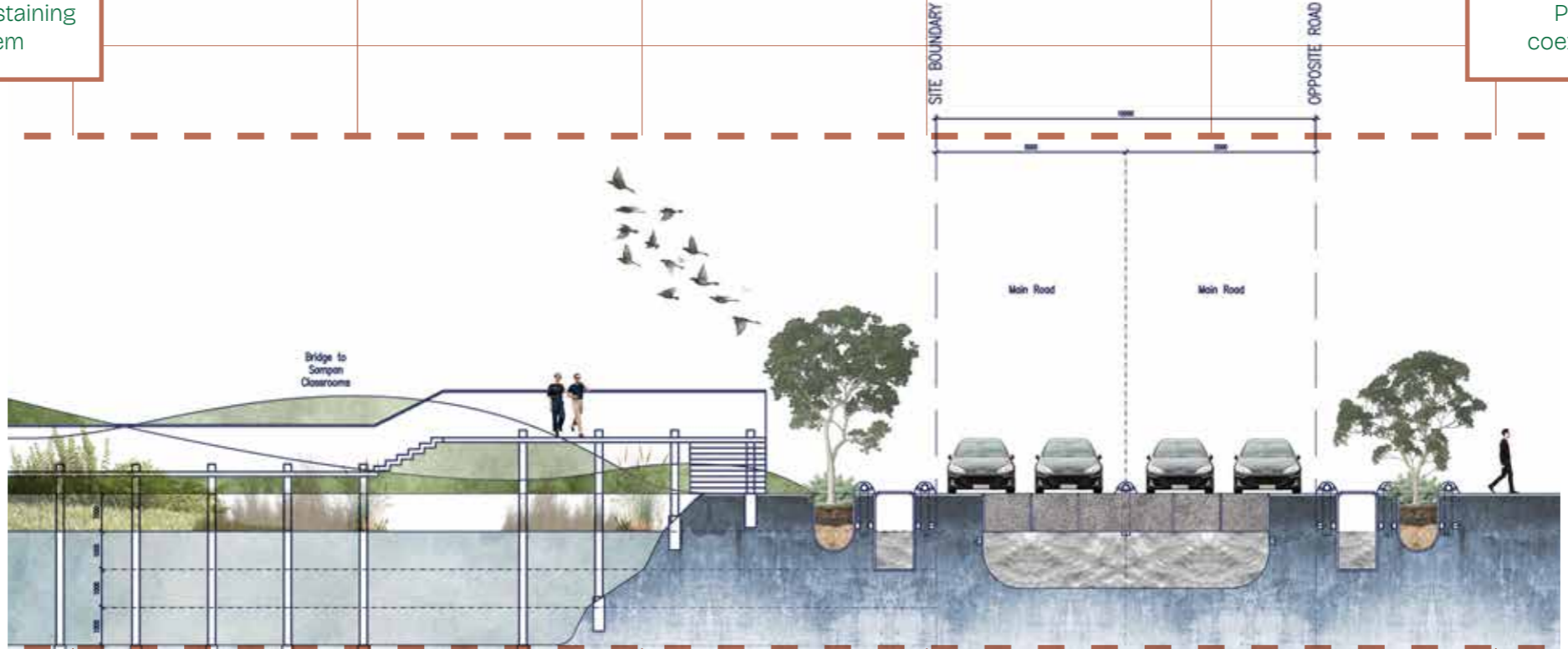
Street Profile A

Self-absorbing & sustaining Urban Ecosystem

People + Nature coexist in equilibrium

Dynamic equilibrium

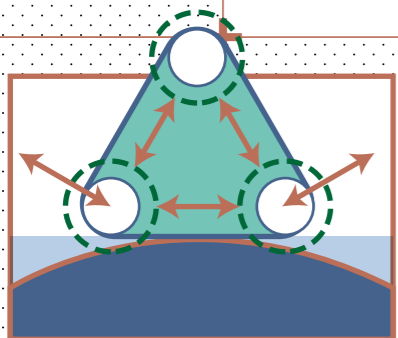
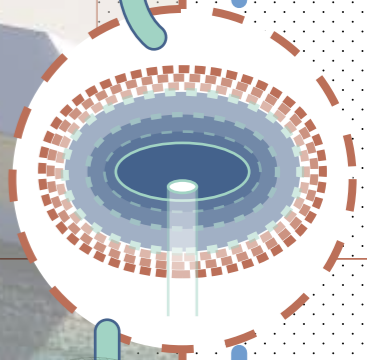
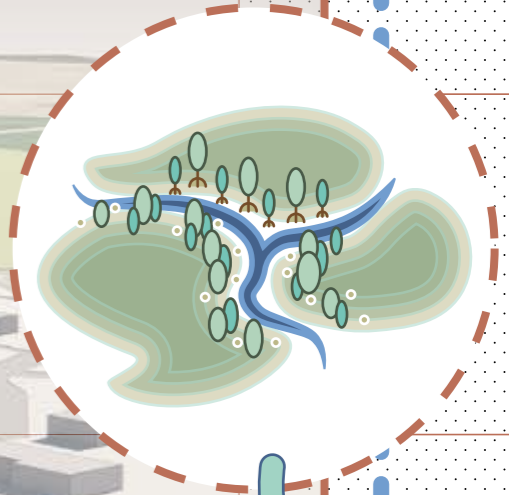
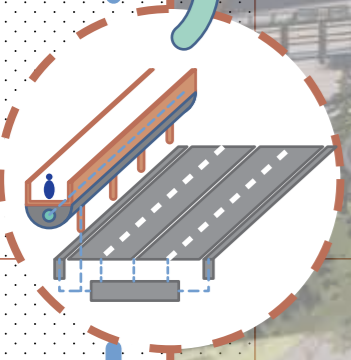
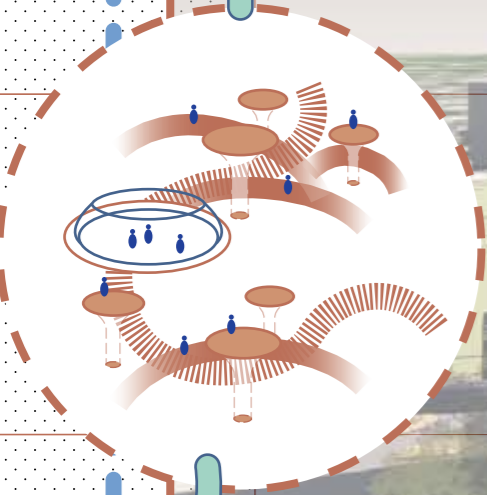
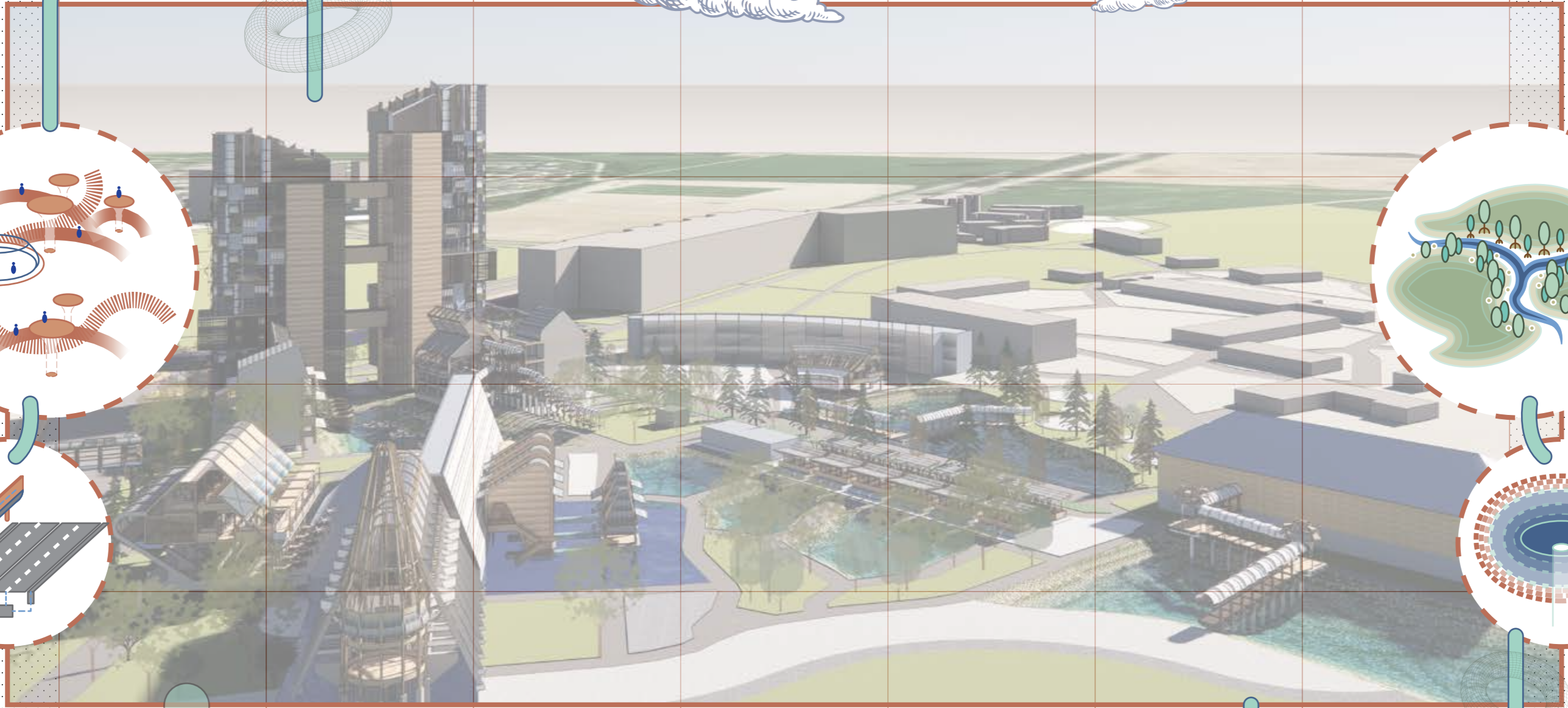
Urban ecology



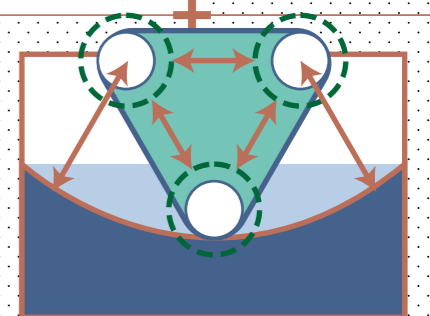
Street Profile B

# Translating Buoyancy To Urban Architecture

to city centre/  
mall zones



Urban architectural language based on buoyancy principles emphasizes eco-friendly infrastructure, including advanced stormwater management systems, energy-efficient technologies, and sustainable construction methods. This approach aligns with the equilibrium of nature and built environment. Buildings are designed with buoyant foundations, allowing them to float or rise with changing water levels. These foundations enable structures to remain stable during floods or changing tides. As the water level rises, the buildings ascend, maintaining equilibrium with the water.



# Urban Resilience Program

## Lake Vekurijärvi



Lamassaari, Vekurinveranta and Kalliolaakso are located on the shores of lake Vekurijärvi (length approx. 2 km, width approx. 300 m). It is a fish-rich lake with beautiful sunsets. Lamassaari is part of the Viikki-Vanhankaupunginlahti nature reserve.

## River Vantaa



Since the late 19th century, the water quality of the Vantaa River has been degraded, especially during the 1960s and 1970s, when municipal and industrial wastewaters polluted it heavily and improvements in wastewater treatment were not yet effective (Schönach, 2015).



By intertwining the principles of balanced urban development, urban resilience, dynamic equilibrium, and urban ecology, the initiative not only equips the community with essential skills in aquaculture, water management, and food preservation but also reshapes urban planning towards a more resilient and inclusive future. Through decentralized learning centers and riverbank modifications, the program establishes a blueprint for fostering community prosperity while simultaneously revitalizing the natural environment. In embracing the interconnected theories of urban development, the program exemplifies a forward-thinking strategy that not only addresses immediate challenges but also lays the groundwork for a resilient and harmonious urban landscape.



# Equipping the Community



## Revitalization of Rivers

Widening + strengthening river banks

THEORY 1 Balanced Urban Development

### Restructure

Relinking urban and residential along the perimeter of the river  
Creating a linear/ balanced development

Urban Resilience

THEORY 2

### Food Security

Sustainable food source  
Reduced external dependency  
Self-sufficient local food supply chain in the face of disruptions

THEORY 1 Dynamic Equilibrium

### Equalization

Net Zero/ Net Negative City  
Balancing resource consumption and pollution with resource generation and purification

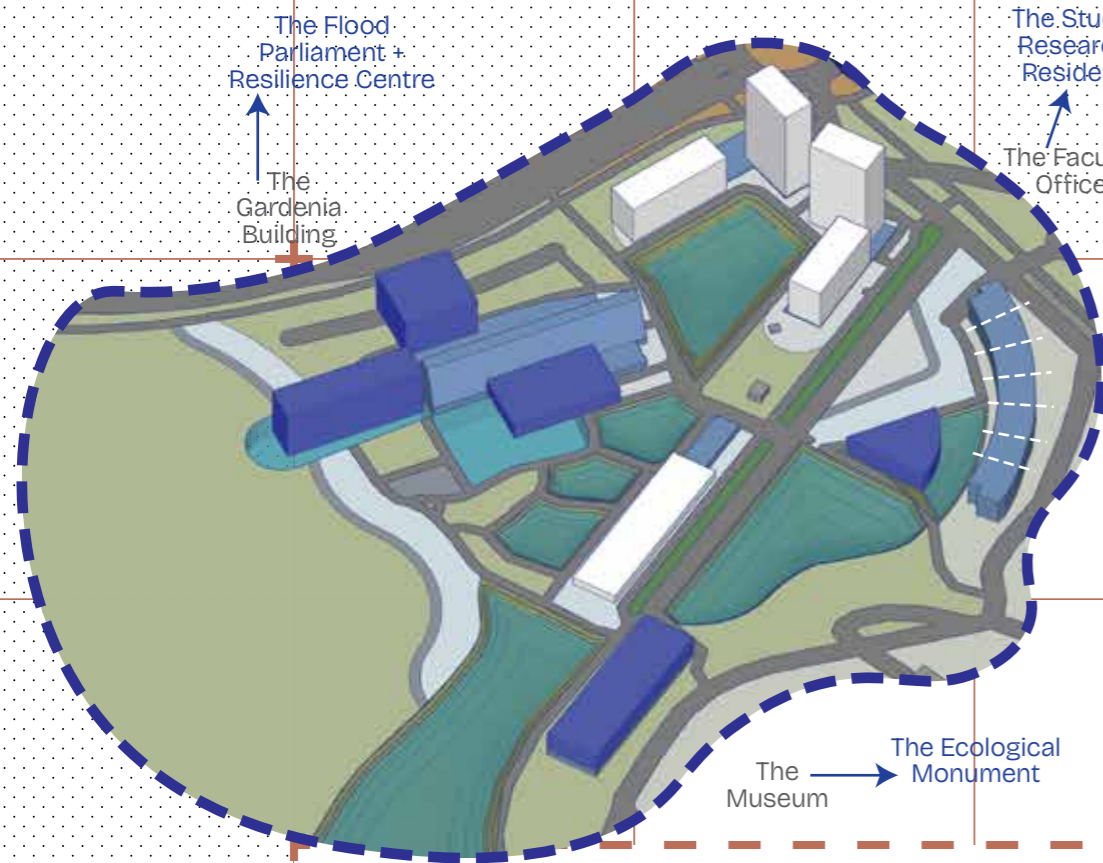
Urban Ecology

THEORY 1

### Biodiversity

Harmonious coexistence between the urban environment and the natural world  
Strengthening soil structures through natural life

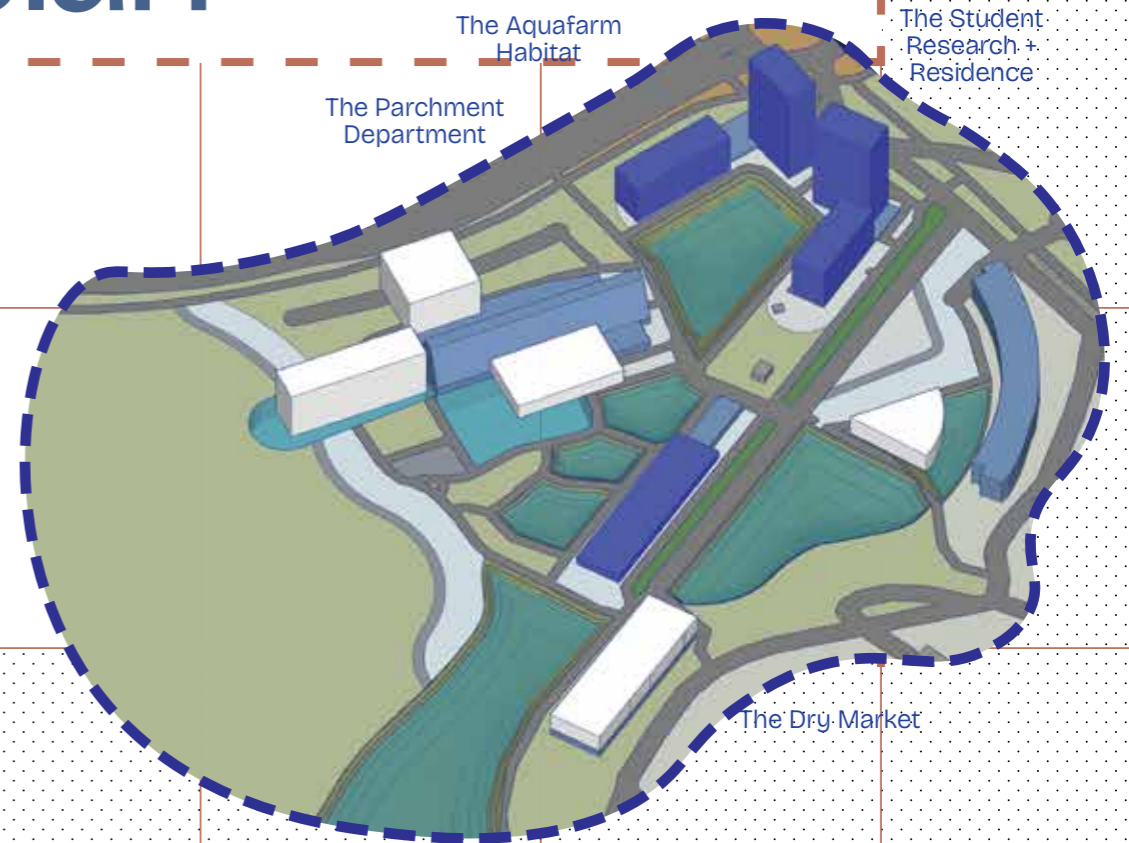




**RENOVATION**

# The Masterplan

**NEW  
CONSTRUCTION**



# Defining Urban Program

## Research

Research data

Research Activity

### Observation

In-depth exploration of real-life water and community-related issues and challenges around the site.

Setting:  
Observatory



### Education

Disbursement of factual and based theoretical knowledge and instillment of the correct mindset to face the challenges.

Setting:  
Classroom



### Training

Provision of vocational and skill-based training to the community members to manage economies and resilient respond systems.

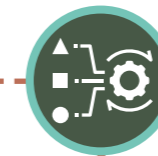
Setting:  
Training arena



### Simulation

Simulative experiential activities to emulate real-life crisis situations, natural ecosystems, and manmade water cycles to immerse communities within the experience of hydrology.

Setting:  
Production plant



### Experimentation

Continuous experimentation with natural resources and the response from the natural environment to maintain equilibrium of assets.

Setting:  
Laboratory



Water

Community

## Social Hydrology as Community Outreach

The urban program within the masterplan initiates with comprehensive observation, progressing to educational modules disseminating knowledge on flood dynamics, safety protocols, and environmental resilience. Practical training follows, incorporating sophisticated simulations and experimentation in social hydrology. The urban program in the masterplan, rooted in social hydrology, imparts resilience by infusing elements of enjoyment, calculated risk, heightened awareness, meticulous preparation, and immunity across all constituents of the Flood Parliament—comprising the community, water, flora, and fauna. This holistic strategy not only enhances the community's ability to withstand challenges but also fosters a symbiotic relationship with the environment, ensuring collective preparedness and adaptability.

# The Flood Parliament

Everyone is a member!

Everyone gets a vote!

Members of Parliament

## Governance

research institute  
flood & water specialists  
sociology specialists  
community representatives  
government authorities

## Community

families protective and unifying institutions  
children the next generation of Finland  
youth  
parents upholders of traditions  
elderly members

## Water

Riverwater  
Groundwater  
Stormwater

## Hydroflora

Naturally grown  
Landscape  
Cultivated  
Botanical gardens

## Hydrofauna

Naturally grown  
Farm-bred  
Aquaculture  
Prawn  
Fish

Stormwater Harvesting  
Stormwater Regulating  
Stormwater Processing

**Fun**  
**Risk**  
**Awareness**  
**Preparation**  
**Immunity**

Potable water  
Non-Potable water

Production plant  
Production plant  
Production plant

Water as Setting  
Arena  
Learning Ground  
Habitat  
Farm

Pre-Crisis Training  
Disaster Coordination

Classrooms  
Multi-function studios  
supply distribution point  
refuge center

Real-Crisis Execution

evacuation  
refuge  
food source  
communications

Flood waste repurpose

Classroom  
Classroom

# The Dry Market

Classroom  
Classroom

Agricultural Irrigation

Fish Meal

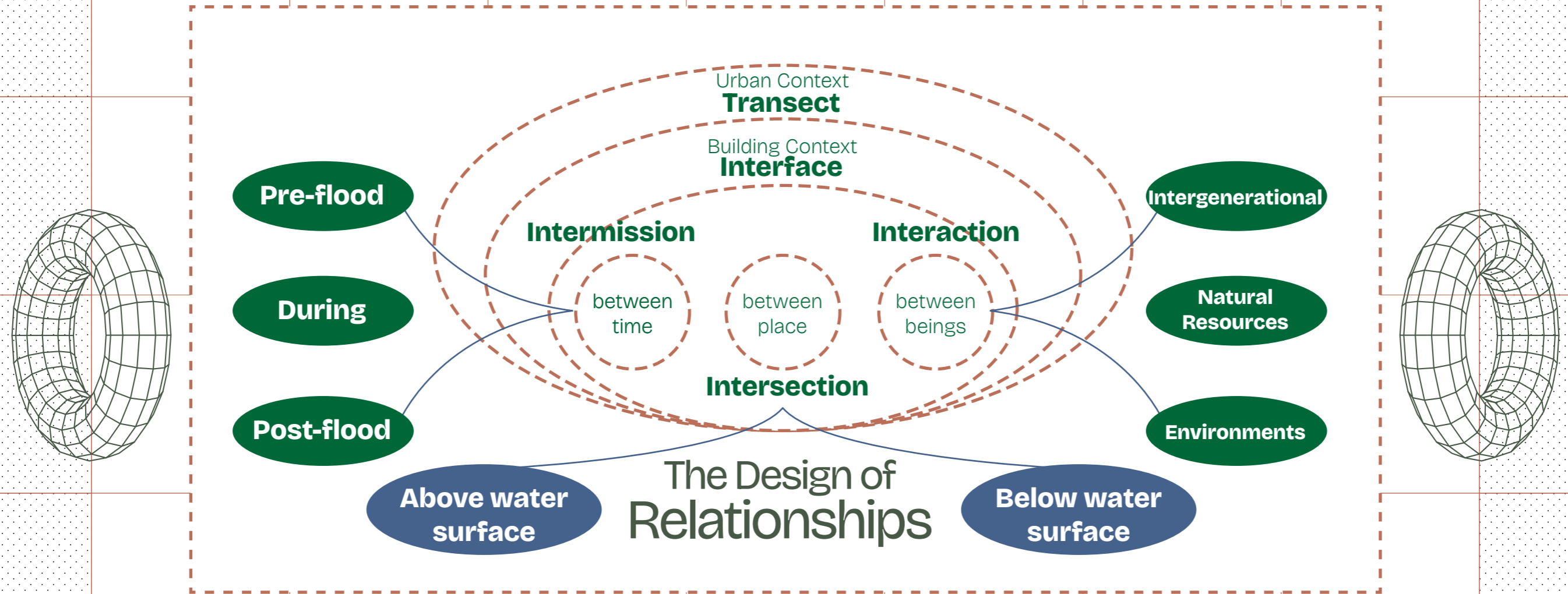
Protein

Keropok-making

Rescue & Resilience

The Aquafarm Habitat

# Defining Urban Space



The urban space within the masterplan unfolds through a transect of urban context, with a dynamic interface connecting buildings. It navigates an intermission between time, transitioning seamlessly through pre-flood, during flood, and post-flood phases. An intersection between places emerges both above and below water surfaces, fostering diverse interactions—intergenerational, with natural resources, and within varied environments.

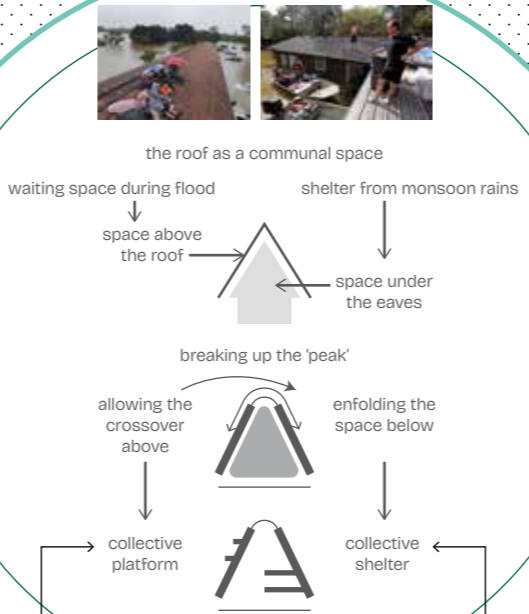
**SOCIAL**

**Spatial Objectives**

To create open spaces that allow for bonding of relationships between different demographic groups



circulating people



formation



linear



hierarchy

**Spatial Qualities**

scattered, varying degrees of formality to introduce a spontaneity and voluntary interactions between community groups

**Village-like configuration**

degree of spontaneity  
symmetry  
degree of formality

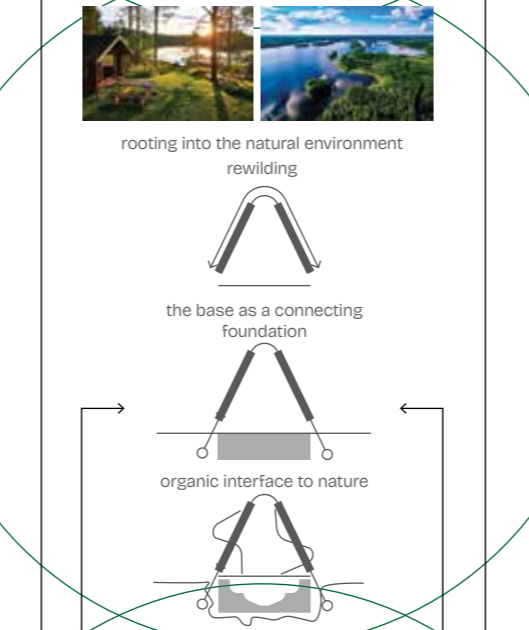
**ENVIRONMENT**

**Spatial Objectives**

To design an environment that will reintroduce wildlife flora and fauna into the urban oasis in the heart of the city.



circulating environments



formation



cluster

**Spatial Qualities**

A recreation of natural sanctuary with biophilic qualities for the symbiotic coexistence of beings

**Recreating Ecosystem Networks**

degree of proximity  
irregularity  
degree of concentration

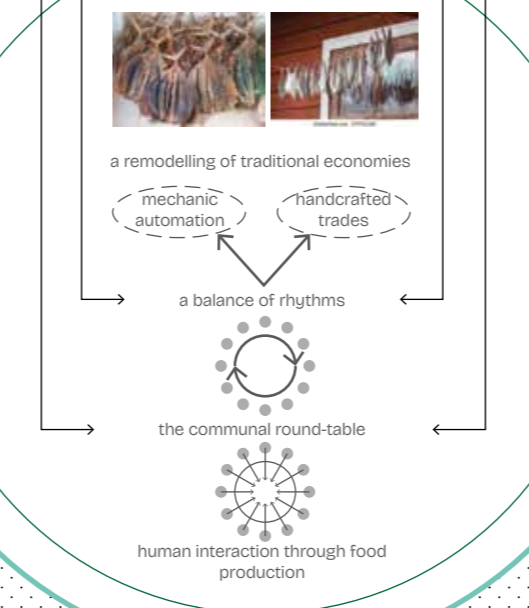
**ECONOMY**

**Spatial Objectives**

To integrate industrial devices and machinery with human production of traditional local craft



circulating resources



formation



radial

**Spatial Qualities**

Industrial activities conducted in a communal setting to allow community interaction during production

**Rotational Resource Fabric**

degree of water content  
order  
degree of processing

cycle

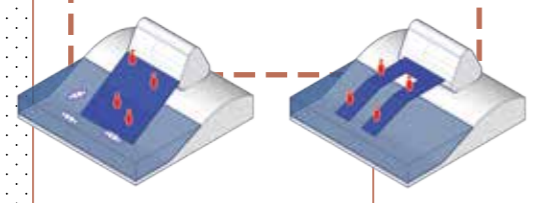


# Defining Urban Masterplan

## Design Development

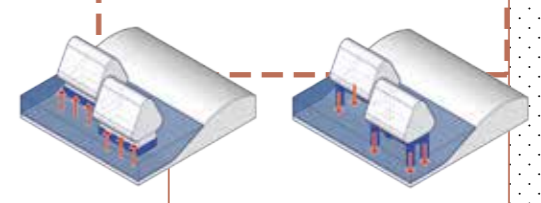
**PHASE 1**  
**Axis**  
Establishing the central axis from the North-south direction to connect the 2 sides around the site.

**Connect**   **Access**



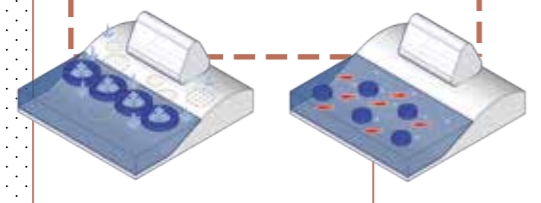
**PHASE 1**  
**Interface**  
Aerating responsive pocket spaces through buoyant structures according to programmatic functions.

**Float**   **Stilt**



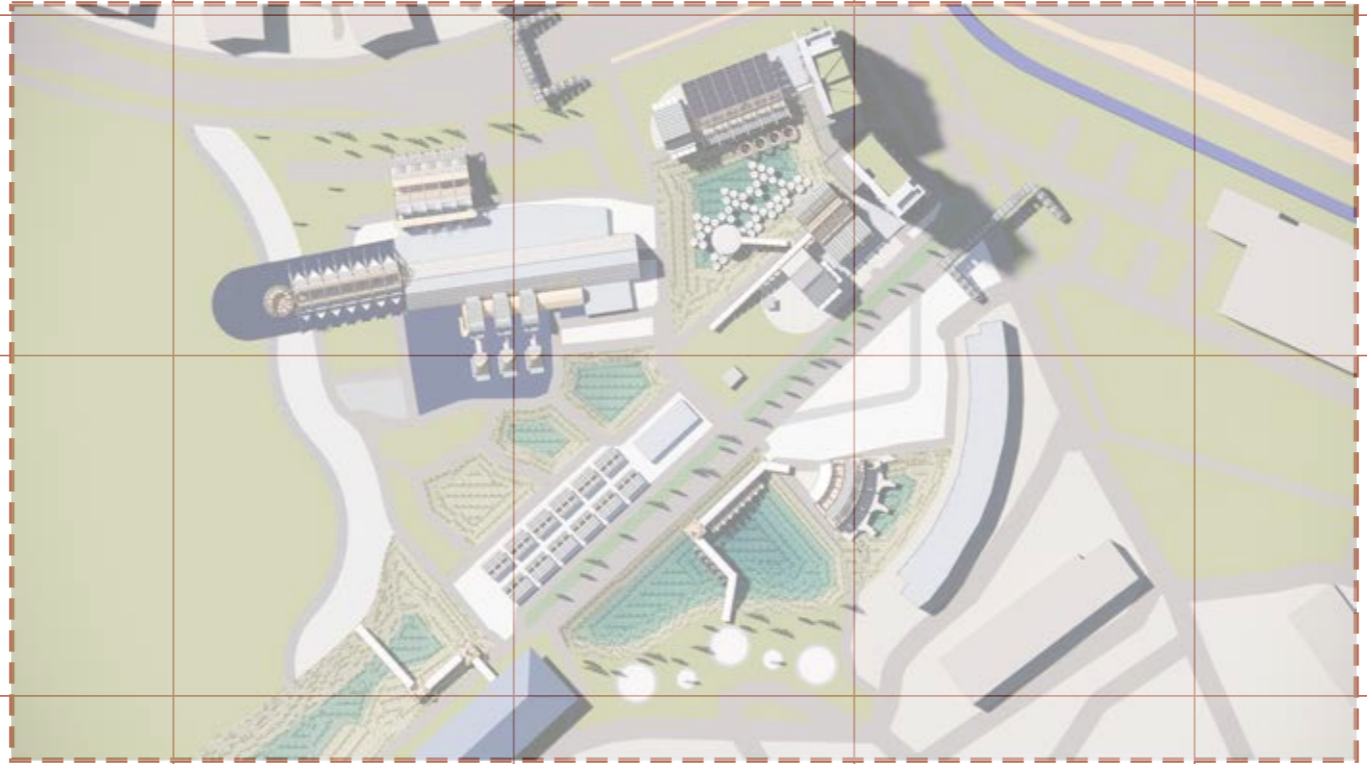
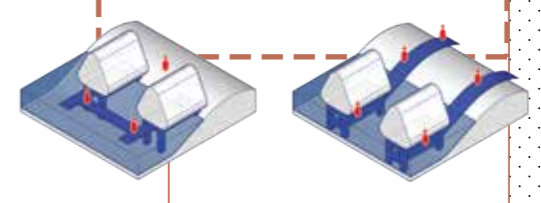
**PHASE 1**  
**Landscape**  
Creating a manmade lake/bioretention pond in the centre of the site to rebuild the natural ecosystem

**Restore**   **Rehabilitate**



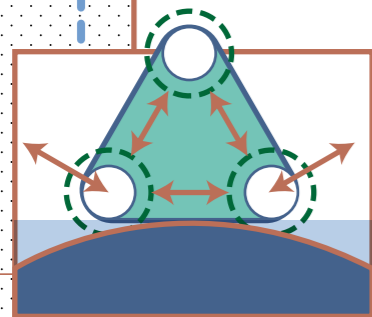
**PHASE 1**  
**Circulation**  
Building the internal circulation around the water and structures through elevated walkways.

**Lift**   **Mound**



The urban masterplan intricately weaves together key elements, beginning with the establishment of a central axis connecting both sides of the site, prioritizing connectivity and access. Responsive pocket spaces, buoyed by float and stilt structures, breathe life into the urban fabric. A central manmade lake/bioretention pond restores and rehabilitates the natural ecosystem, while elevated walkways, embodying lift and mound elements, facilitate internal circulation around water and structures.

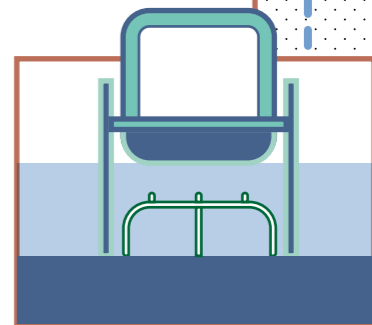
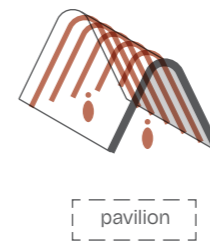
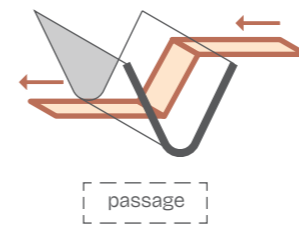
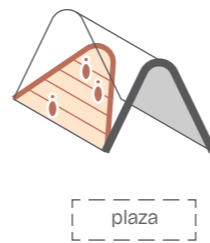
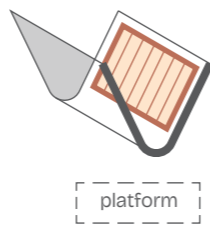
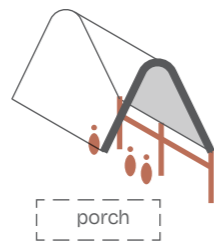
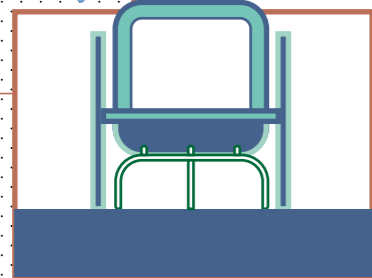
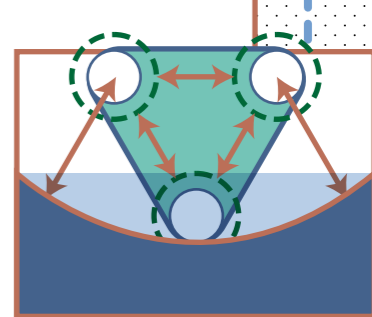
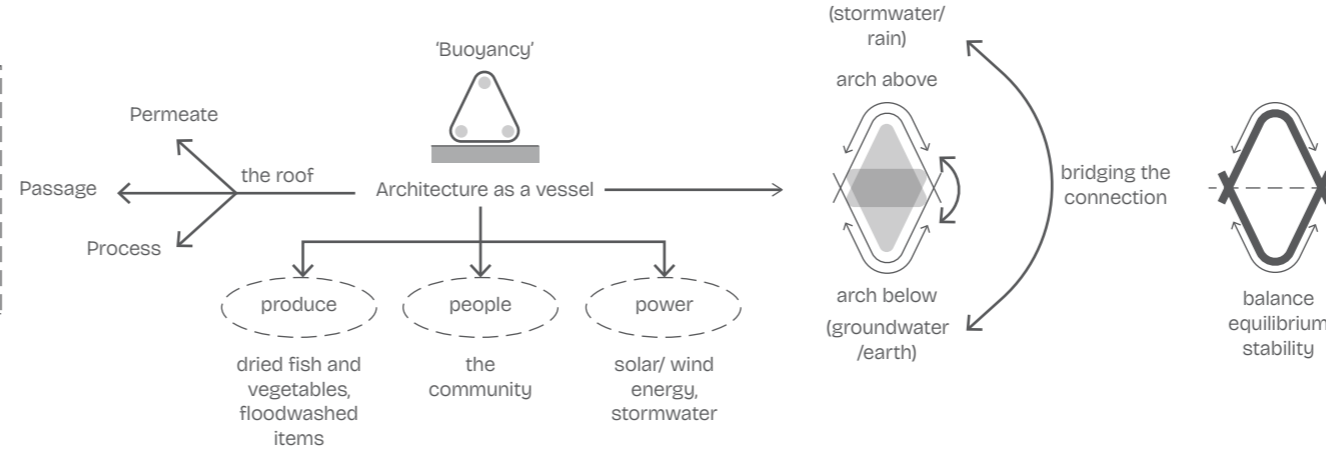
# Structural Concept



structural functions

porch  
platform  
passage  
plaza  
pavilion

varying spatial typologies



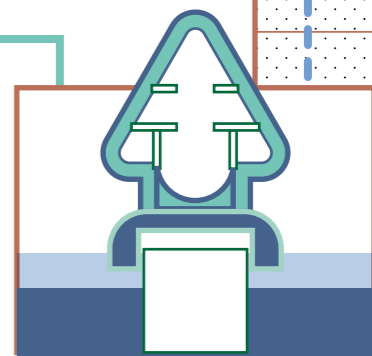
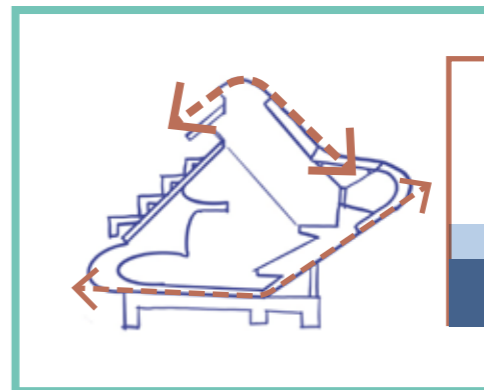
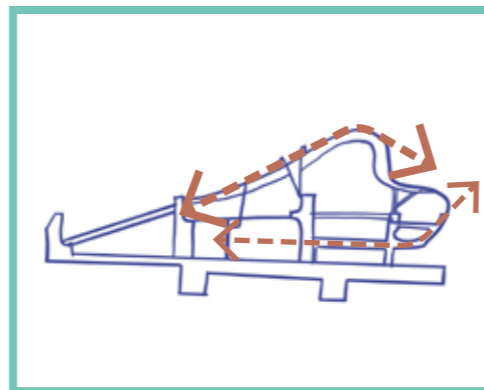
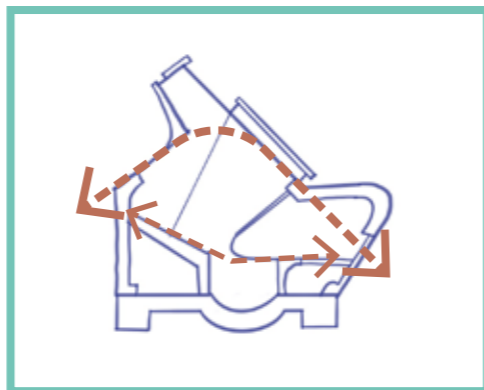
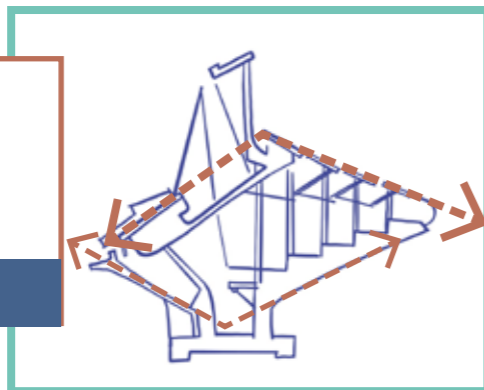
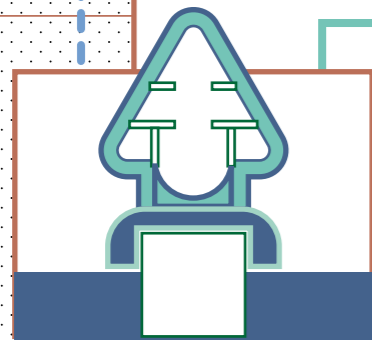
An archive of vessels

the parchment department

the aquafarm

the recovery harbour

the kampung cookhouse





## Higher Ground



### The Guarded Garage

Rental of elevated parking space for privately owned vehicles during floods.



### The Floodproof Vaults

Rental of safe deposit lockers for important private belongings during floods.



### Digital Popbox

Pick-up and drop-off space units for market goods trading

## Rescue & Resilience



### The Sampan Classrooms

Flexible classroom settings for disaster and crisis training as well as flood season schooling.



### The Boating PlayYard

Water vehicular management induction while providing fun boating activities for youth and children.



### The Recovery Harbour

Disaster coordination and relief centre for victims of flood.

## Monumental Ecopark

### Congregation Point

A public park of freshwater swamp plants to act as a social node for the local community.



### Stormwater sprinklers

Integration of stormwater infrastructure as park facilities and landscape design features for the community.



### The Flood Memorial

A commemorative sculpture to mark down annual flood levels around the site.



# The Urban Masterplan

## River's AquaFarm



### Spawning Stations

Breeding facilities for fish and prawn suitable to be harvested for local keropok making.



### Aquaponic Weed Gardens

Plantation of edible weeds such as lemongrass and kangkung using aquaponic technology.



### Nature's Water Aerator

Natural ecosystem as an inherent water purifying and oxidizing mechanism for stormwater.

## The Flood Parliament

### The Water Bender

A series of sculptural devices to aerate and purify collected stormwater.



### Submersible Observatory

A public observatory and gallery to educate the community about water management systems underground.



### The Flood Decelerator

The stormwater pump systems and mechanisms that work to retain floodwaters and control inundation.



## The Dry Market

### The Tidal Reserves

Recycle and repurposing warehouse for floodwater-soaked items and devices.



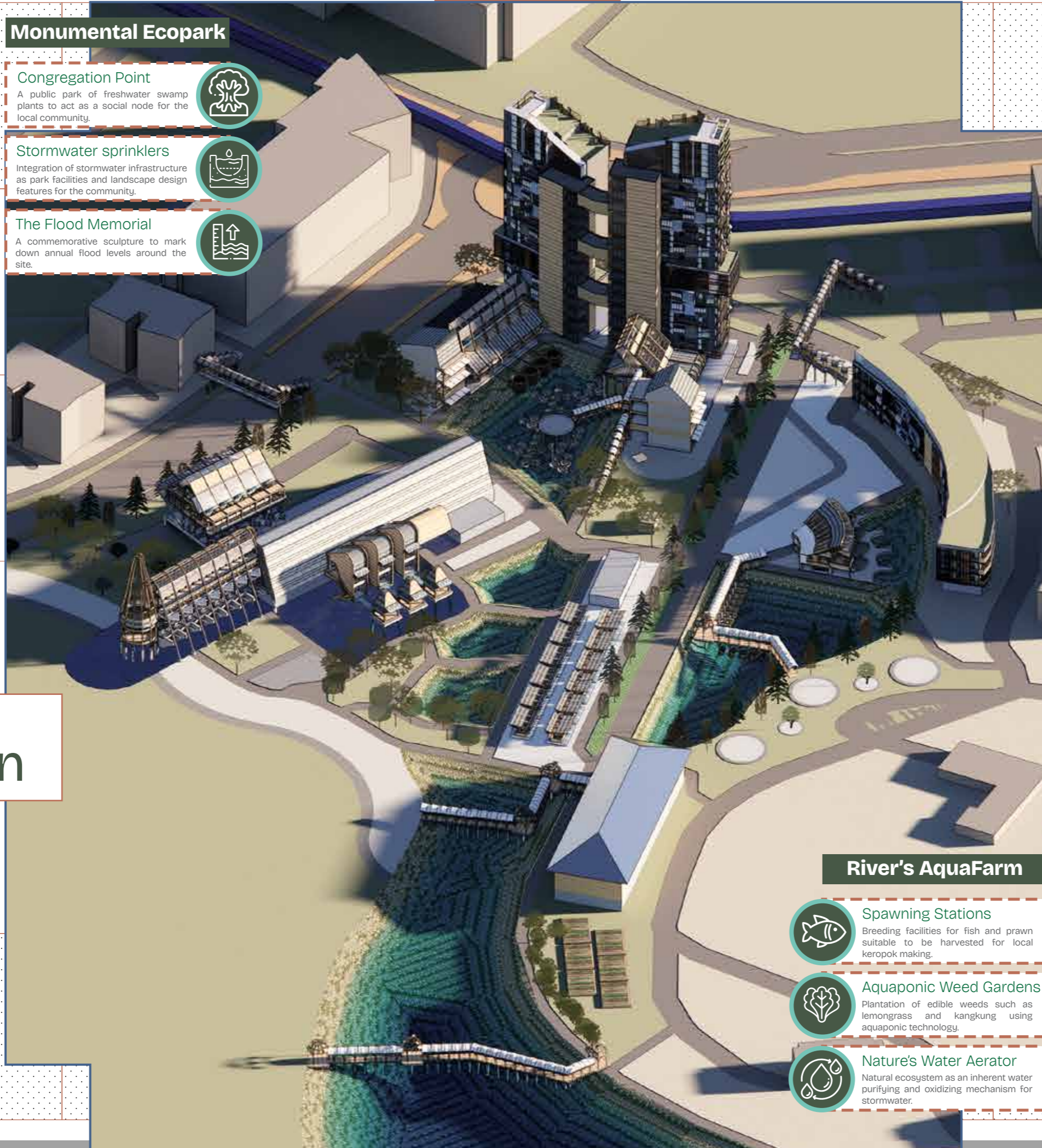
### The Kampung Keropokery

The shared communal kitchen for villagers to make traditional local snacks collectively.



### Parchment Department

Drying and water suction facility to dry keropok and water-soaked items during flood.

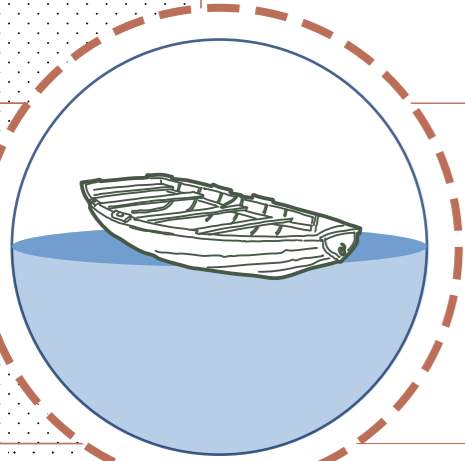


# Rescue & Resilience (R&R Centre)

## Transportation hub

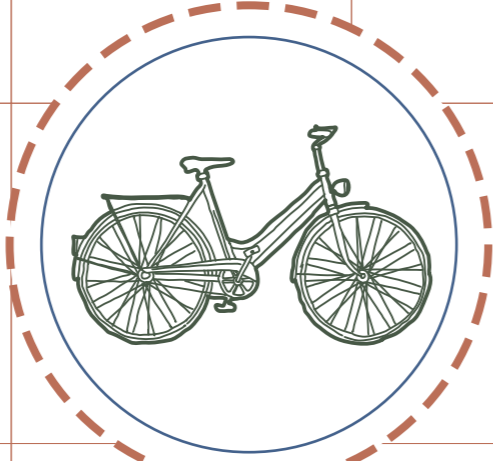
### Docking Stations

Parking facilities for community-owned water and land vehicles for ease of travel

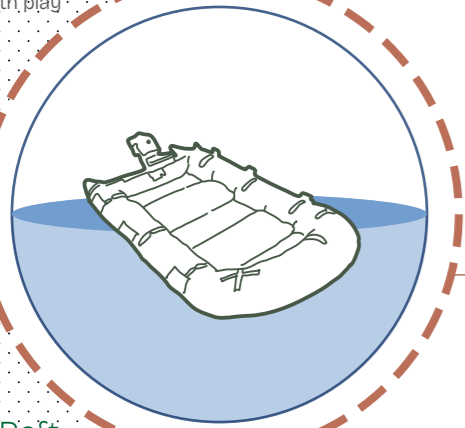


Sampan

Kids and youth play

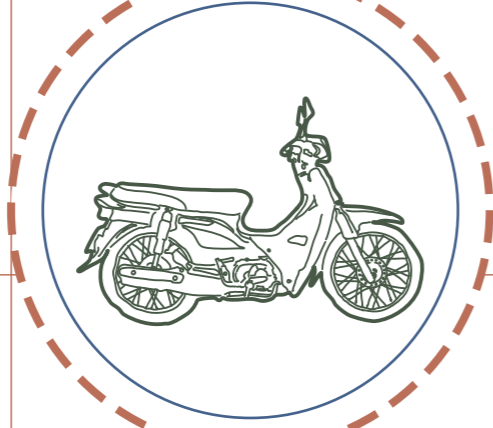


Bicycles



Rescue Raft

for flood rescue



Motorcycles



Water scooter

for village farmers



Public bus station

## The Recovery Harbour

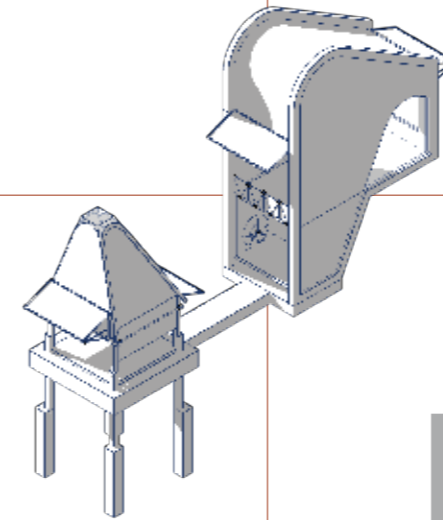




**The Recovery Harbour**



**Modular unit**  
Response unit



**Rescue & Resilience**

**The Sampan Classrooms**

Flexible classroom settings for disaster and crisis training as well as flood season schooling.



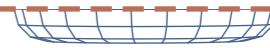
**The Boating PlayYard**

Water vehicular management induction while providing fun boating activities for youth and children.



**The Recovery Harbour**

Disaster coordination and relief centre for victims of flood.



**Outreach**

**Pre-flood**

boating play and water vehicular management training

**During flood**

refuge centre and aid distribution point

**Post flood**

disaster coordination and management

**Research Data**

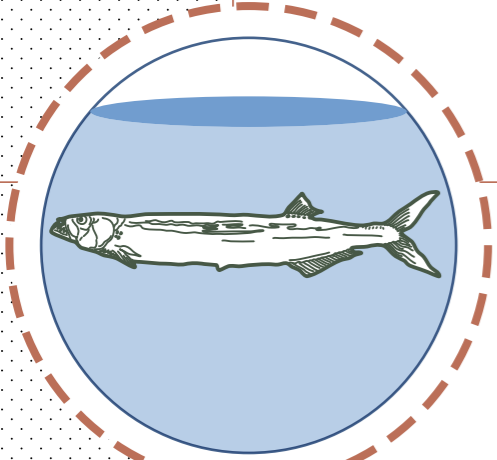
- local youth and children demographics
- water vehicular management proficiency
- disaster coordination plans
- aid distribution volume
- refuge center capacity

# The Dry Market

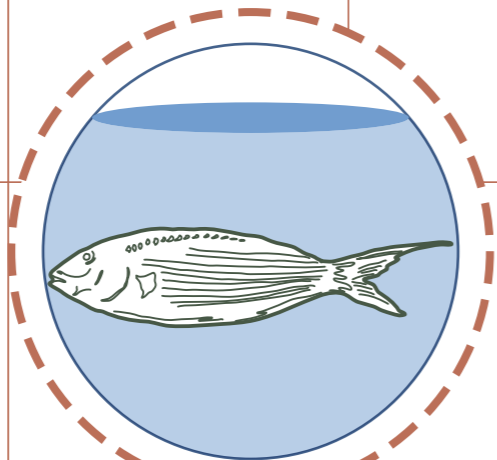
## River's AquaFarm

### Spawning Stations

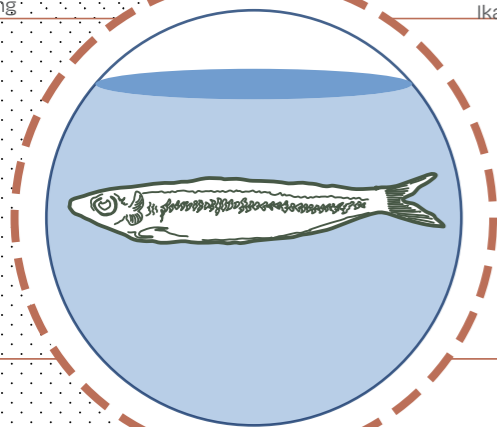
Breeding facilities for fish and prawn suitable to be harvested for local keropok making.



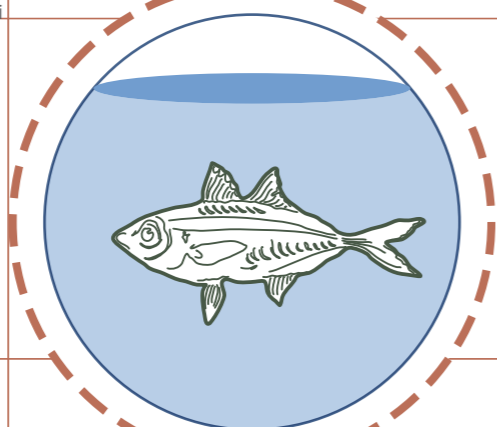
Wolf Herring  
Ikan Parang



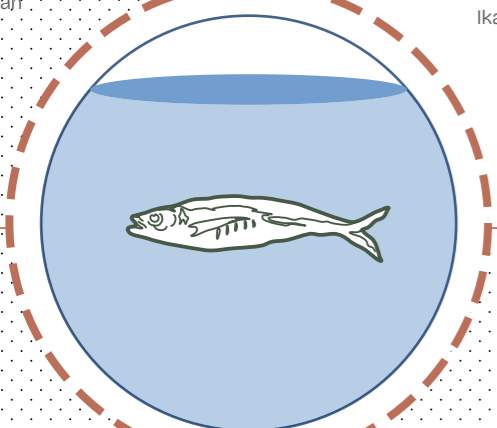
Threadfin bream  
Ikan kerisi



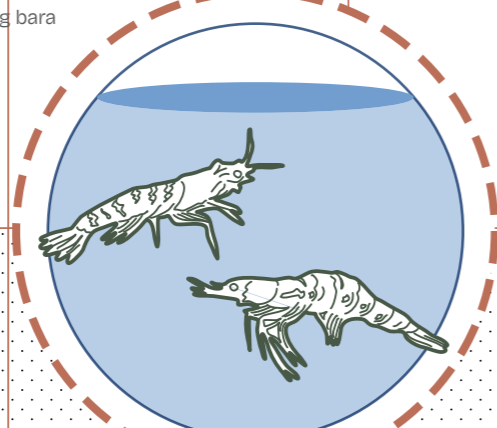
Sardine  
Ikan tamban



Ox-eyed scad  
Ikan lolong bara

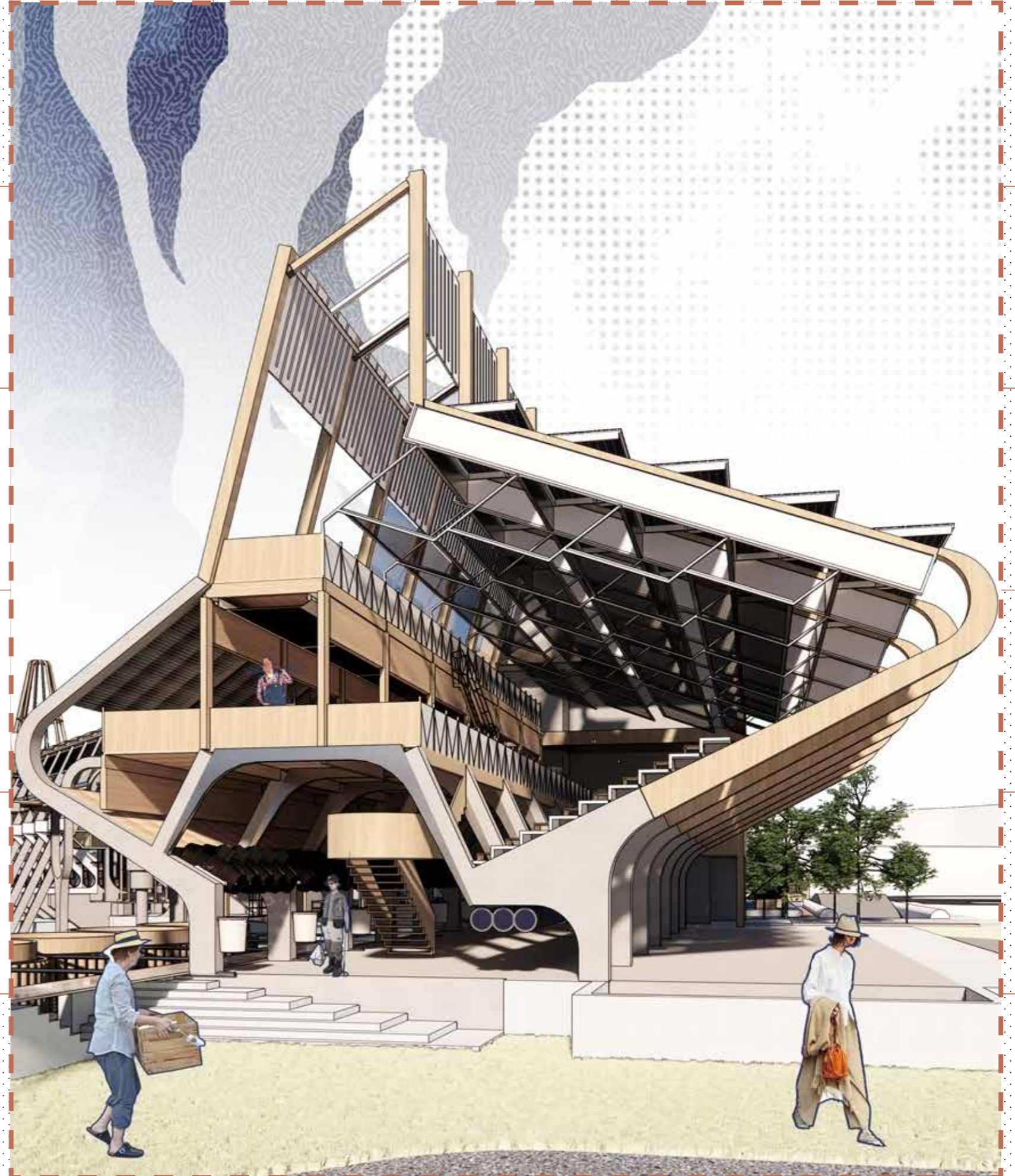


Round scad  
Ikan selayang



Shrimp  
udang

## The Parchment Department

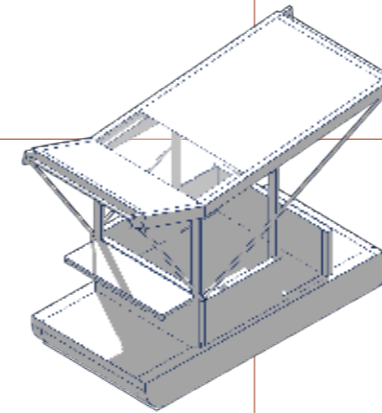




**The Market Square**



**Modular unit  
Market Stall**



**The Dry Market**

**The Tidal Reserves**

Recycle and repurposing warehouse for floodwater-soaked items and devices.



**The Kampung Keropokery**

The shared communal kitchen for villagers to make traditional local snacks collectively.



**Parchment Department**

Drying and water suction facility to dry keropok and water-soaked items during flood.



**Outreach**

Pre-flood

food preservation and production i.e. keropok and salted fish

During flood

public cafeteria, cookhouse and market to sustain food economies

Post flood

drying and repurposing floodwashed household items

**Research Data**

- local family and elderly demographics
- traditional food preservation methods/ recipes
- local appetite and palate
- market supply and demand
- food security volume and capacity

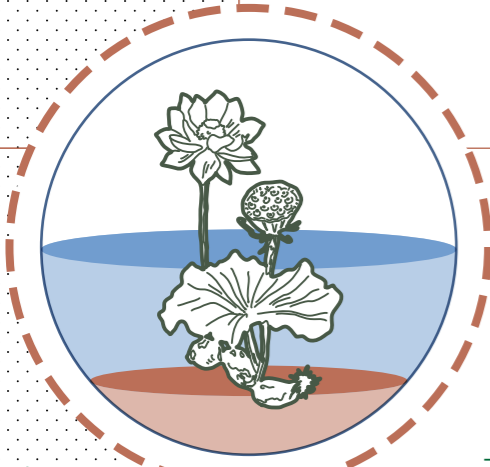
# The Flood Parliament

## River's AquaFarm

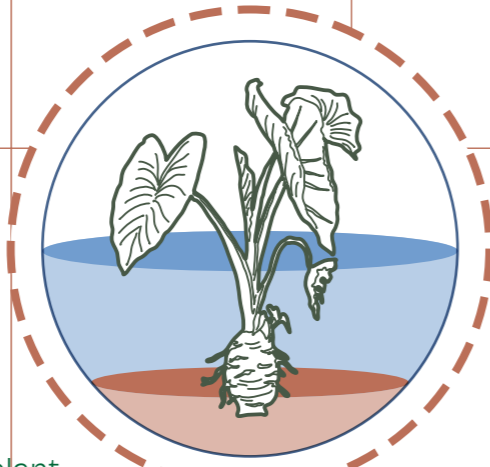
**Aquaponic Weed Gardens**  
Plantation of edible weeds such as lemongrass and kangkung using aquaponic technology.



## The Water Bender



Water Lotus  
Teratai



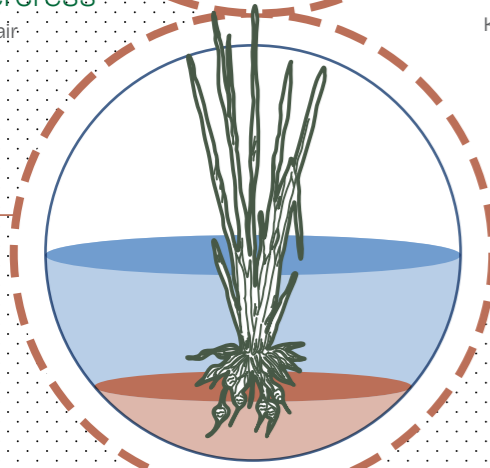
Taro plant  
Teratai



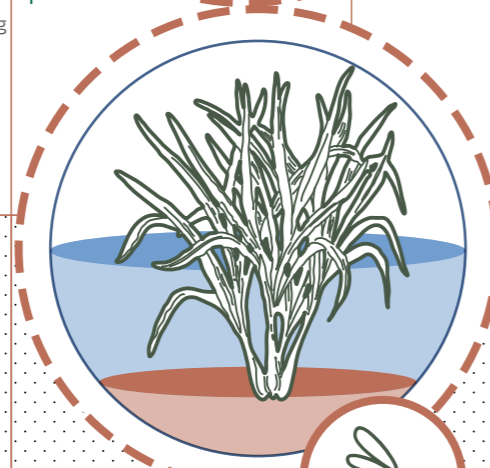
Watercress  
Selada air



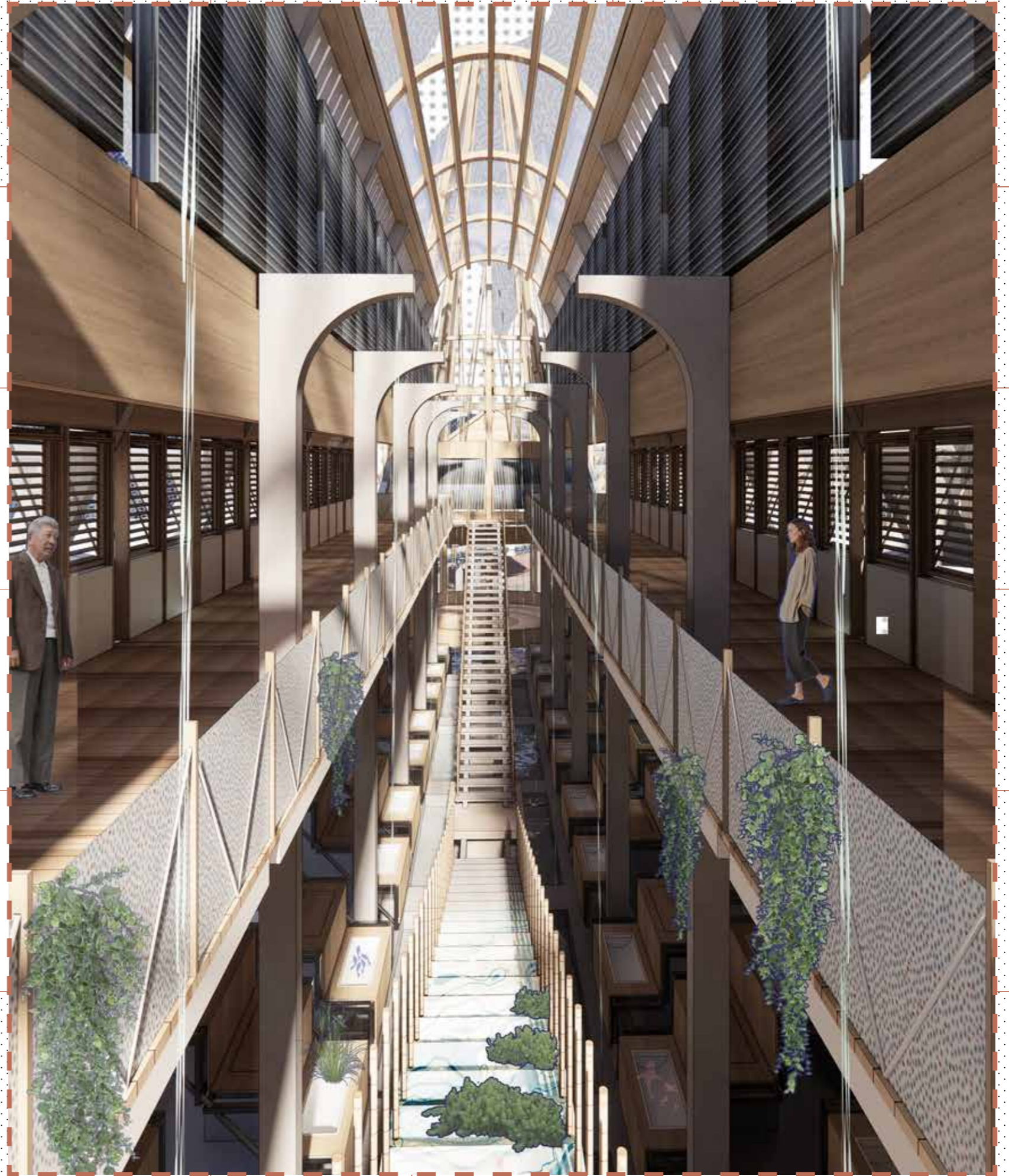
Water spinach  
Kangkung



Water Chestnut  
Buah Berangan



Lemongrass  
Daun serai

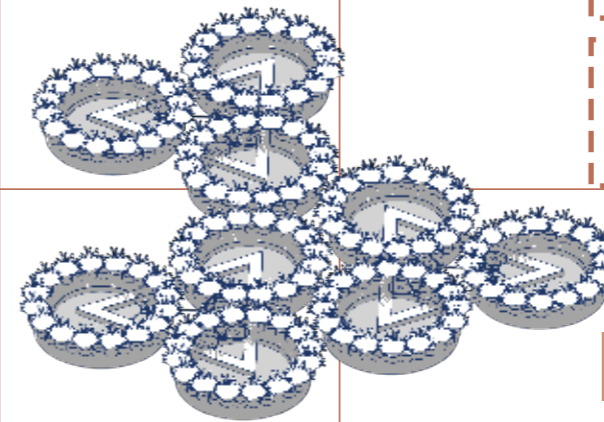




**River's Aquafarm**



**Modular unit  
Aquafarm**



**The Flood Parliament**

**The Water Bender**

A series of sculptural devices to aerate and purify collected stormwater.



**Submersible Observatory**

A public observatory and gallery to educate the community about water management systems underground.



**The Flood Decelerator**

The stormwater pump systems and mechanisms that work to retain floodwaters and control inundation.



**Outreach**

**Pre-flood**

aqua botanical garden that doubles as water purification and aerator system

**During flood**

flood mitigation and control through stormwater pump systems

**Post flood**

parliamentary discussion and reflection chamber on flood issues

**Research Data**

- general community demographics
- awareness levels of floods
- knowledge of flood mitigation methods
- affinity to natural environment
- stormwater management volume and capacity



# Sustainability

The design has built-in back-up systems including food storage, rain collection and power generation systems. These homes are latticed together in group of 5 to 10 to form a mini community in time of flood. This allows mini community to be self sustain for a longer period, and eases the arrival of external help.

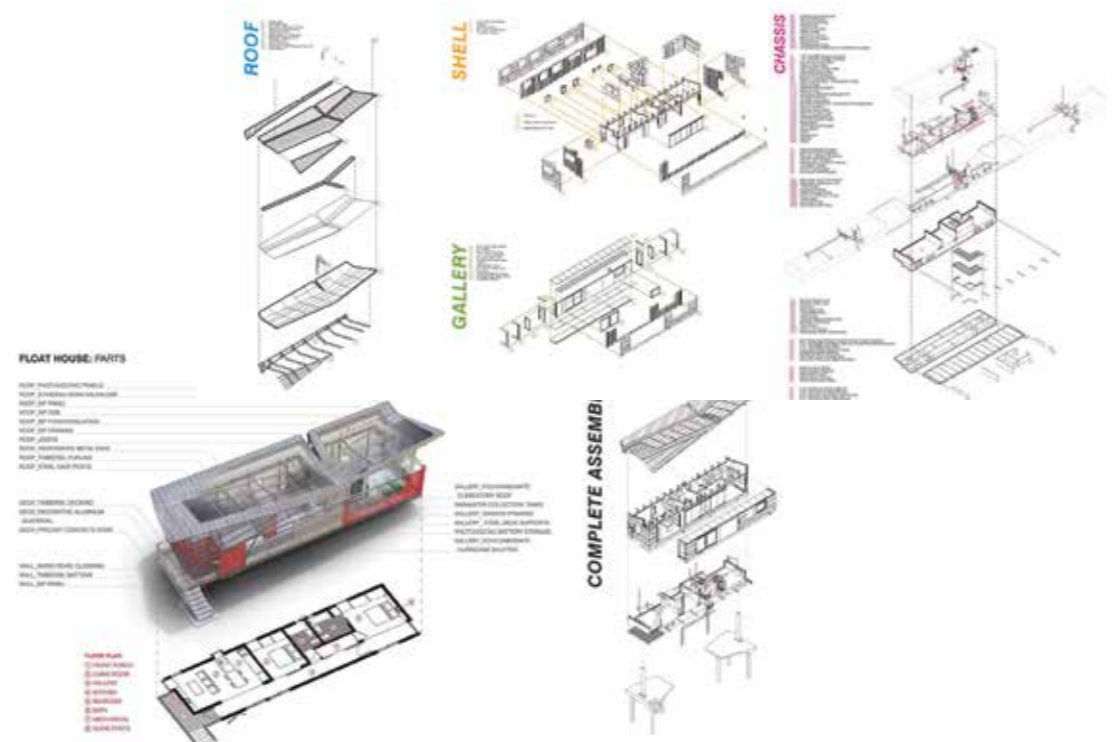


# Sealing

The quay-facing side of the structure is sealed with perforated aluminium sheeting that displays the house's number. The perforations are illuminated at night by a panel of blue LEDs but remain dim during daylight hours.

# Precedent Structural Studies

## The Float House Morphosis Architects



### Mechanism

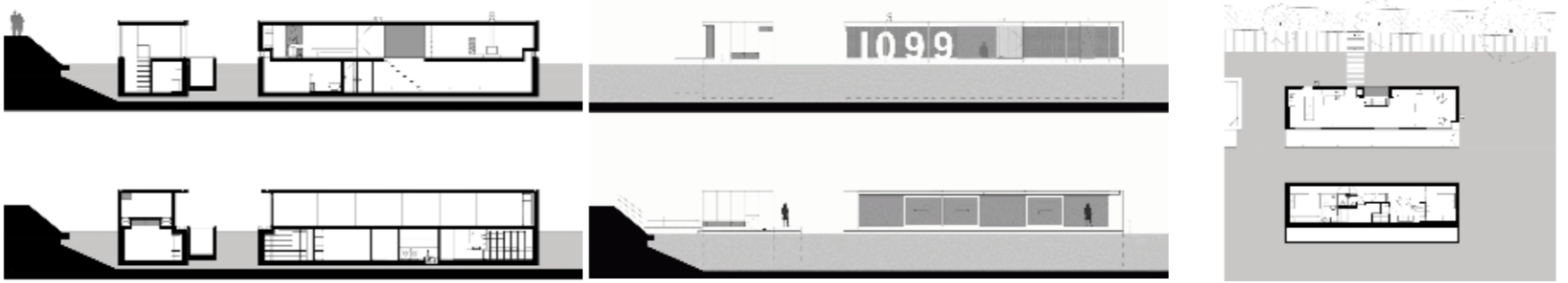
To protect from flooding, the FLOAT House can rise vertically on guide posts, securely floating up to twelve feet as water levels rise. In the event of a flood, the house's chassis acts as a raft, guided by steel masts, which are anchored to the ground by two concrete pile caps each with six 45-foot deep piles.

Like the vernacular New Orleans shotgun house, the FLOAT House sits on a 4-foot base; rather than permanently raising the house on ten foot or higher stilts, the house only rises in case of severe flooding. This configuration accommodates a traditional front porch, preserving of the community's vital porch culture and facilitating accessibility for elderly and disabled residents.



Buoyant  
Stilt Foundations

## Aqua Floathome Netherlands



### Mechanism

Half of this floating house by +31 Architects is submerged below the waterline of Amsterdam's river Amstel, while the other opens out to a buoyant terrace. Based on a ship, the lower portion of the house is submerged in the river while the upper storey sits level with the water's surface. The floating design is intended to help the residents "enjoy every day a feeling of being on holiday."

Floating steps descend into the windowless basement. The stairwell is flanked by glass balustrades that help to bring light down to the lower level, which is largely open plan. The house is connected to the quay by a wooden bridge, which flexes as the residence rises and falls with the tide.



Embedded Structures



# Hydroscapes

A carefully laid out garden acts as a natural flood warning system. Terraces set at different levels are designed to flood incrementally and alert the occupants well before the flood water reaches a threatening level - termed as 'intuitive landscape'. The terraced levels improve recovery by providing dry areas as water levels drop and plants help to reduce saltation of the dock.

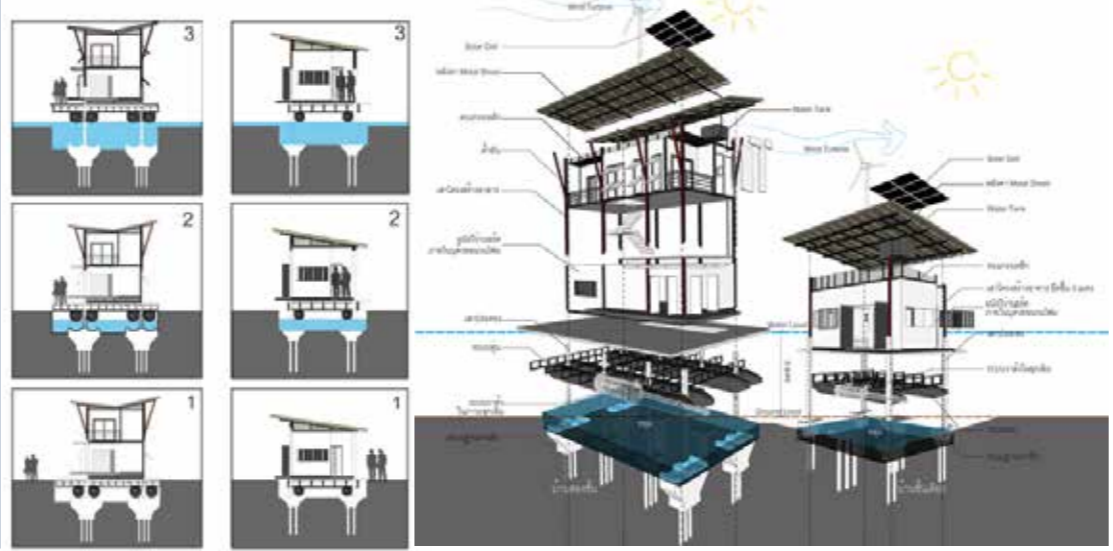


# Services & cabling

The amphibious house is connected to its utilities via elephant cabling. These flexible service pipes are designed to extend up to 3m, allowing all of the services to remain clean and operational during any flood event. Crucially, this also allows the occupants to return to the property immediately after a flood, maximising the continuity of their daily lives.

## The Amphibious House

### Thailand



### Mechanism

Hidden under the house and its wrap-around porch are steel pontoons filled with styrofoam. These can lift the structure three metres off the ground if Ban Seng village, two hours north of Bangkok, floods as it did in 2011 when two-thirds of the country was inundated, affecting a fifth of its 67 million people.

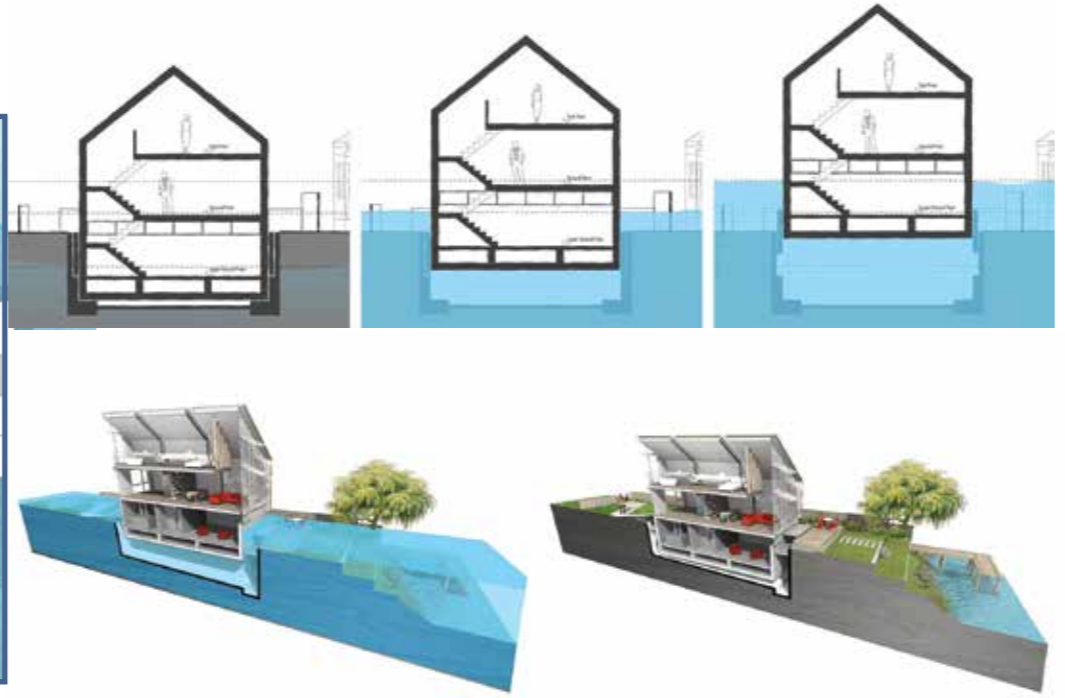
The 1,000 square foot floating house will be anchored to the lake's shore, complete with electricity and flexible-pipe plumbing. Like the amphibious house, the floating house is an experiment for the NHA to understand what construction materials work best and how fast such housing could be built in the event of floods.

### Float Test

The amphibious house, built over a man-made hole that can be flooded, was completed and tested in September 2013. The home rose 85cm as the dugout space under the house was filled with water.

## The Amphibious House

### United Kingdom



### Mechanism

The solution was an amphibious house, a building that rests on the ground when conditions are dry, but rises up in its dock and floats during a flood. The house itself sits in the ground and the floating base is almost invisible from the outside. The ground floor of the house is raised above the ground by less than 1 m rather than by almost 2 m as will be required if it were not amphibious. This approach meant that the 225m<sup>2</sup> three-bedroom dwelling could be constructed over three floors in the place of a single-storey 90m<sup>2</sup> house without significantly increasing the ridge height.

### Float Test

A float test was conducted during construction when the wet dock was filled with the water and the house elevated half a metre under its own buoyancy. The house was also tested again once the steel frame was complete and the house filled with furniture.

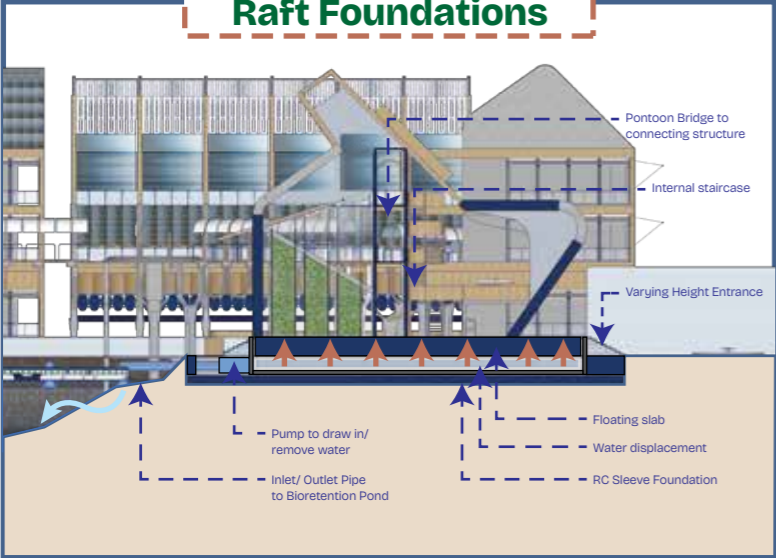
Between November 2019 and February 2020, severe winter flooding occurred across the United Kingdom. During this period the River Thames swelled and the owners of the #AmphibiousHouse, as featured on Channel 4's Grand Design series reported: "the house continues to rise and fall without intervention".

Buoyant Raft Foundations

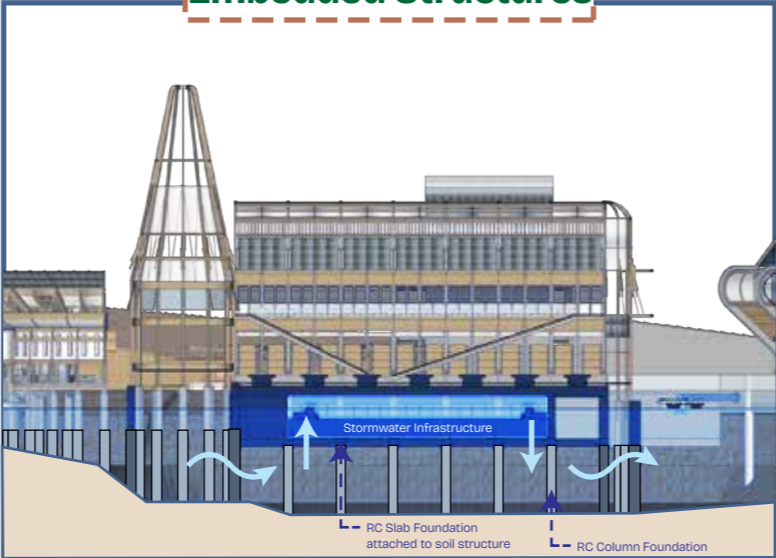


# Innovative solutions for Buoyancy

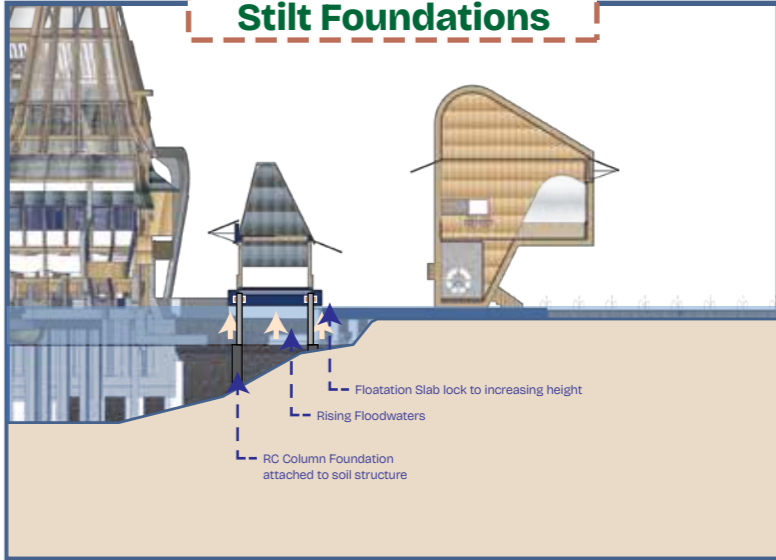
## Buoyant Raft Foundations



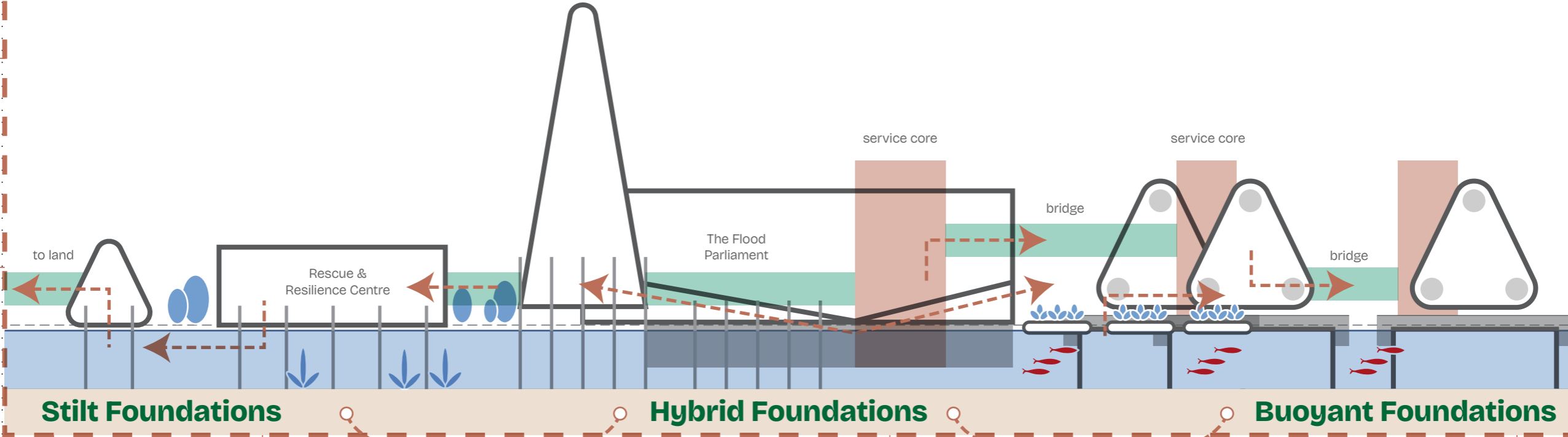
## Embedded Structures



## Buoyant Stilt Foundations



## Journey through Buoyancy

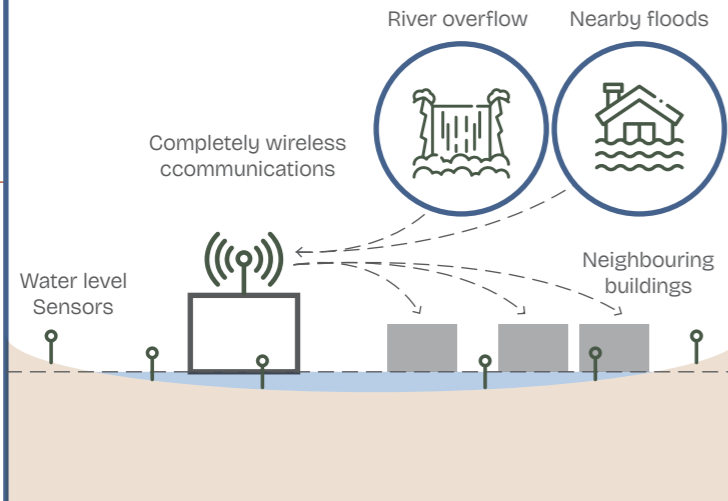


## Telecommunications

To provide all-time communication especially regarding flood and water levels.

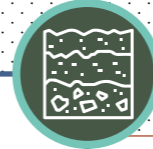


### Flood alert systems

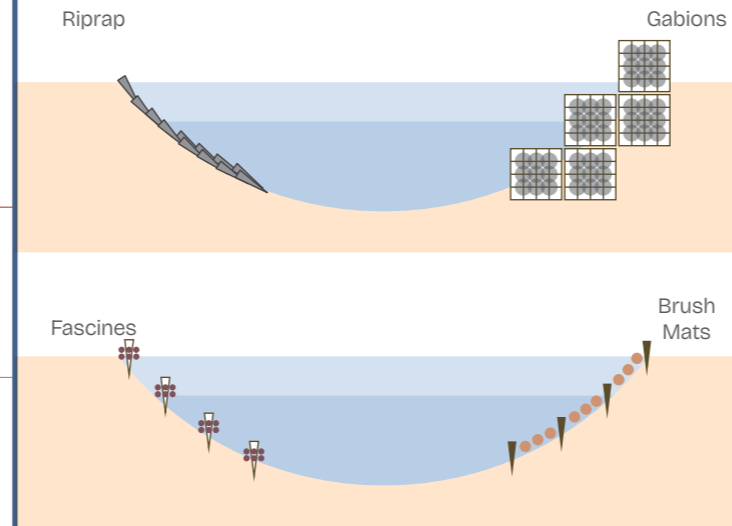


## Soil erosion control

To maintain the integrity of the soil banks at the perimeter of the lake



### Soil Bioengineering

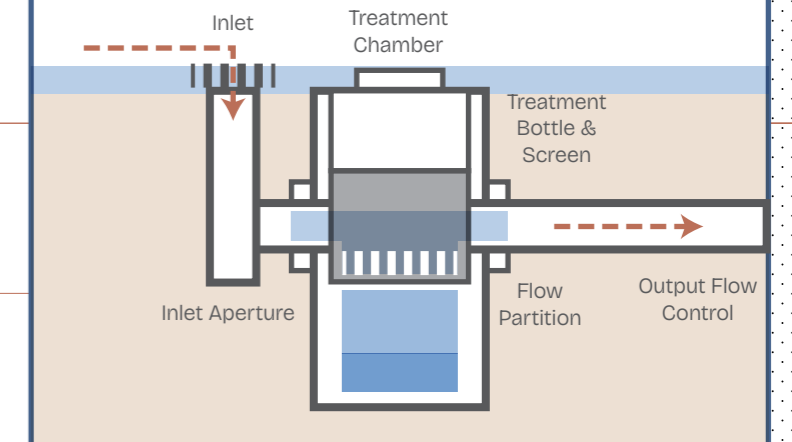


## Waste filtration

To prevent influx of external rubbish and waste into the site.



### Gross Pollutant Trap

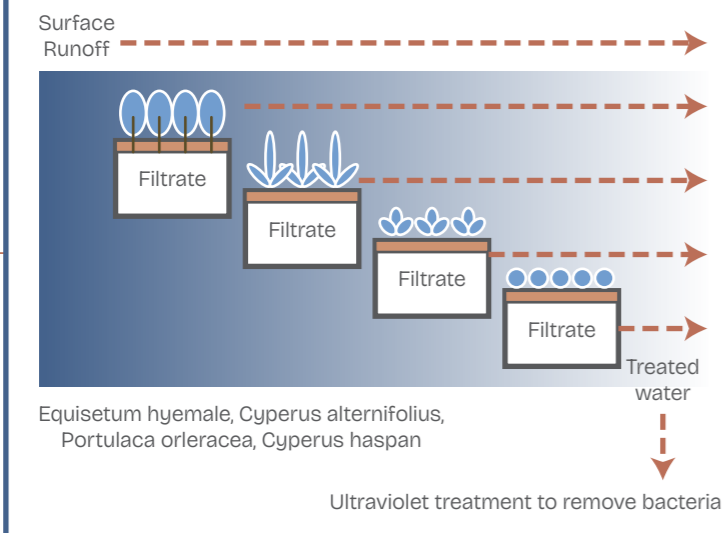


## Water Supply

To continuously supply non-potable water from repurposing stormwater and maintain clean water for the lake.



### Cleansing Biotope

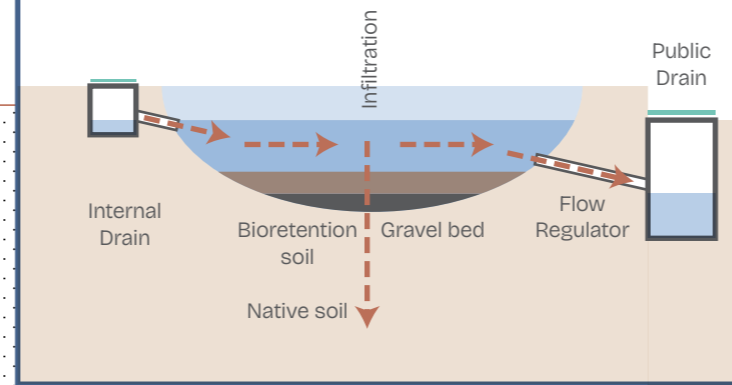


## Sewage works

To provide a self-sustaining osd tank for sewage purposes on the site itself



### Self-sustaining On-Site Detention Tank (OSD)

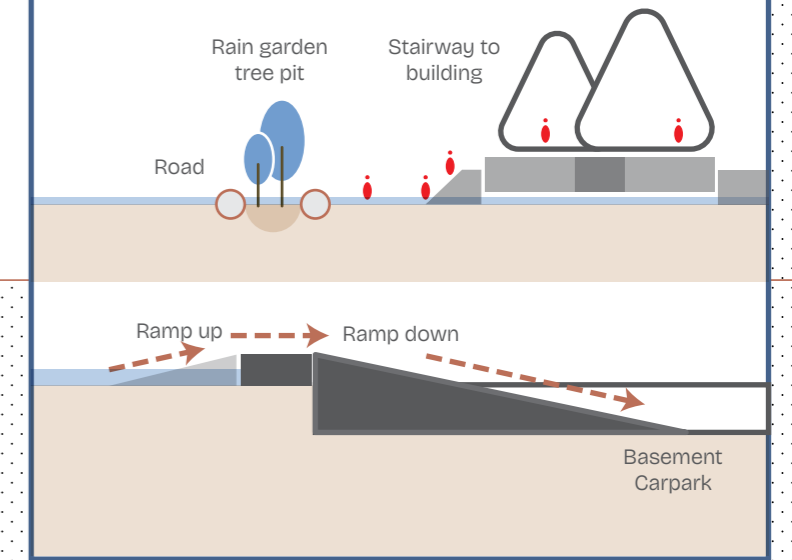


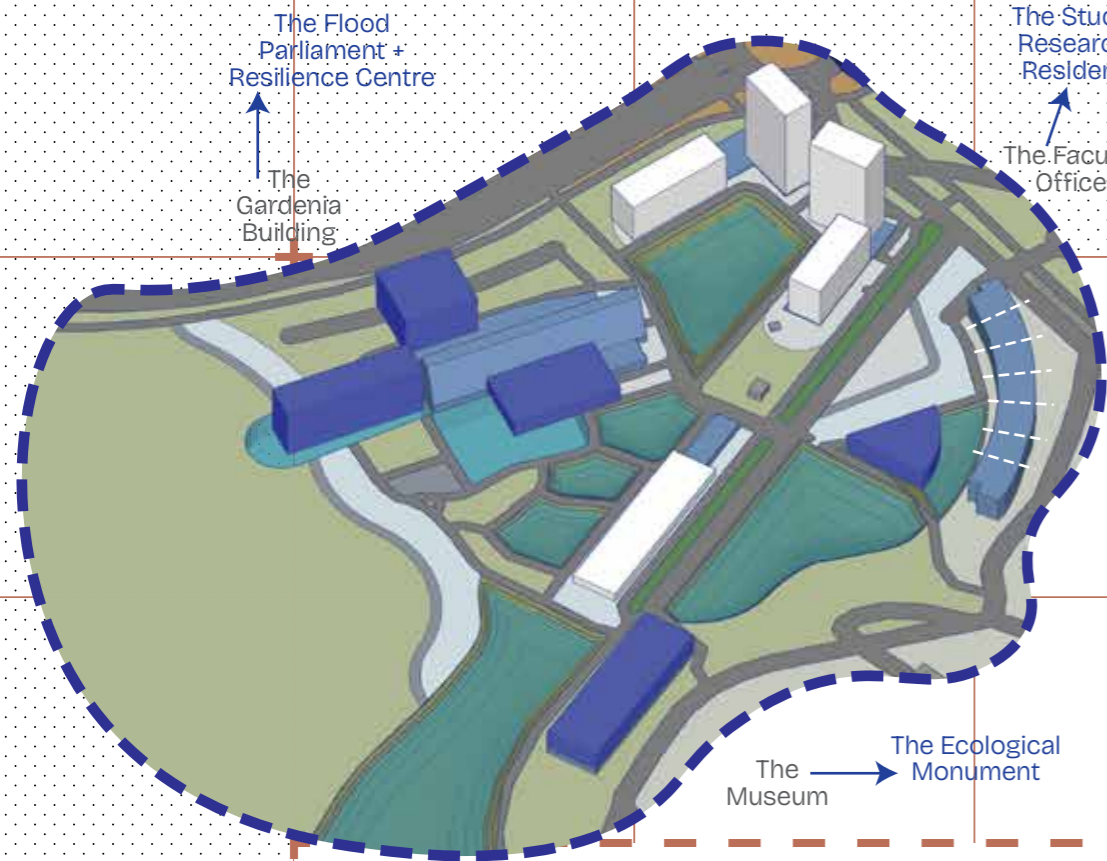
## Basement sealing

To seal off the basement carpark and infrastructure in case of flooding



### Ground elevation

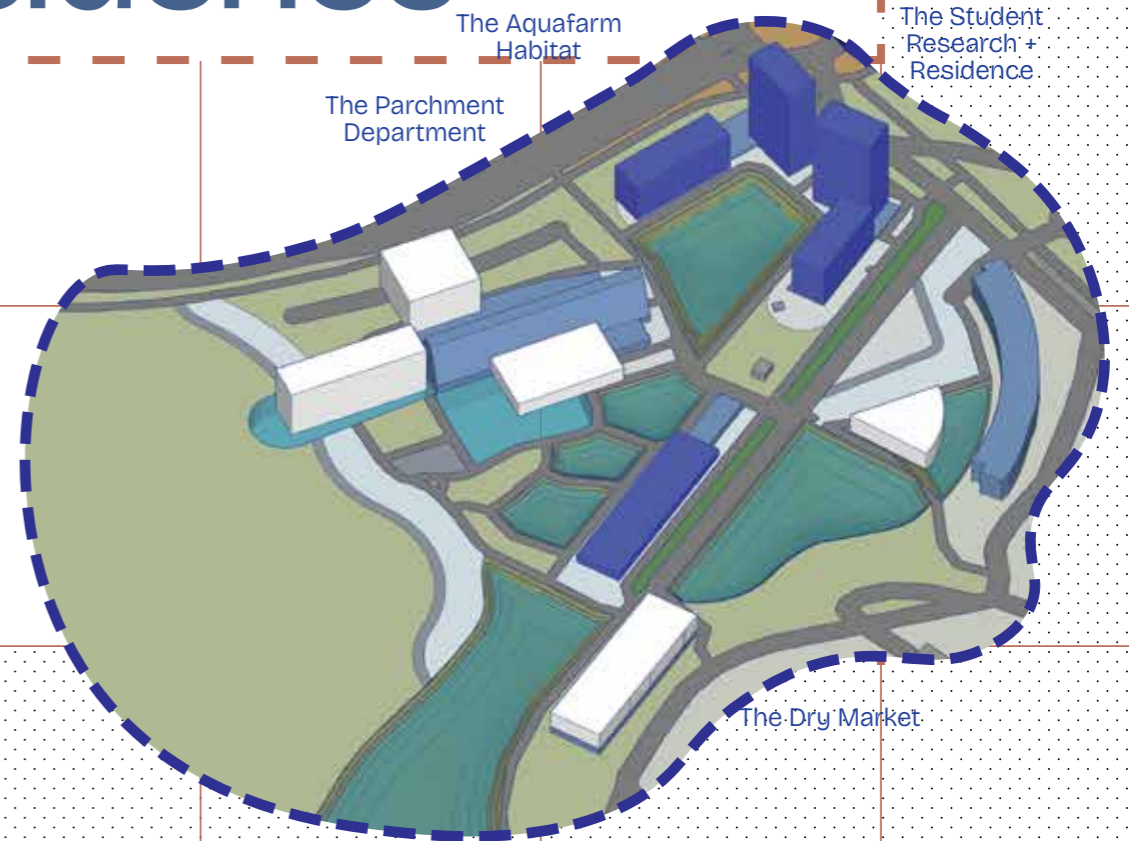




**RENOVATION**

# The Student Residence

**NEW  
CONSTRUCTION**



## Urban Nomads

Residential design concept



Finland's first settlers, during the first millennium BC, included the Saami, a nomadic people inhabiting the north, and the Tavastians from central Europe. They spoke a language belonging to the Finno-Ugric group, completely different from the Indo-European languages spoken elsewhere in Europe.

# The Nomadic Nature

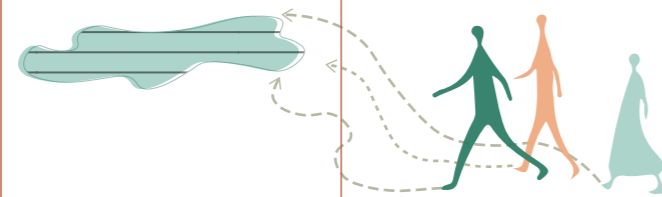
## 'Nomad'

A non-native person who travels to and resides in a place due to its proximity to resources and opportunities. Historically, nomads reside in the oasis for food and water. In the urban context, this is translated into jobs, education, religious intentions and artistic belonging.

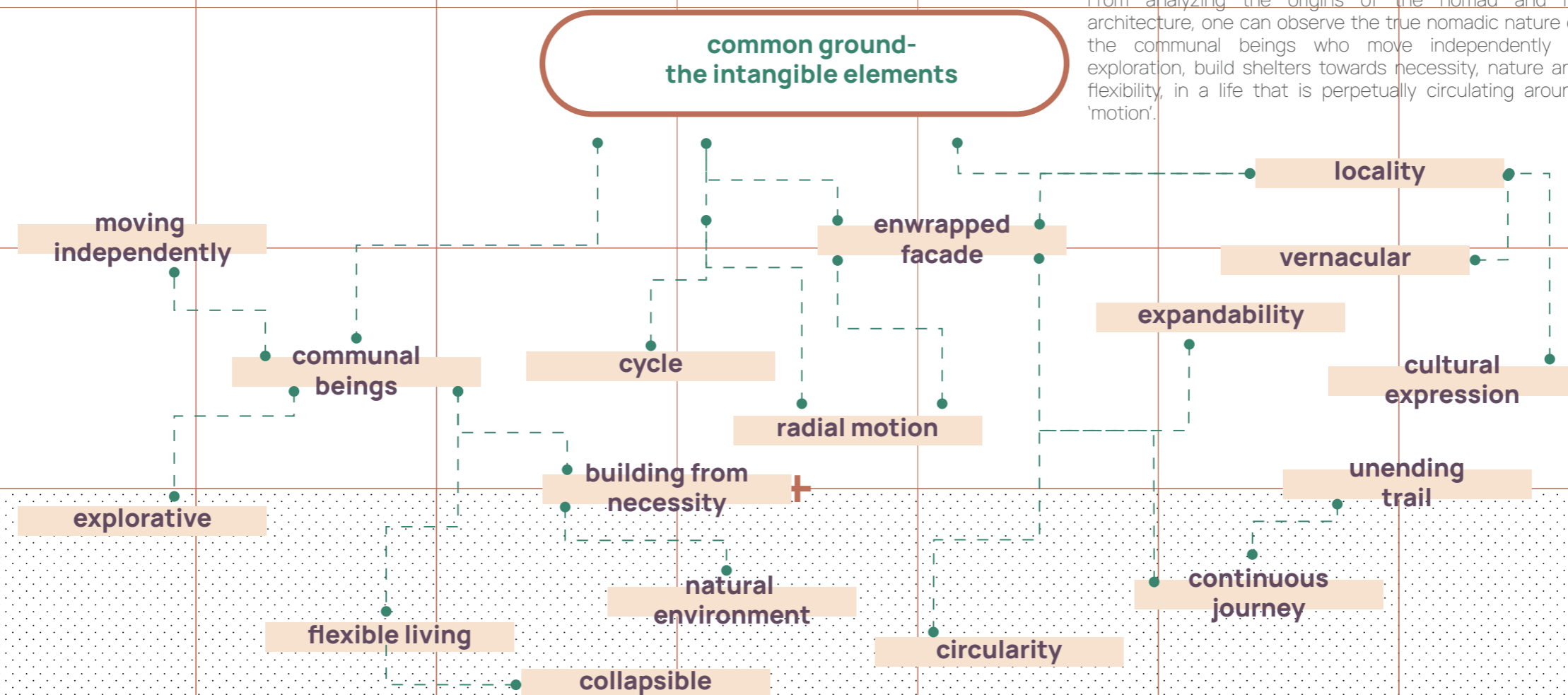
## Redefine 'Dwelling'



The student as an urban nomad travels to and fro its place of rest and place of routine in a continuous daily cycle.



From analyzing the origins of the nomad and its architecture, one can observe the true nomadic nature of the communal beings who move independently in exploration, build shelters towards necessity, nature and flexibility, in a life that is perpetually circulating around 'motion'.



# Urban Nomads

Residential design concept

# An Image of Motions

architectural vision

an unending journey

a paradigm shift

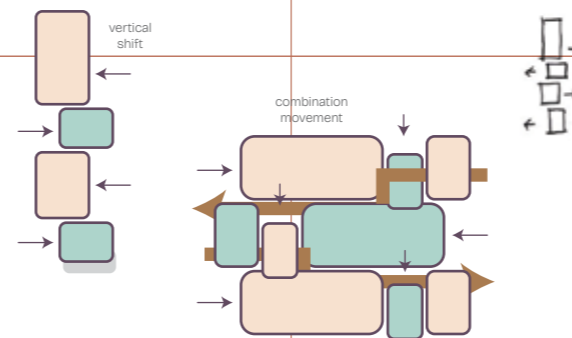
everchanging

traversing throughout

01

## shift

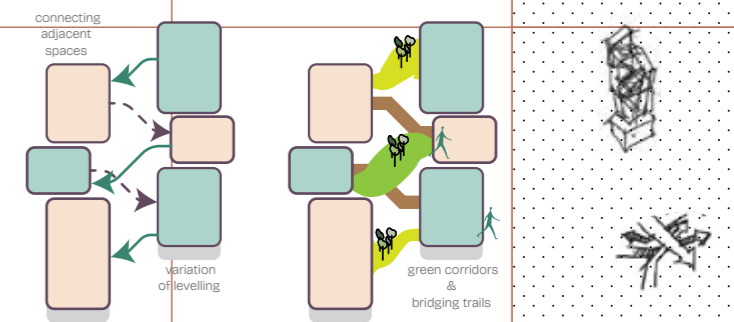
transposing the massing temporarily to demonstrate a shift in weight, space and volume, crafting a disparate experience for the nomad on the move.



02

## connect

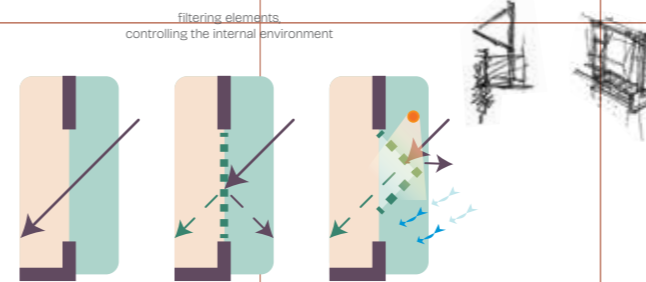
creating circulations and intersections that allow spaces to merge and collide, to facilitate sharing and community building.



03

## respond

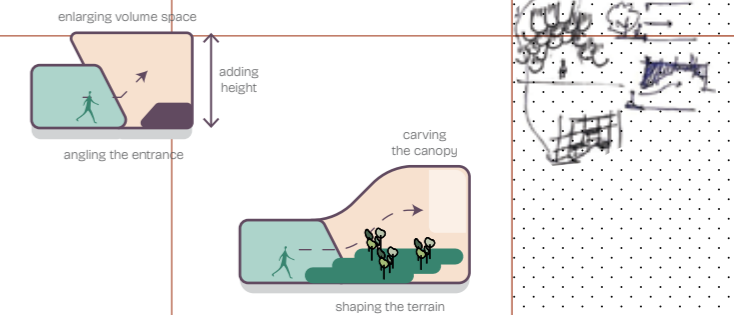
shaping the exterior building skin and form that is responsive towards external elements of weather and site activities



04

## transition

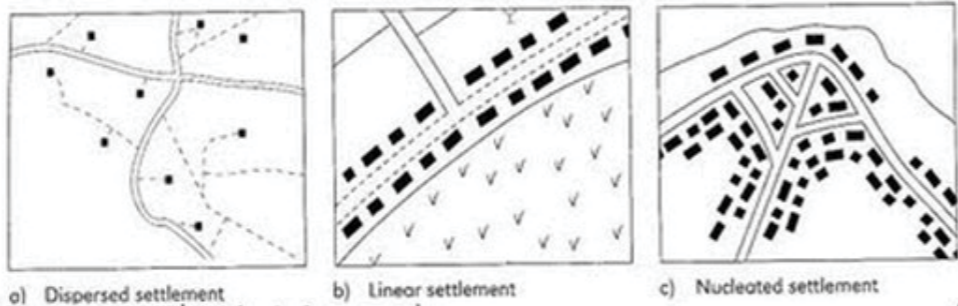
an attempt to create buffer and transitional spaces that soften the passage from public to private spaces or from the city to the nomadic haven.



# Urban Nomads

Residential design concept

# Sporadic Settlement



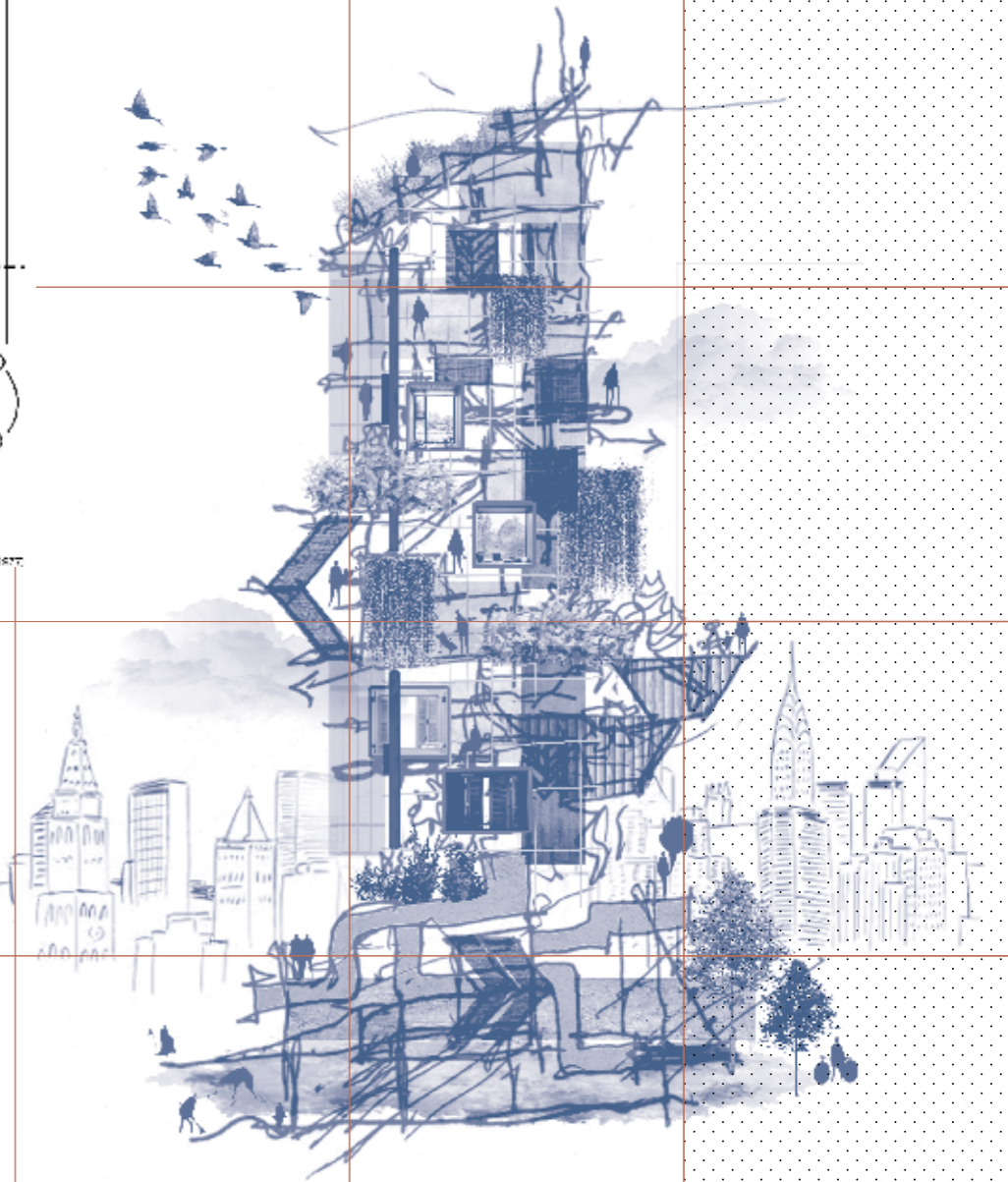
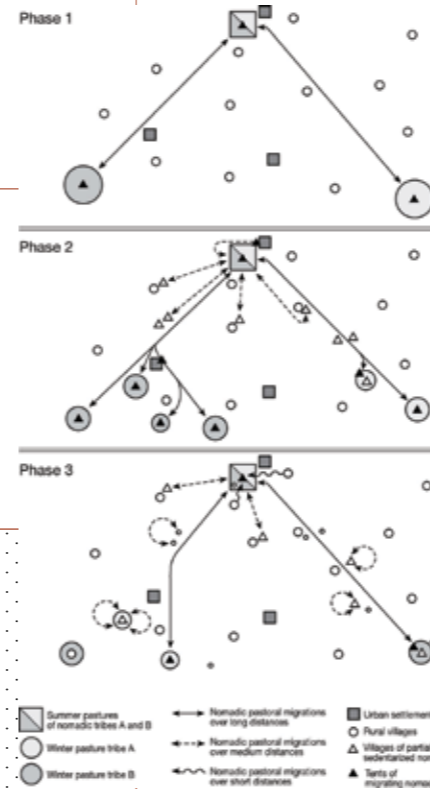
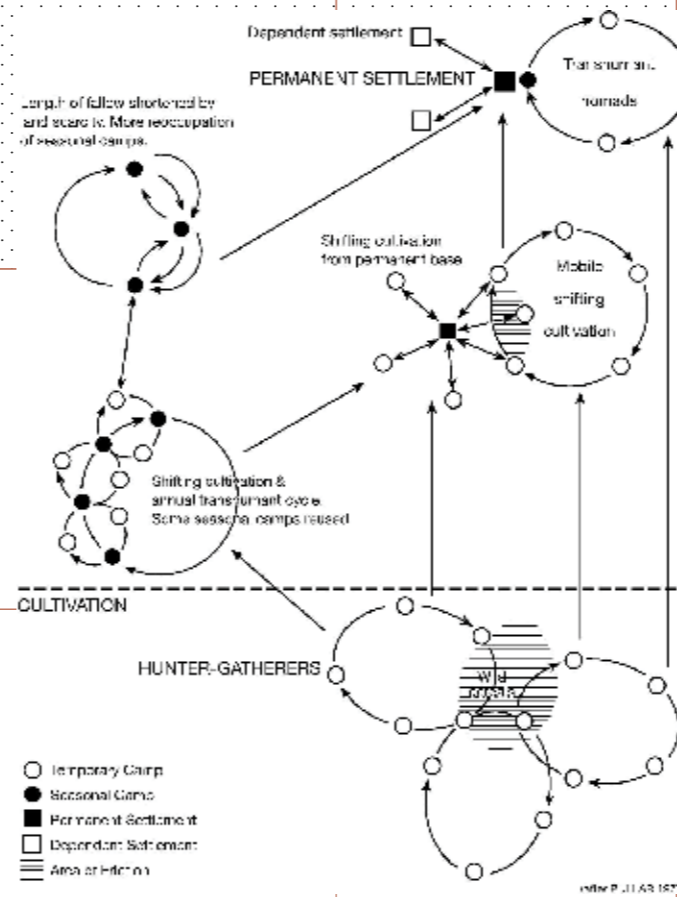
Dispersion



Seasonal movement



Impermanence



# Urban Nomads

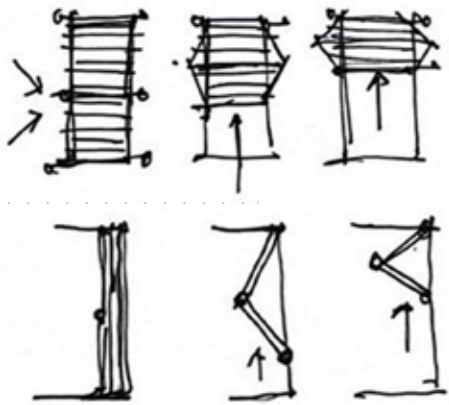
Residential design concept

# Unfolding Expandability

## Foldable Fenestration

### Unfolding Mechanism

Injecting a more efficient architectural solution to the time-consuming rolling blinds, to adapt to the practical needs of the urban nomad.

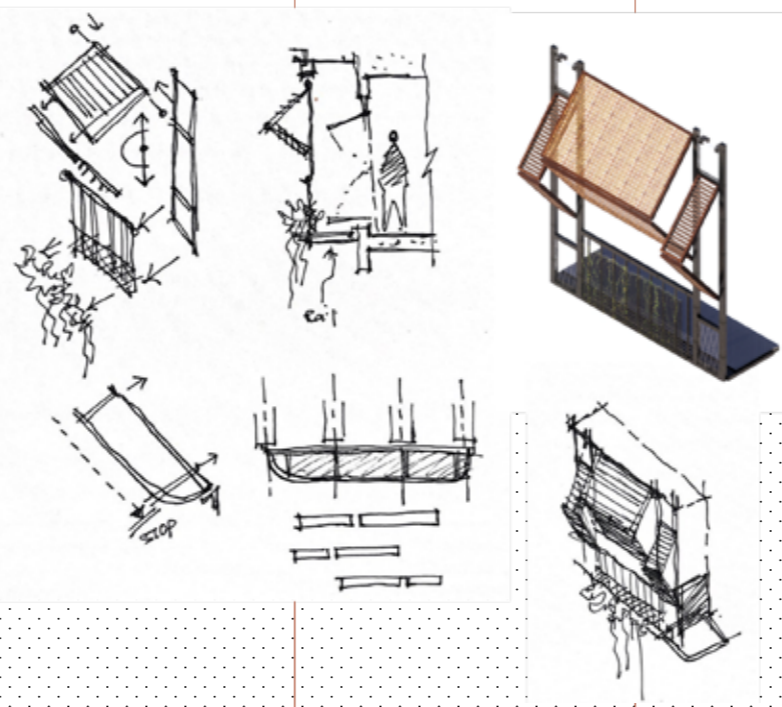


## Mobile Structures

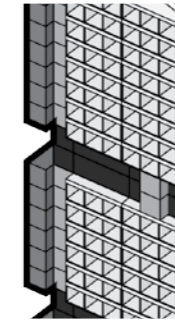
### Shifting Balconies

- Flexible Shading and Mobility

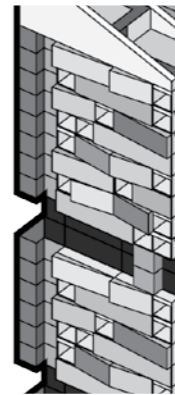
Prototype modular units of movable balconies along a track or rail that runs with the length of the residential unit to allow flexible shading and mobility.



## Expandable Living



Residential units aligned to the regular 2.8m grid in uniform manner.



Extending and expanding the units inward, outward, horizontally and vertically to the needs of the Urban Nomad.



Filling in the gaps and open spaces with green communal passages and pockets for The Urban Nomad.

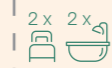


# Urban Nomads Residential design concept

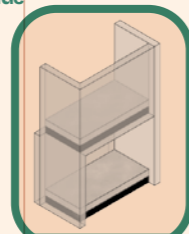
## Type 03 The Hollow

An extensive and open corner unit that unfolds to panoramic views all around, enabling the urban nomad to live on the edge with multiple other residents.

User Capacity  
2 pax



\* Self-tinting glass facade



Double decker bunk

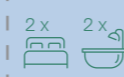


Elevator balcony

## Type 02 The Commune-able

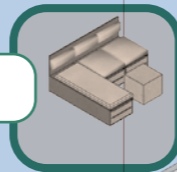
A comfortably sized residence for the social-loving urban nomad, suitable for families and friend groups.

User Capacity  
2-3 pax



Foldable partitions

Multi-storage furniture



Construction Beams



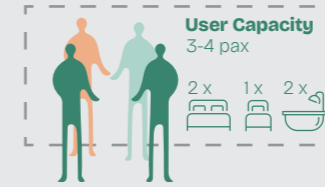
Shifting Balcony

Interplantation

Rotation Extendable Balcony

Modular Hempcrete Exterior Wall Panel

Modular Hempcrete Exterior Wall Panel



## Type 04 The Ridge

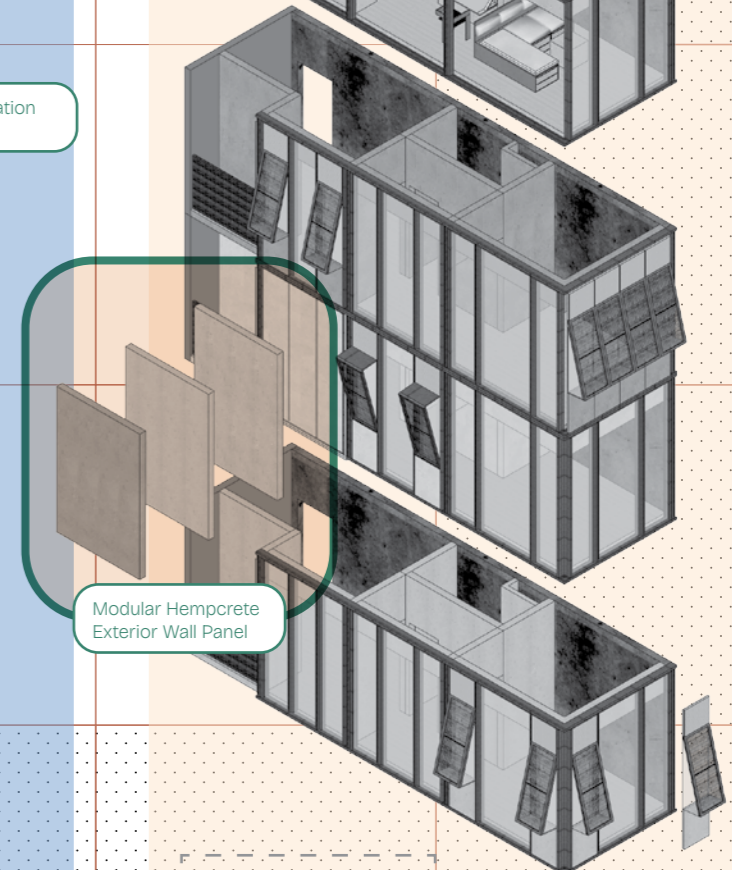
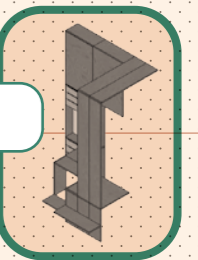
A relatively small studio residence that can fit 1-2 persons for the urban nomad that is inclined to solitary living and personal space.

User Capacity  
1 pax



\* Self-tinting glass facade

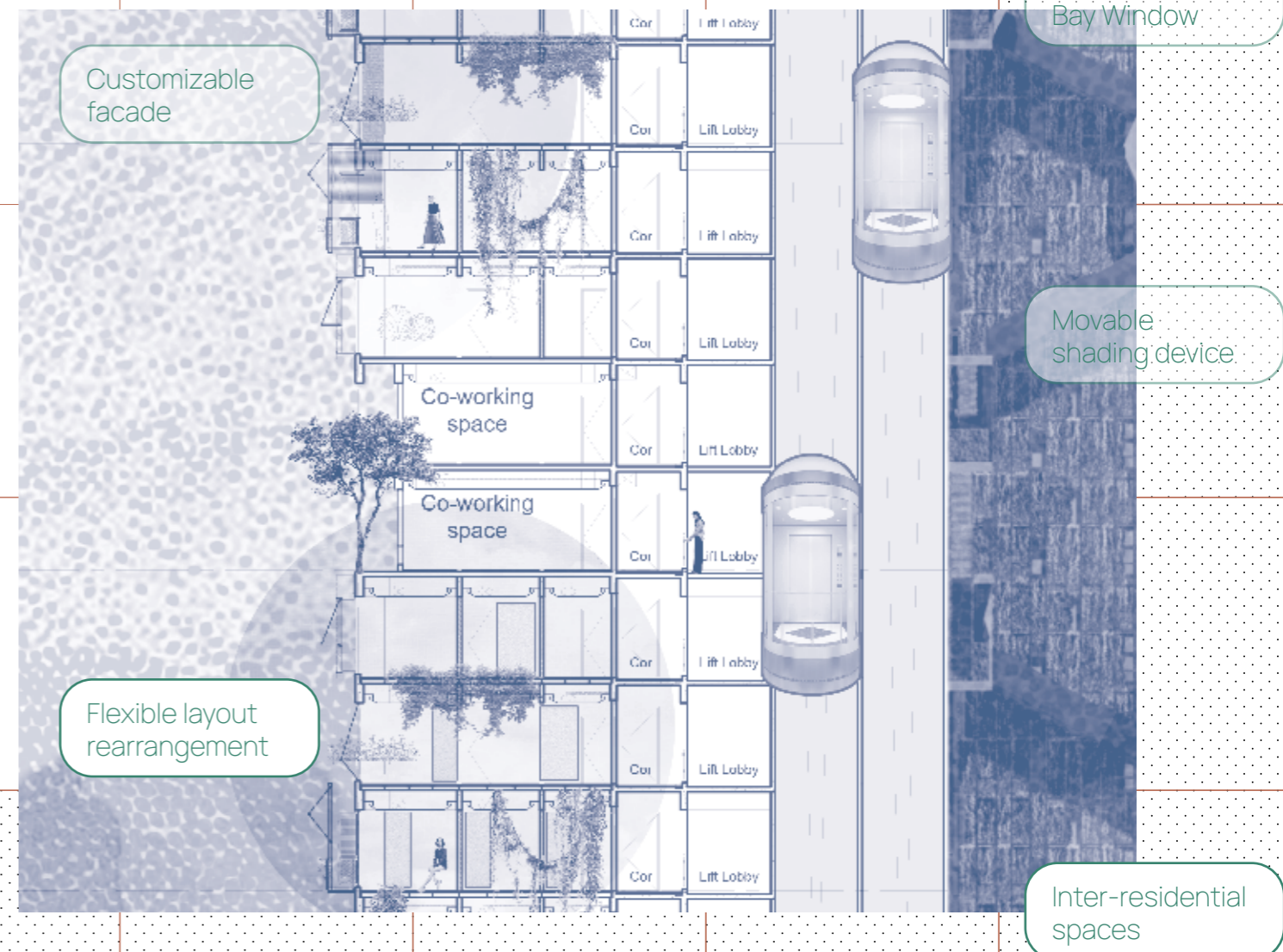
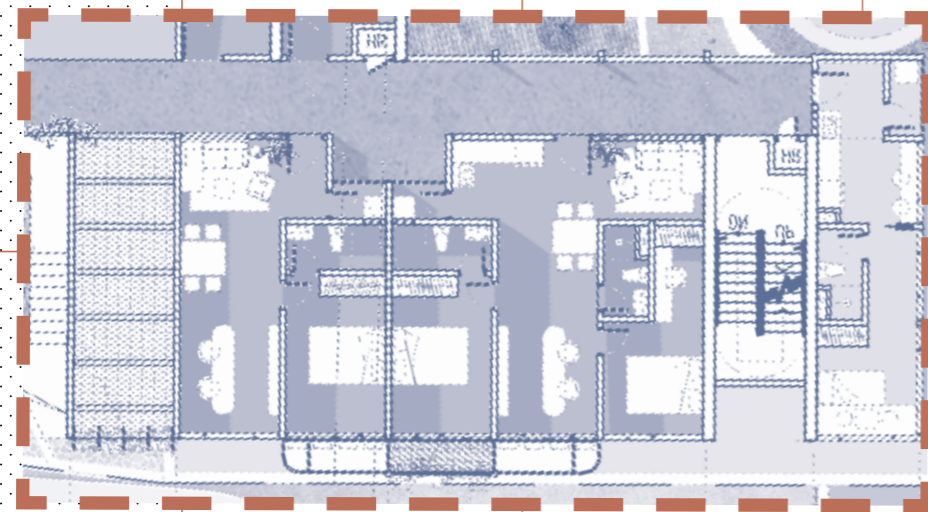
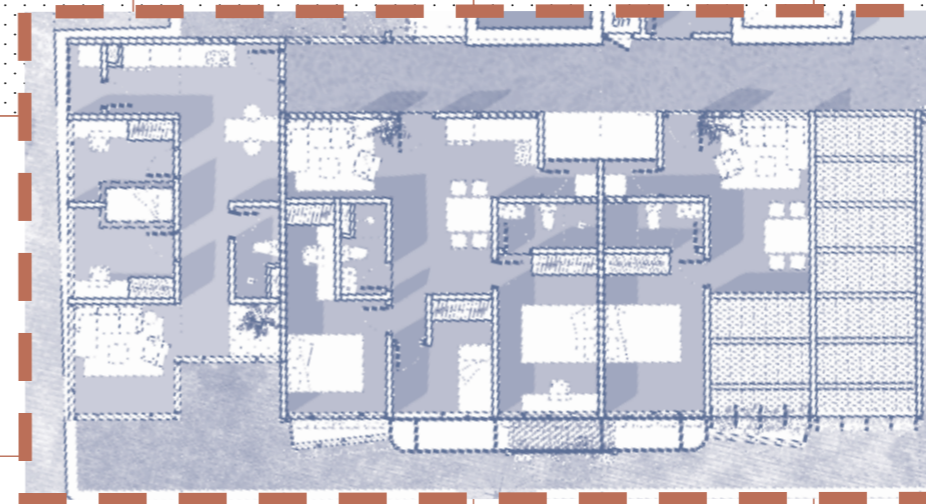
Multifold component



# Urban Nomads

Residential design concept

## Variational Diagrams



# Urban Nomads

Residential design concept

## Flexibility of living space: The Hollow

# Customized living, Flexible moving

allowance to transform the architectural features of living spaces

550 sqft  
x1



\*Detachable shading devices

1100 sqft  
x2

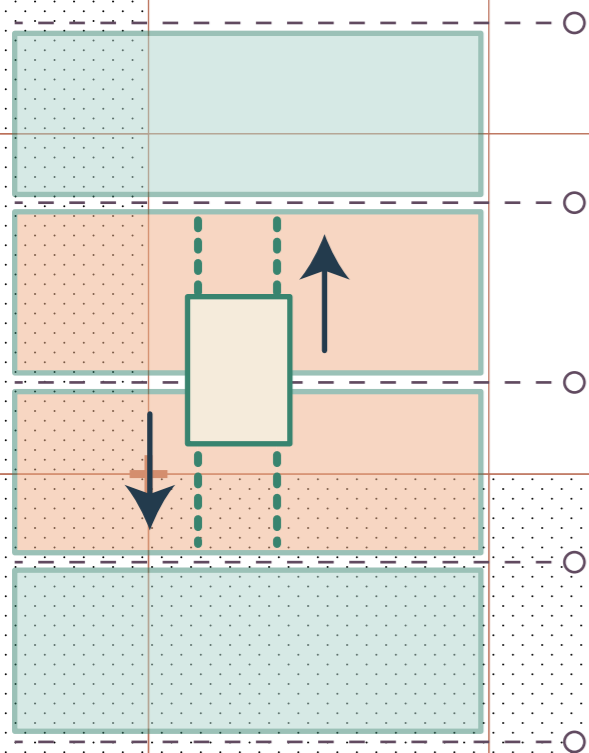


\*Shifting balcony elevator

## The Ridge/ Hollow

## The Ridge

A full unit



An extended unit

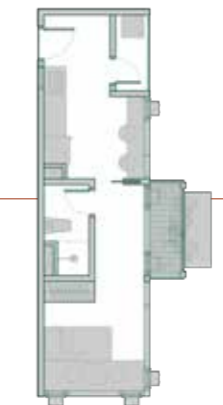


300 sqft  
x1



\*Detachable shading devices

600 sqft  
x2



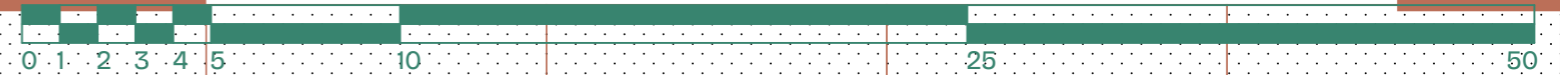
\*Shifting balcony elevator

Looking into each residential unit, the place of living for The Urban Nomad is designed to extend the function of conventional bedrooms and living areas into multi-purpose communal chambers that are bridged together by a facade system of movable balconies. Characterized by the expandability and collapsibility of movable architecture, the facade of the residence unfolds to the external environment while also allowing The Urban Nomad to 'shift' through spaces, hence collectively creating the skin of the towers that is porous yet versatile.

A full unit

# Urban Nomads

Residential design concept



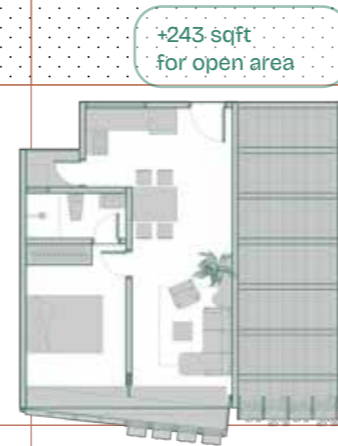
SCALE 1:200

## Flexibility of living space:

### The Commune-able



01 452 sqft



01 695 sqft



EXTEND! →

02 569 sqft



02 695 sqft



← EXTEND!

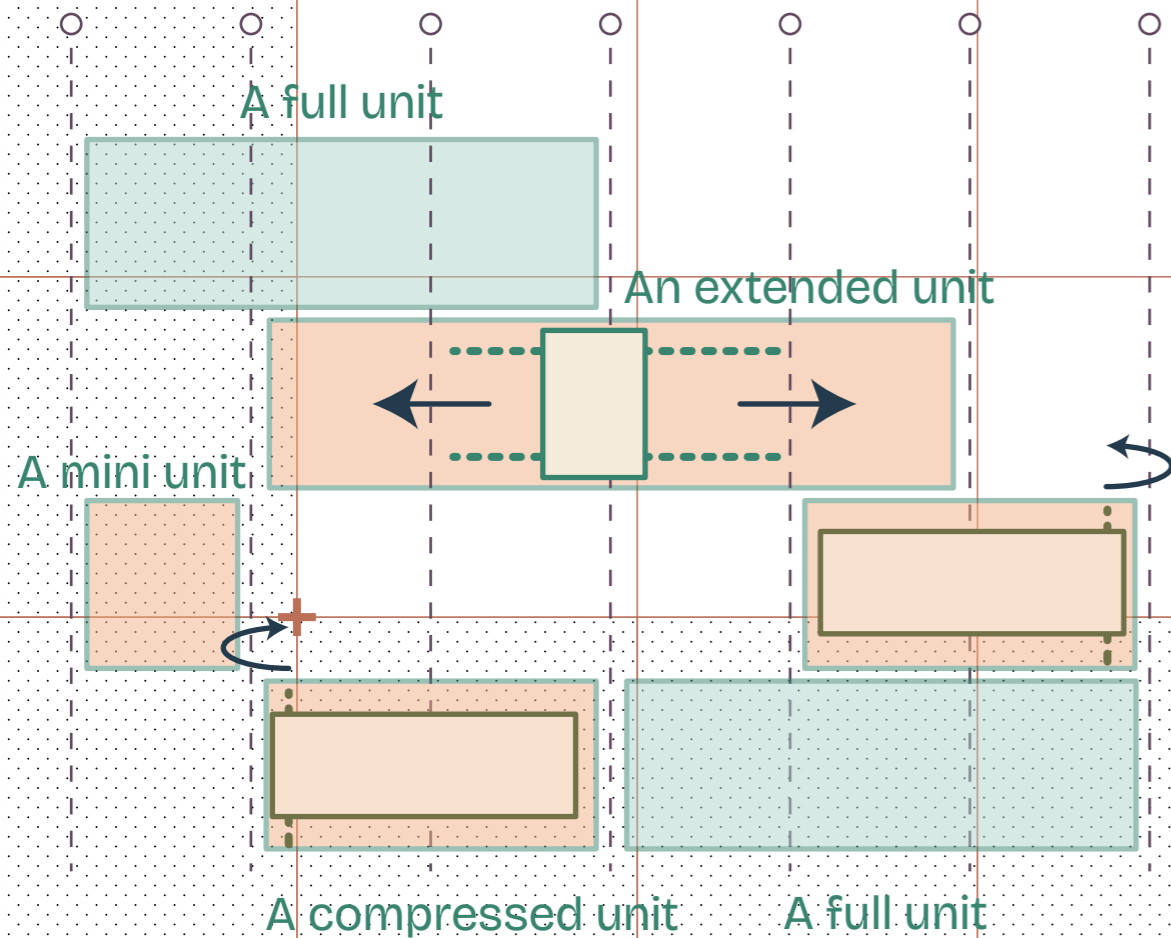
\*Shifting balcony track

+ 222 sqft

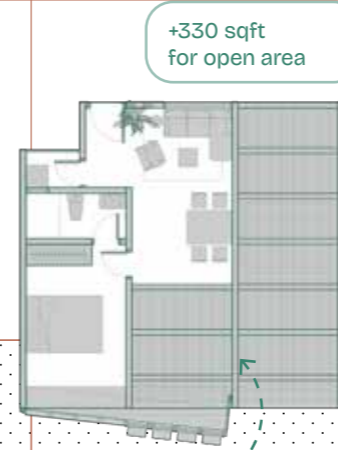
+ 465 sqft

+ 695 sqft

### EXPAND OUTWARD



03 365 sqft



\*Rotation Extendable balcony

### EXPAND INWARD

Each residential unit is designed with the allowance to expand inward, outward, vertically and horizontally allowing the Urban Nomad to choose how much space to occupy/enclose/expose and the general arrangement of the layout only restricted to the provided floor beams.

Besides, the Urban Nomad can customise the facade of the living space in terms of shading, visibility, shading, and accessibility into the external mobile balconies.

# Ground Floor Plan

Viikki - The Edu-Buoyancy

**The Buoyant Urban Nomads**  
new student residences

**Viikki - The Edu-Buoyancy**  
renewed living campus for nature

The Aquafarm Habitat

The Dry Market

Resilience & Rescue Centre (R&R)

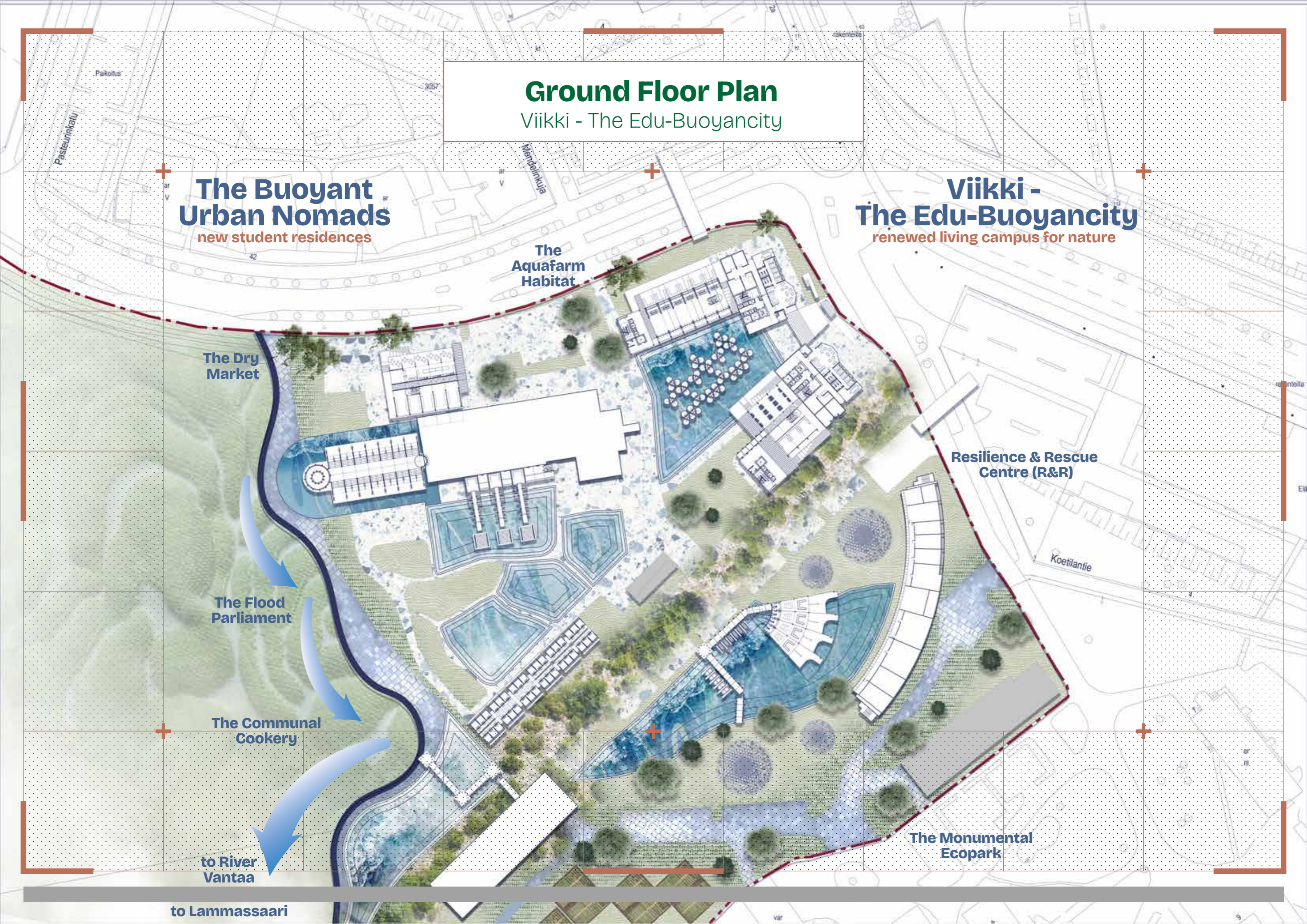
The Flood Parliament

The Communal Cookery

to River Vantaa

The Monumental Ecopark

to Lamassaari



# Typical Residential Plan

## Viikki - The Edu-Buoyancy

- + Connecting to existing winery functions
- + Introducing new water source



water purification

gardenia building



nature research + living

old student dormitory

- + Connecting to existing residential functions
- + Introducing new landscape features
- + Incorporating communal research and farming activities

old faculty office



- + Merging faculty rooms to 2 dorm rooms to a bathroom
- + Reusing the old internal wall structures
- + Reinstallation of residential facade and openings

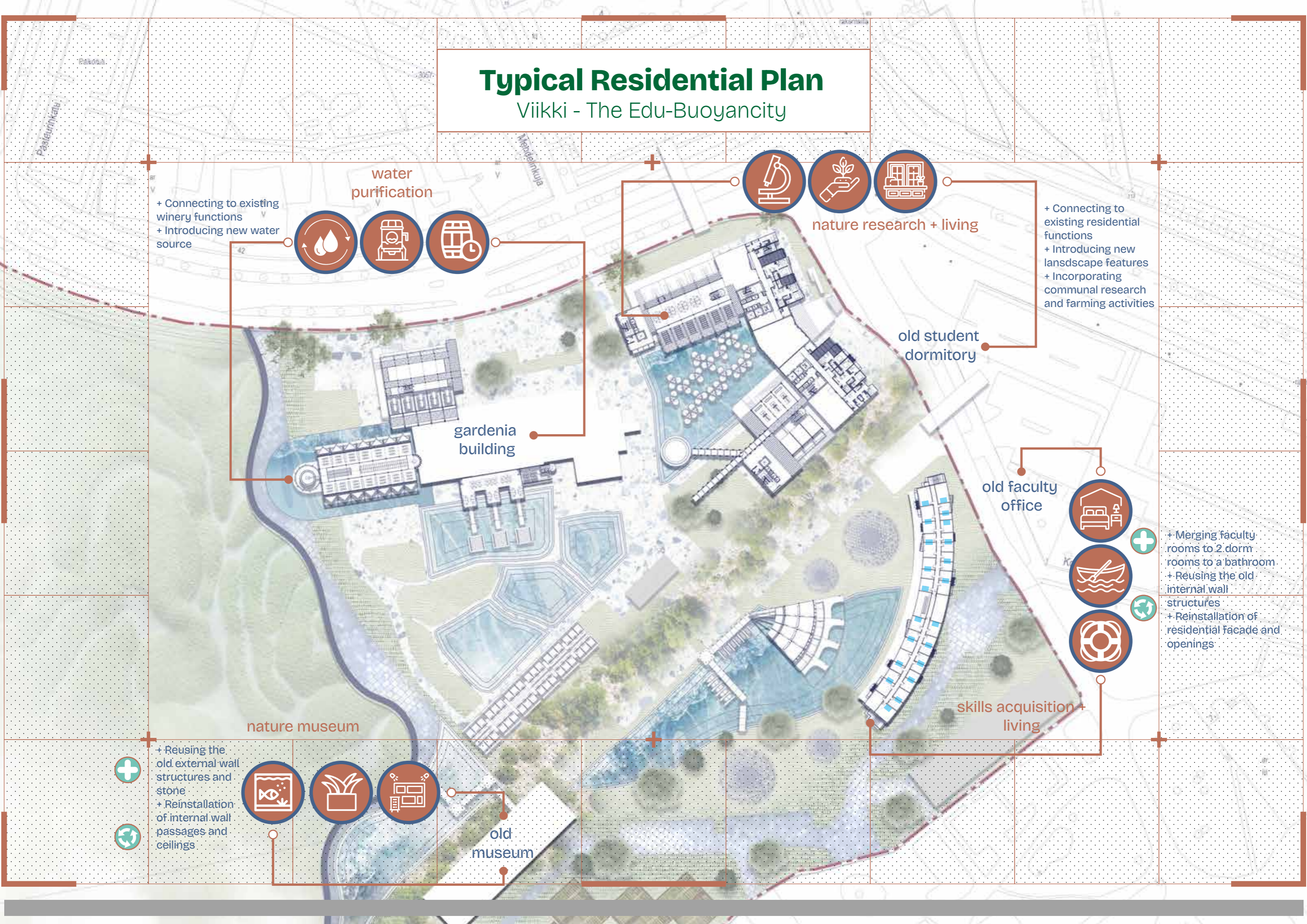
nature museum

- + Reusing the old external wall structures and stone
- + Reinstallation of internal wall passages and ceilings



old museum

skills acquisition + living



# Facade Design

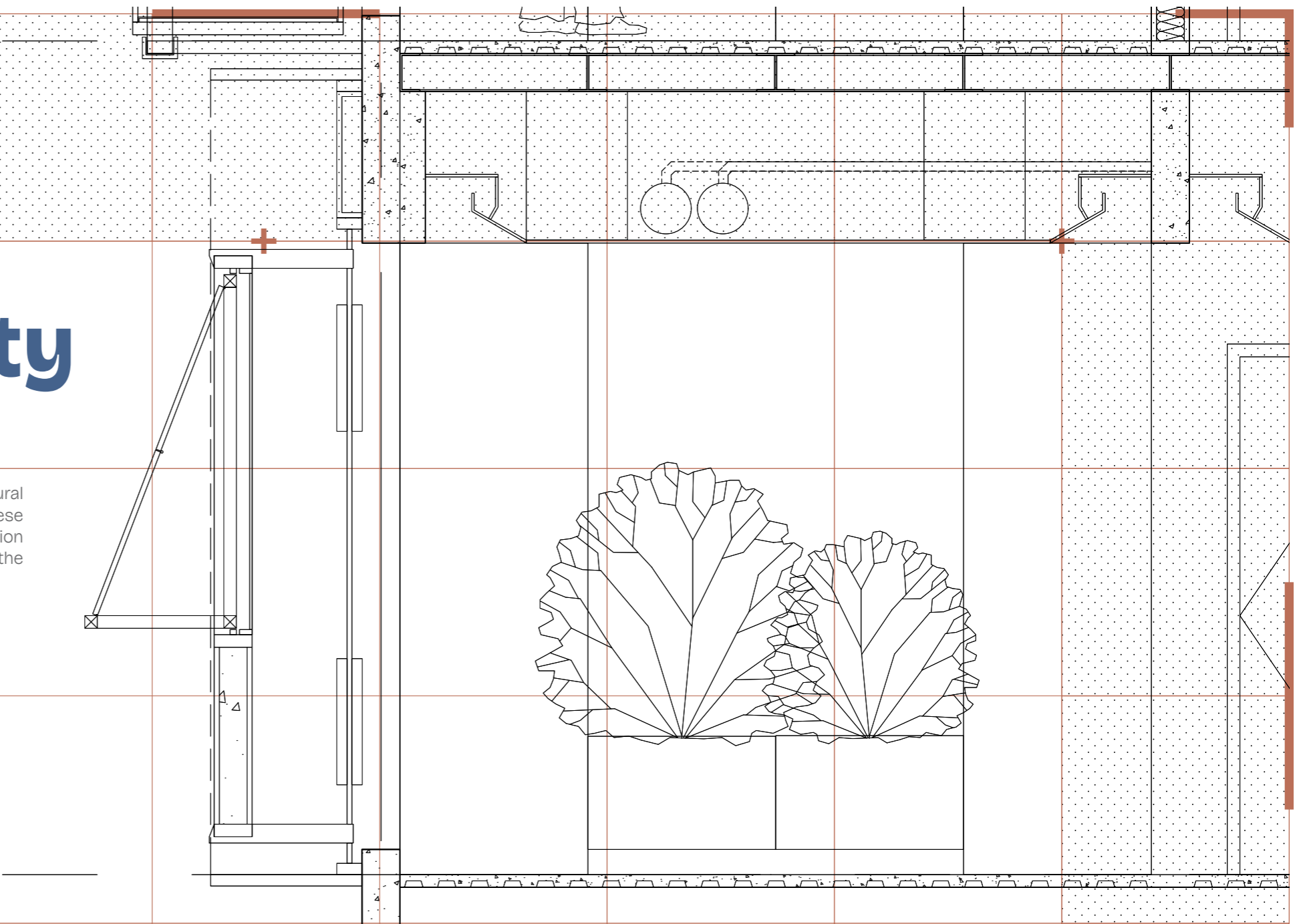
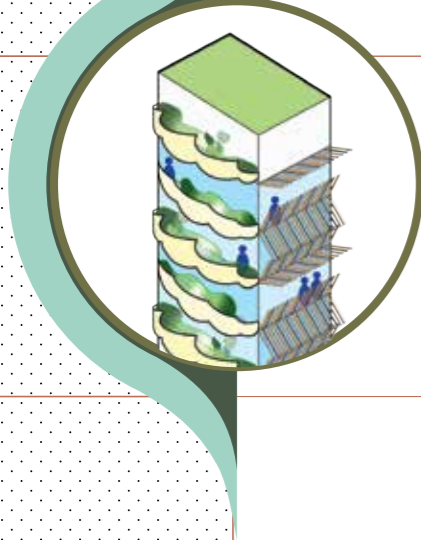
## Climatic response

### 02 | Technology

# Materiality

## of Building Elements

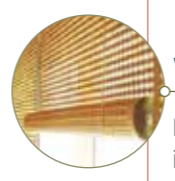
The façade of the building is designed with natural materials with high resistance and durability. These materials also have great sound and heat insulation properties which filter the negative elements of the city in which the site is located.



EXAMPLE OTTV CALCULATION 3 STOREY BUILDING

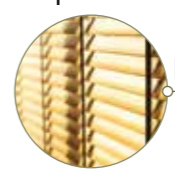
| Component                       | Facade Orientation | Elevation   | Facade Area (m <sup>2</sup> ) | Wall Area (m <sup>2</sup> ) | Window Area (m <sup>2</sup> ) | Constant | ρ (Absorptivity of wall/roof) | U-Value (K) | CF   | SC     | WWR  | 1-WWR | OTTV     | Heat Conduction (W) | OTTV % |            |                        |
|---------------------------------|--------------------|---|-------------------------------|-----------------------------|-------------------------------|----------|-------------------------------|-------------|------|--------|------|-------|----------|---------------------|--------|------------|------------------------|
| Heat Conduction Through Walls   | East               | 250mm Reinforced Concrete Wall with grey painted wall | 528.00                        | 0                           | 528.00                        | 15       | 0.65                          | 0.07        | 1.23 | N/A    | 1.00 | 0.00  | 0.00     | 0.00                | 0.55%  |            |                        |
|                                 | West               | 250mm Reinforced Concrete Wall with grey painted wall | 1505                          | 684                         | 820.00                        | 15       | 0.65                          | 0.07        | 0.94 | N/A    | 0.54 | 0.46  | 0.31     | 467.51              |        |            |                        |
|                                 | South              | 250mm Reinforced Concrete Wall with grey painted wall | 1505                          | 684                         | 820.00                        | 15       | 0.65                          | 0.07        | 0.92 | N/A    | 0.54 | 0.46  | 0.31     | 467.51              |        |            |                        |
|                                 | North              | 250mm Reinforced Concrete Wall with grey painted wall | 528.00                        | 0                           | 528.00                        | 15       | 0.65                          | 0.07        | 0.90 | N/A    | 1.00 | 0.00  | 0.00     | 0.00                |        |            |                        |
| TOTAL WALL OTTV =               |                    |   | 1361 WWR @ 0.4                |                             |                               |          |                               |             |      |        |      |       |          |                     |        | 935.03     |                        |
| Heat Conduction Through Windows | East               | 4mm Laminated Glass with low-e coating                | 528.00                        | 0                           | 528.00                        | 6        | 0.3                           | 1.23        | N/A  | 1.00   | 1.80 | 1.80  | 1.80     | 950.40              | 9.27%  |            |                        |
|                                 | West               | Bamboo woven screen                                   | 1505                          | 684                         | 820.00                        | 6        | 1.4                           | 0.94        | N/A  | 0.54   | 4.58 | 4.58  | 6.888.00 |                     |        |            |                        |
|                                 | South              | Bamboo woven screen                                   | 1505                          | 684                         | 820.00                        | 6        | 1.4                           | 0.92        | N/A  | 0.54   | 4.58 | 4.58  | 6.888.00 |                     |        |            |                        |
|                                 | North              | 8mm Laminated Glass with Low-e coating                | 528.00                        | 0                           | 528.00                        | 6        | 0.3                           | 0.90        | N/A  | 1.00   | 1.80 | 1.80  | 950.40   |                     |        |            |                        |
| TOTAL WINDOW OTTV =             |                    |   | 1361 WWR @ 0.4                |                             |                               |          |                               |             |      |        |      |       |          |                     |        | 15,476.80  |                        |
| Heat Gain Through Windows       | East               | 8mm Laminated Glass with low-e coating                | 528.00                        | 0                           | 528.00                        | 194      | N/A                           | 0.3         | 1.23 | 0.33   | 1.00 |       | 78.74    | 45,577.25           | 90.17% |            |                        |
|                                 | West               | Bamboo woven screen                                   | 1505                          | 684                         | 820.00                        | 194      | N/A                           | 1.4         | 0.94 | 0.33   | 0.40 |       | 24.07    | 36,227.64           |        |            |                        |
|                                 | South              | Bamboo woven screen                                   | 1505                          | 684                         | 820.00                        | 194      | N/A                           | 1.4         | 0.92 | 0.33   | 0.73 |       | 43.00    | 64,708.73           |        |            |                        |
|                                 | North              | 4mm Laminated Glass with low-e coating                | 528.00                        | 0                           | 528.00                        | 194      | N/A                           | 0.3         | 0.90 | 0.4144 | 0.26 |       | 18.81    | 9,932.79            |        |            |                        |
| TOTAL WINDOW HEAT GAIN =        |                    |   | 1361 WWR @ 0.4                |                             |                               |          |                               |             |      |        |      |       |          |                     |        | 119,446.90 |                        |
| Total Wall Area =               |                    |   | 4066                          |                             |                               |          |                               |             |      |        |      |       |          |                     |        | 368,068.13 |                        |
|                                 |                    |   |                               |                             |                               |          |                               |             |      |        |      |       |          |                     |        | OTTV =     | 31.56 W/m <sup>2</sup> |

**OTTV VALUE:**  
41.58 W/m<sup>2</sup>  
Less than 50%,  
therefore considered  
efficient



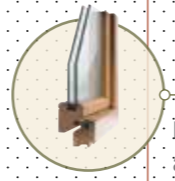
Woven Bamboo Screen

Bamboo screens allow natural light to waft its way into interior spaces quite well due to its woven and porous surface. This window covering option is made of natural materials without warping, fading or deteriorating.



Bamboo Louvers

Eco-friendly material and renewable resource, has natural antibacterial properties to improve the quality of indoor air. Being strong and dense, it acts as a good barrier against outside noise.



Reclaimed timber frame

Repurposed material that can act as a better insulator against heat, without rusting in high humidity environment.



Hempcrete Modular Wall Panel

Lightweight material (1/8 weight of regular concrete), has a negative footprint and environmentally friendly, mold resistant and moisture absorbing.

U-value: 1.4 W/m<sup>2</sup>K  
EE Value: 19 MJ/kg

U-value: 1.4 W/m<sup>2</sup>K  
EE Value: 19 MJ/kg

U-value: 0.7 W/m<sup>2</sup>K  
EE Value: 10 MJ/kg

U-value: 0.07 W/m<sup>2</sup>K  
EE Value: 1.9 MJ/kg

# Facade Design

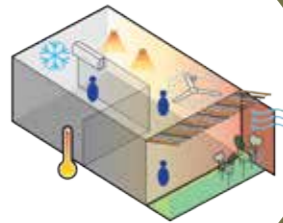
Climatic response

## 02 | Technology

# Daylighting

### building technologies

The student residence is recognized for its sustainable features that constitute the ability to exist and thrive resiliently on its own.

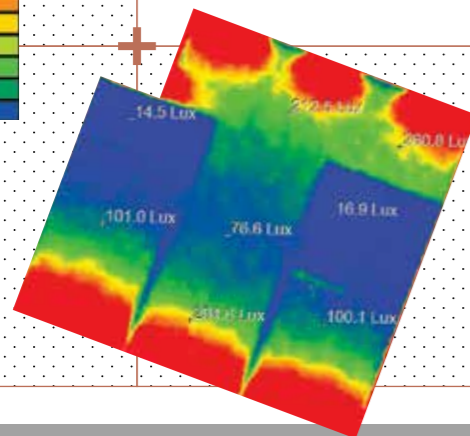
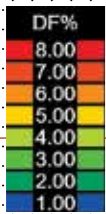
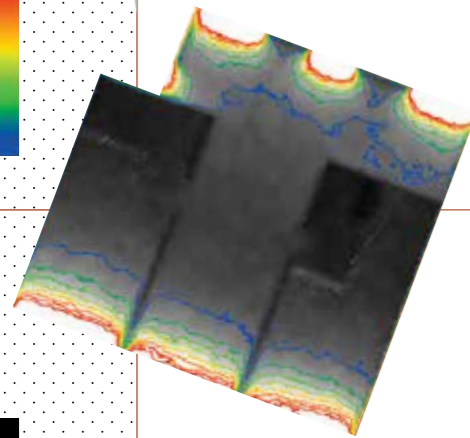
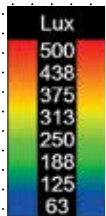
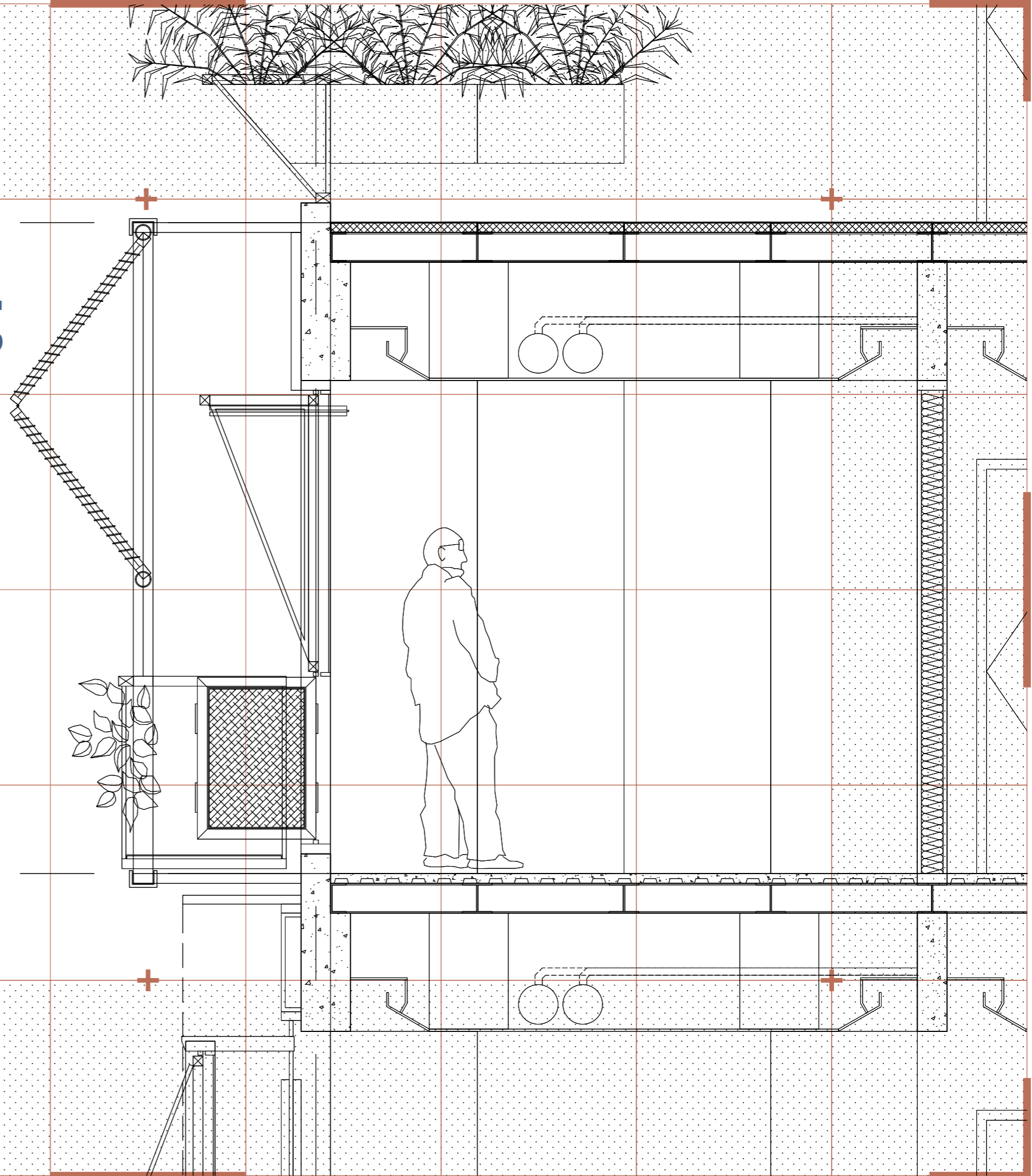


## 01 | Daylight factor

Each unit is designed to have ample daylight from both its front-facing facade and corridor-facing entrance.

## 02 | Illuminance

Since there is plenty of allowance for daylight, illuminance value is high as well showing that solar radiation may affect the indoor thermal comfort. Therefore flexible modular shading devices are applied.



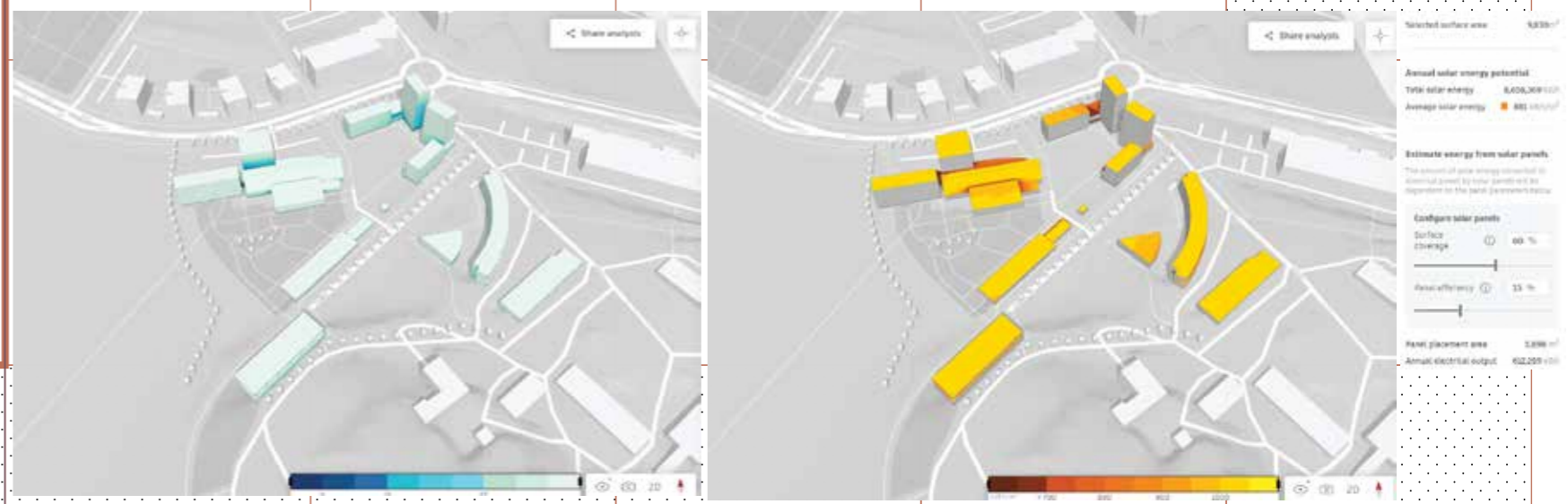
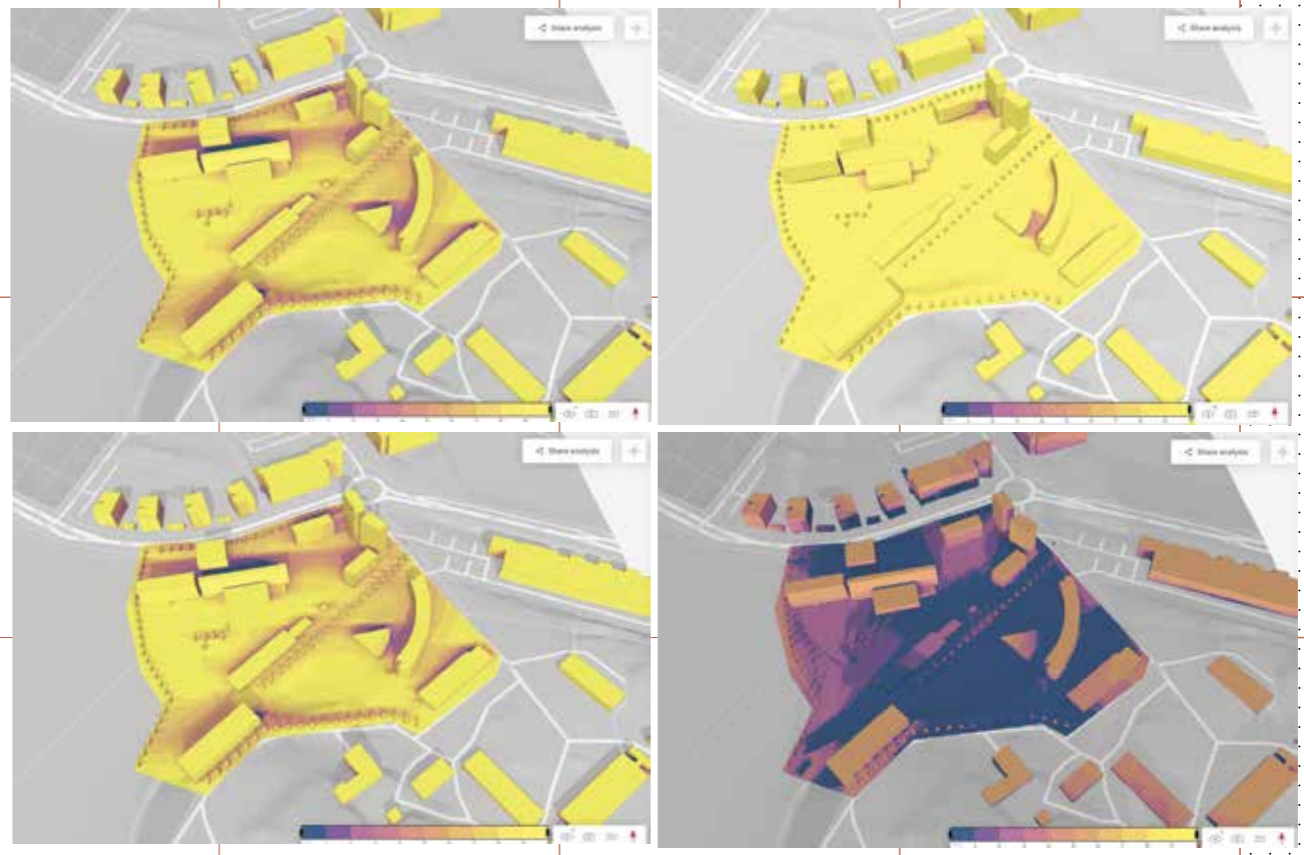
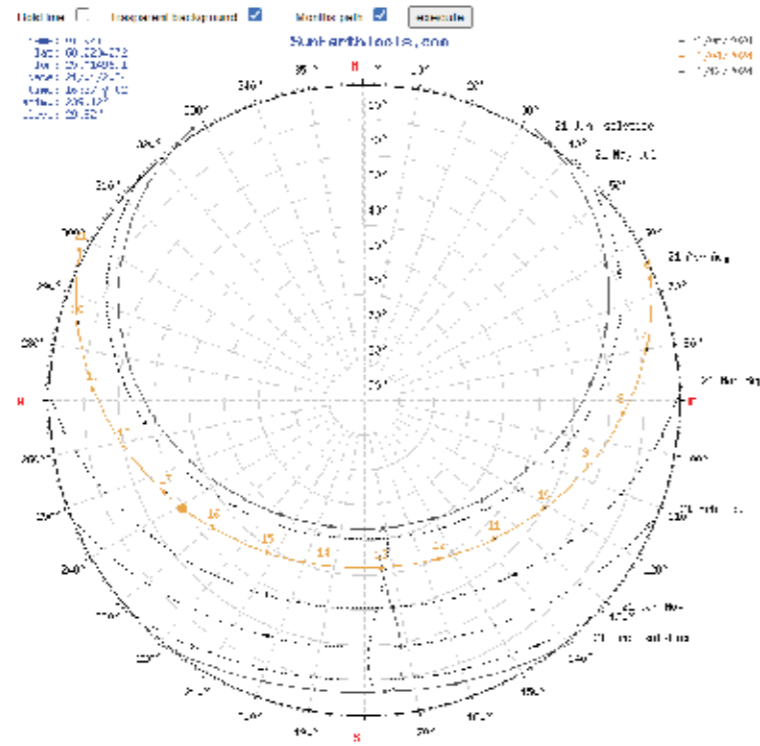
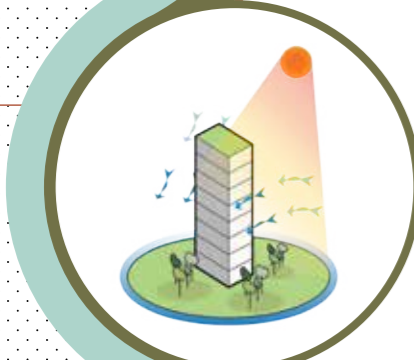
# Sunpath and shadow studies

Climatic response

01 | Site Context

## Sun Hours

Daylight and Solar Opportunity



# Wind and Ventilation

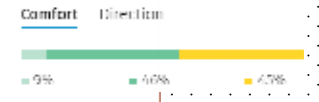
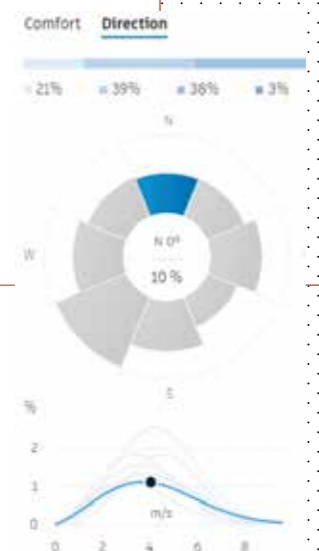
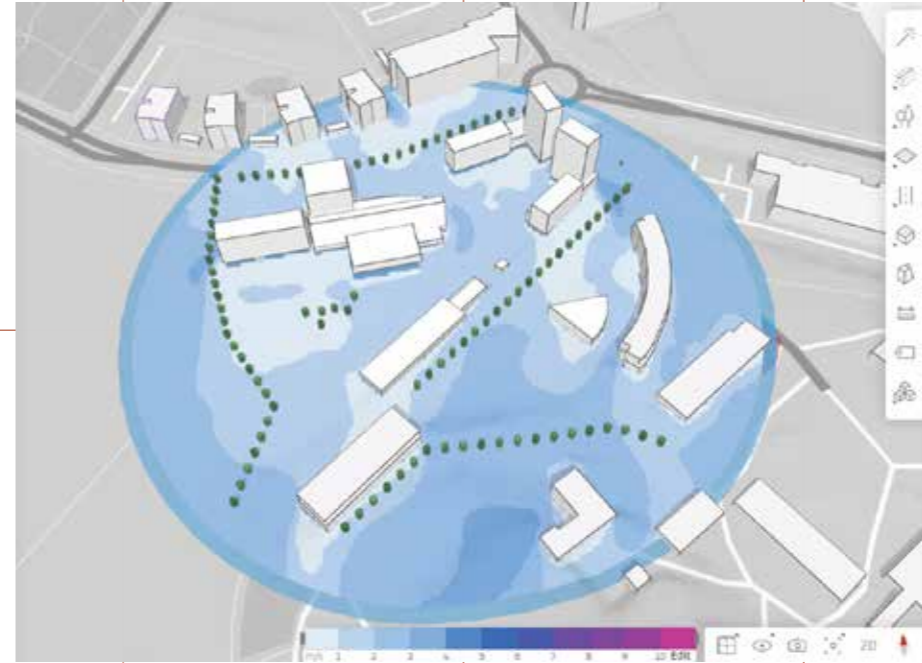
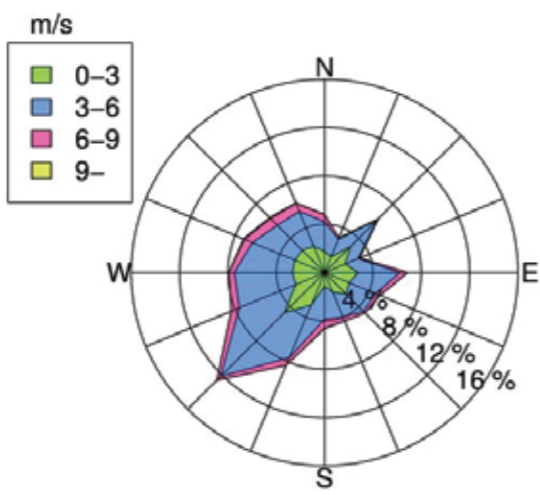
## Climatic Response

### 01 | Site Context

# Wind

## direction and comfort

Wind roses for the data from the meteorological tower in Helsinki Kaisaniemi. Calm winds 0.32%.



03 | Sustainability

# Life cycle assessment

conducted on the new construction of the student residence blocks

Embodied carbon benchmark

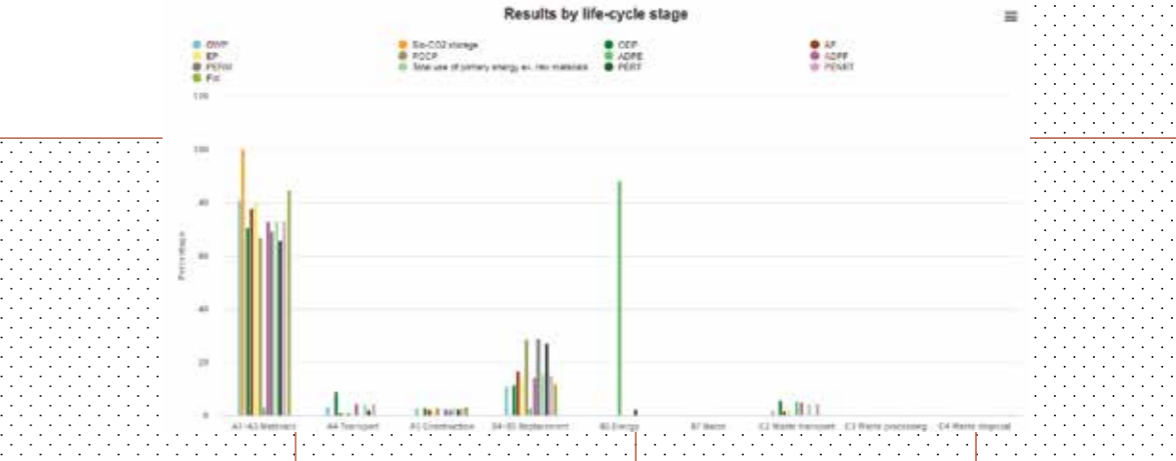
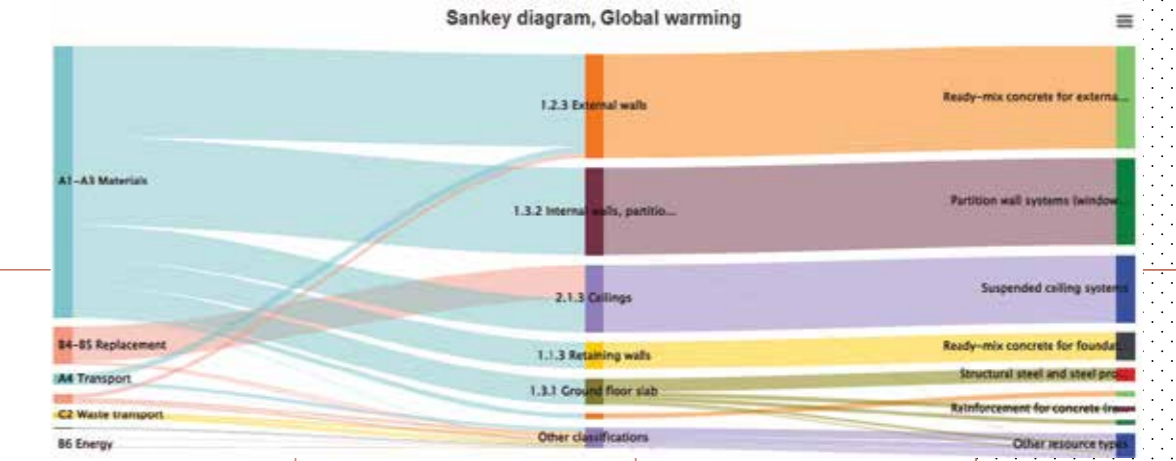
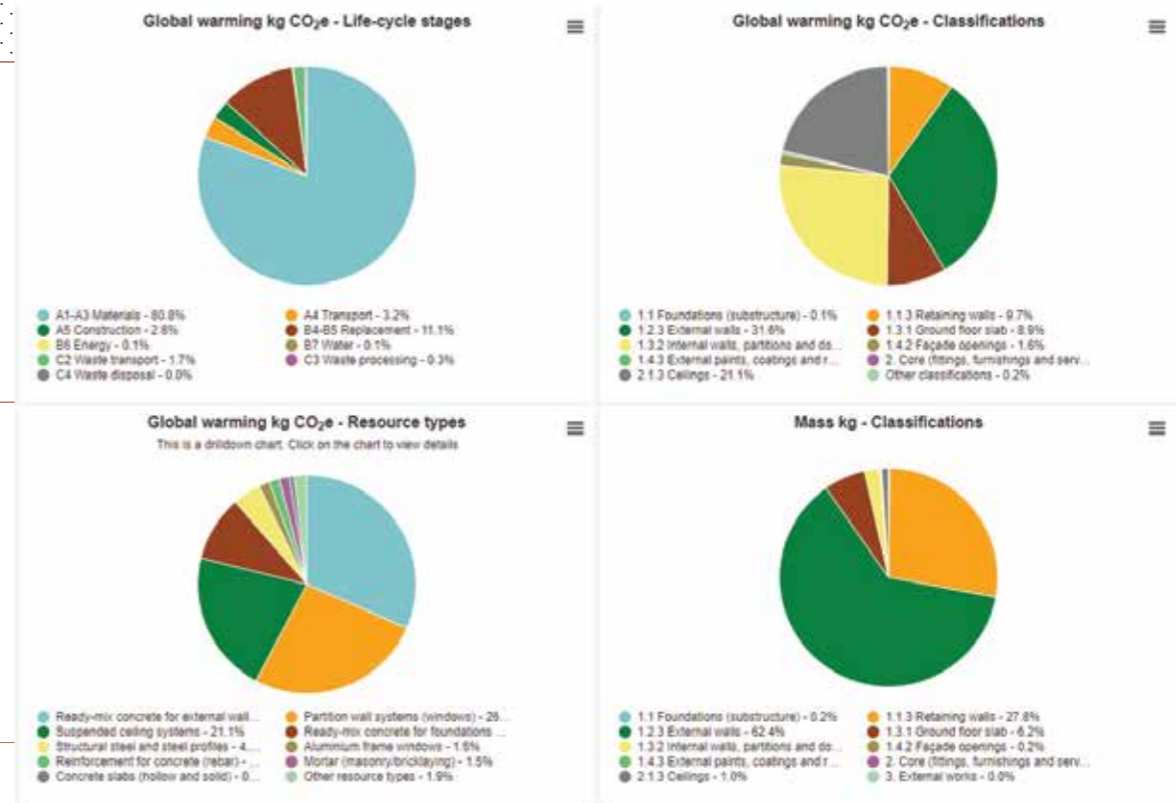
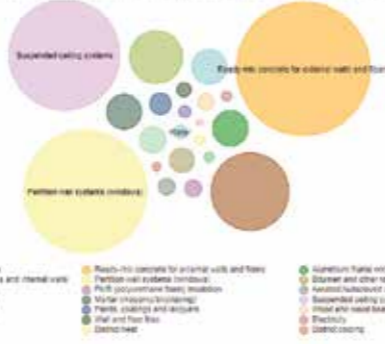
| Cradle to grave (A1-A4, B4-B5, C1-C4) | kg CO <sub>2</sub> e/m <sup>2</sup> |
|---------------------------------------|-------------------------------------|
| (< 320) <b>A</b>                      | <b>241</b>                          |
| (320-360) <b>B</b>                    |                                     |
| (360-400) <b>C</b>                    |                                     |
| (400-440) <b>D</b>                    |                                     |
| (440-480) <b>E</b>                    |                                     |
| (480-520) <b>F</b>                    |                                     |
| (> 520) <b>G</b>                      |                                     |

Finland all building types - 2023 Q3

Download as image

Bubble chart, total life-cycle impact by resource type and subtype, Global warming

Hover your mouse over legends in the chart to highlight specific bubble minimum and maximum (only available for readability)



4 846 Tonnes CO<sub>2</sub>e

4.49 kg CO<sub>2</sub>e / m<sup>2</sup> / year

242 275 € Social cost of carbon

# Green Design Features

## Sustainable Design Components

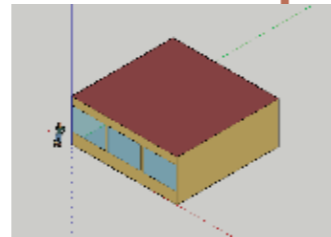
### 03 | Sustainability

# Energy calculations

conducted on the single unit of student residence

#### Site to Source Energy Conversion Factors

|                  | Site=>Source Conversion Factor |
|------------------|--------------------------------|
| Electricity      | 3.167                          |
| Natural Gas      | 1.084                          |
| District Cooling | 1.056                          |
| District Heating | 3.613                          |
| Steam            | 1.200                          |
| Gasoline         | 1.050                          |
| Diesel           | 1.050                          |
| Coal             | 1.050                          |
| Fuel Oil No 1    | 1.050                          |
| Fuel Oil No 2    | 1.050                          |
| Propane          | 1.050                          |
| Other Fuel 1     | 1.000                          |
| Other Fuel 2     | 1.000                          |



| Building description |                              |
|----------------------|------------------------------|
| Building name        |                              |
| New / Refurbishment  | New                          |
| Building type        |                              |
| Surface              | 67,8 m <sup>2</sup>          |
| Volume               | 223,8 m <sup>3</sup>         |
| Weather file         | FIN_Helsinki.029740_IWEC.epw |

### Compliance

| Indicator     | Building [kWh/m <sup>2</sup> ] | Limit value [kWh/m <sup>2</sup> ] | Comply |
|---------------|--------------------------------|-----------------------------------|--------|
| Heating needs | 282,9                          | 15,0                              | No     |
| Cooling needs | 8,2                            | 15,0                              | Yes    |

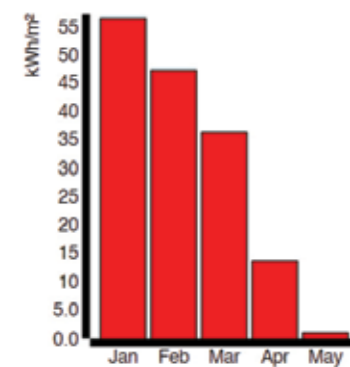
| Lighting autonomy 300 Lux       | Autonomy [%] | Required [%] | Comply |
|---------------------------------|--------------|--------------|--------|
| TZ: SPACE 1 DAYLIGHTINGCONTROLS | 65,7         | 60,0 %       | Yes    |

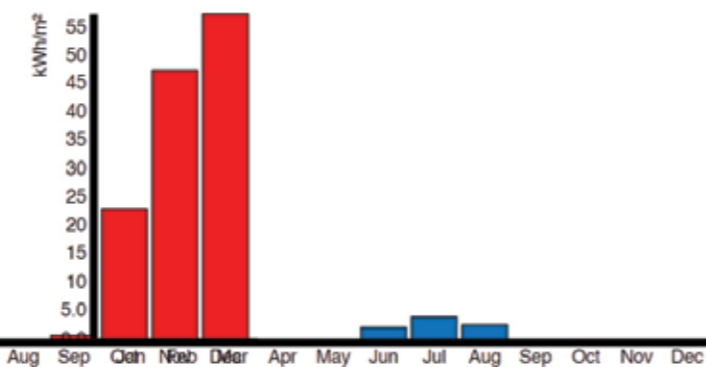
| Summer comfort (overheating % of season) | Overheating [%] | Required [%] | target [%] | Comply |
|--|-----------------|--------------|------------|--------|
| TZ: SPACE 1                              | 0,0             | 10,0 %       | 5,0 %      | Yes    |

### Graphs

Heating needs



Cooling needs



### Heating needs (kWh/m<sup>2</sup>)

|         | Jan   | Feb   | Mar   | Apr   | May  | Jun | Jul | Aug | Sep  | Oct   | Nov   | Dec   | Total  |
|---------|-------|-------|-------|-------|------|-----|-----|-----|------|-------|-------|-------|--------|
| Heating | 56,61 | 47,4  | 36,27 | 13,6  | 1,09 | —   | —   | —   | 0,64 | 22,75 | 47,27 | 57,24 | 282,87 |
| Total   | 56,61 | 47,40 | 36,27 | 13,60 | 1,09 | —   | —   | —   | 0,64 | 22,75 | 47,27 | 57,24 | 282,87 |

### Cooling needs (kWh/m<sup>2</sup>)

|         | Jan | Feb | Mar | Apr | May | Jun  | Jul  | Aug  | Sep | Oct | Nov | Dec | Total |
|---------|-----|-----|-----|-----|-----|------|------|------|-----|-----|-----|-----|-------|
| Cooling | —   | —   | —   | —   | —   | 2,04 | 3,79 | 2,36 | —   | —   | —   | —   | 8,19  |
| Total   | —   | —   | —   | —   | —   | 2,04 | 3,79 | 2,36 | —   | —   | —   | —   | 8,19  |

# Viikki - The Edu-Buoyancity

Visual Impression



# Viikki - The Edu-Buoyancity

Visual Impression



# The Student Residence

## Visual Impression



### Water Efficiency

Priority spaces:

Kitchen/ Bathroom

Agricultural Production Area  
Aquaculture Production Area



### Flexibility

Priority spaces:

Bedroom/ Studio/ Workspace  
/ Study

Research discussion rooms



### Sound proof

Priority spaces:

Research Library  
Research discussion rooms  
Research Laboratory



### Energy Efficiency

Priority spaces:

Agricultural production  
Residential spaces  
Educational spaces



# The Student Residence

## Visual Impression



### Water Efficiency

Priority Application:  
Water contact walls and floors



### Flexibility

Priority application:  
Wall partitions and ceiling panels



### Sound proof

Priority application:  
acoustic ceiling



### Energy Efficiency

Priority application:  
Weather-contact roofs and walls



COMFORT

feel

see

hear

breathe

TODAY'S NEEDS

**Multi Comfort**  
BY SAINT-GOBAIN

SUSTAINABILITY

Energy & Carbon

Materials & Resources

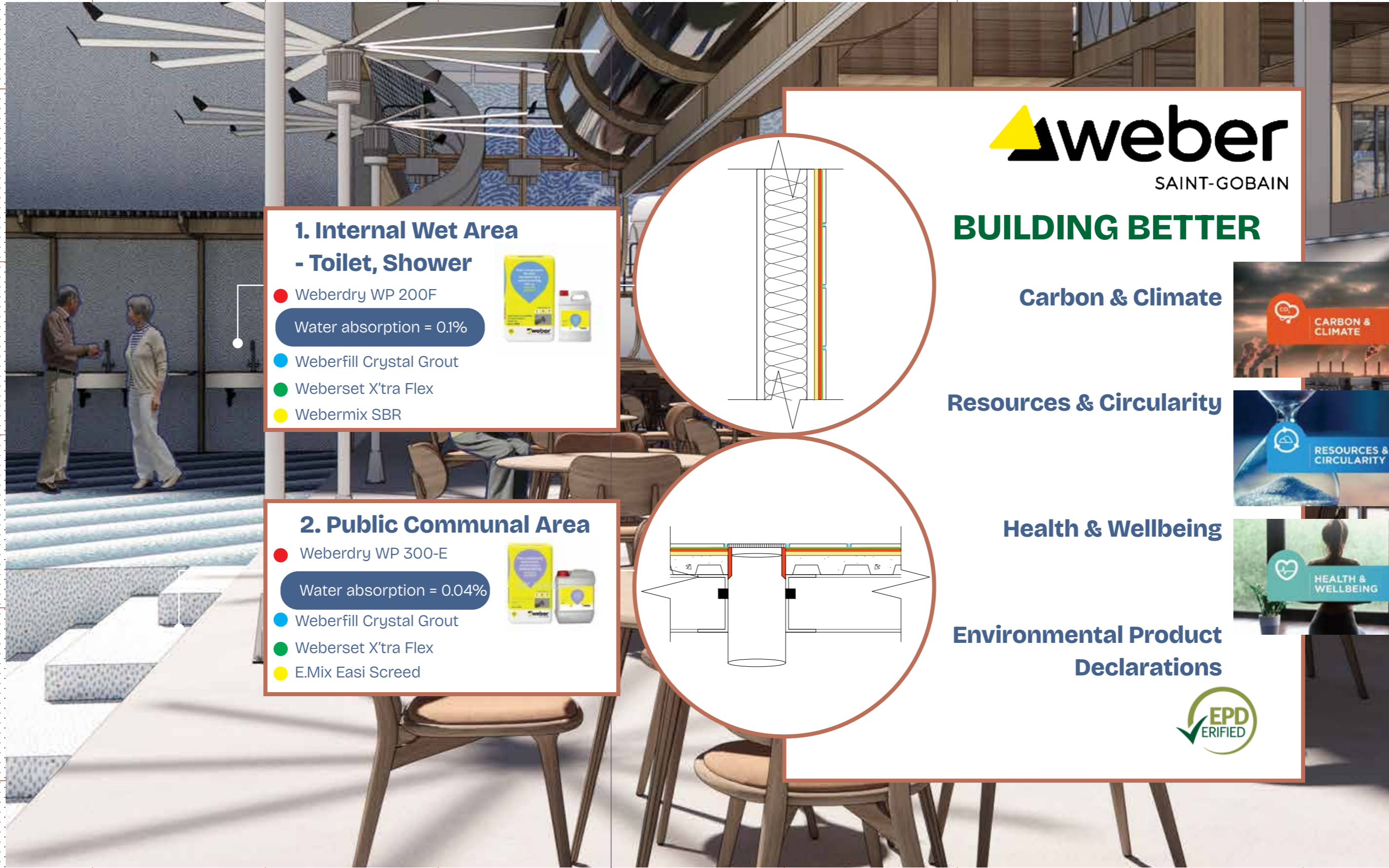
Health & Safety

Water, Biodiversity & Local Value Creation

TOMORROW'S CHALLENGES

# The Saint Gobain Ecosystem

## Product Highlight



### 1. Internal Wet Area - Toilet, Shower

- Weberdry WP 200F
- Weberfill Crystal Grout
- Weberset X'tra Flex
- Webermix SBR

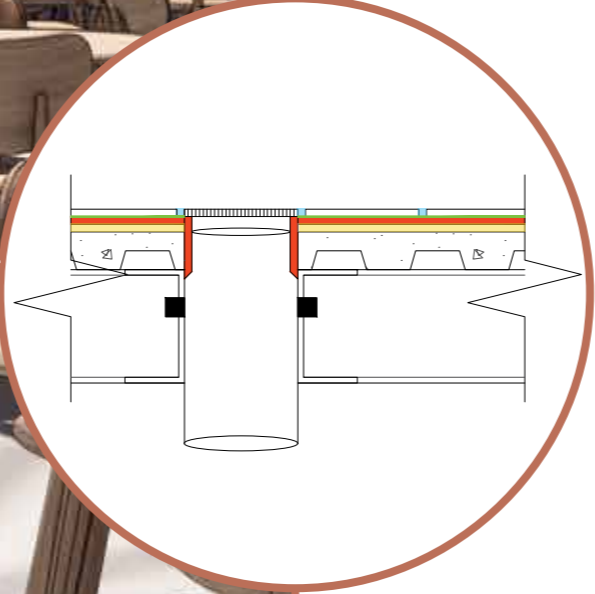
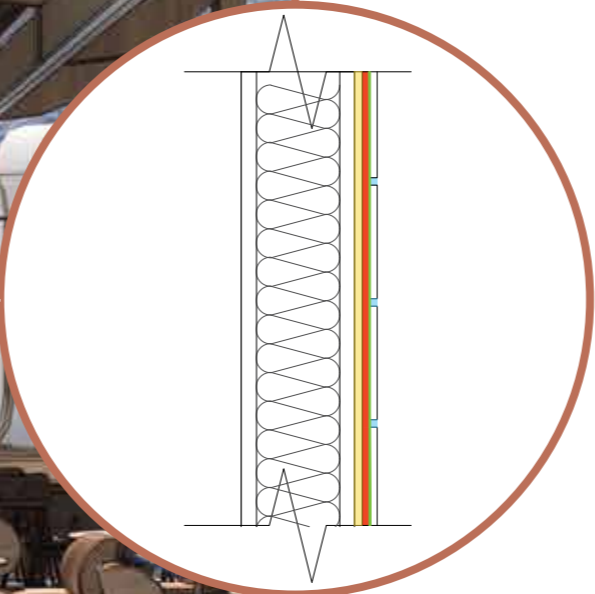
Water absorption = 0.1%



### 2. Public Communal Area

- Weberdry WP 300-E
- Weberfill Crystal Grout
- Weberset X'tra Flex
- E.Mix Easi Screed

Water absorption = 0.04%



**BUILDING BETTER**

Carbon & Climate



Resources & Circularity



Health & Wellbeing



Environmental Product  
Declarations





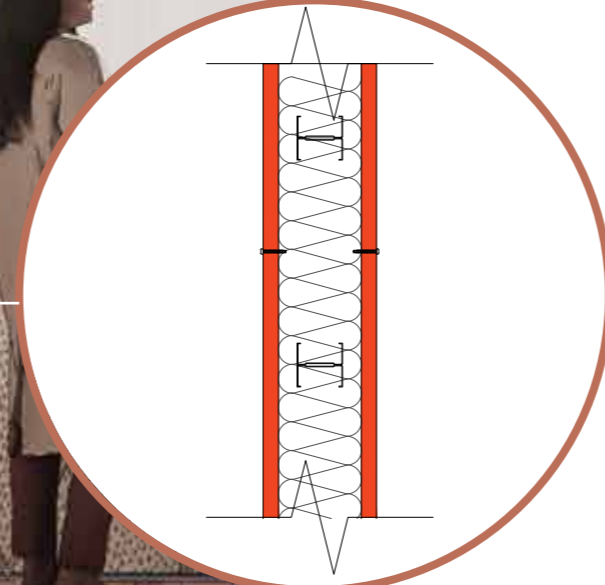
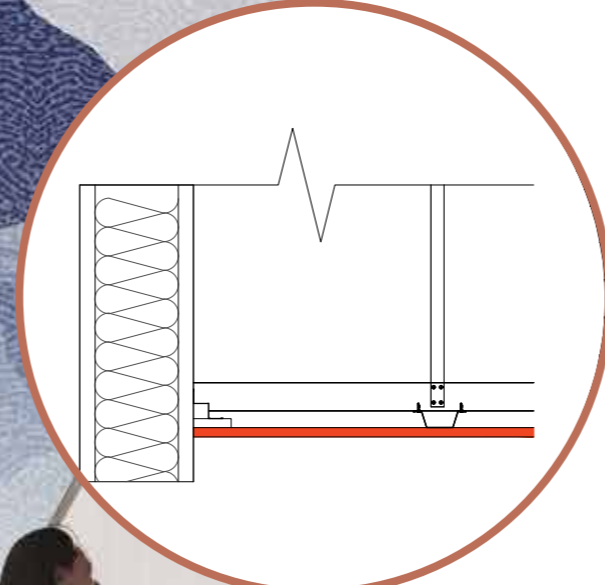
# The Saint Gobain Ecosystem

## Product Highlight



### HEALTHIER SPACES

-  **Visual Comfort**  
Aesthetics
-  **Acoustic Comfort**  
Insulation
-  **Safety**  
Fire Resistance
-  **Indoor Air Quality**  
ActivAir minimizes VOCs
-  **Thermal Comfort**  
Balanced Thermal Environment



#### General Ceiling Panel

Gyproc Gyplock Ceiling System

Withstand wind pressure



#### General Wall Partitions

Gyproc Wall System

Lightweight solution

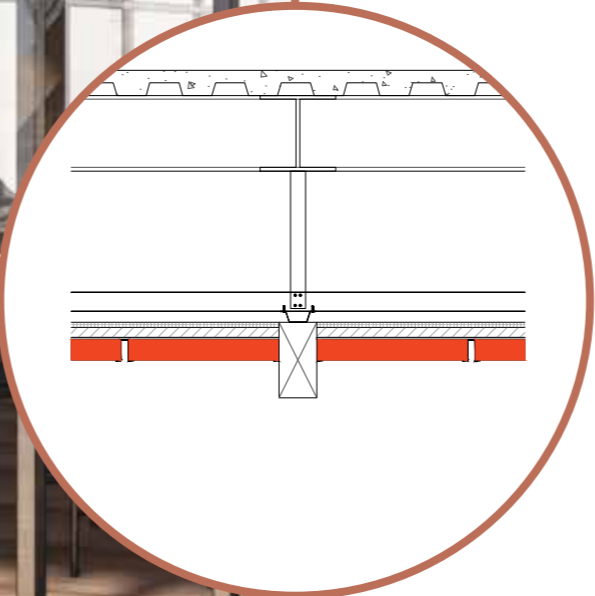



# The Saint Gobain Ecosystem

Product Highlight



**1. Research Lab/ Library**  
Ecophon Super G Plus A  
1A Mechanical Impact



## TOWARDS NET-ZERO ACOUSTICS

Commitment & Progress



Transparent Reporting



Circularity & Innovation



A New Low Point



# The Saint Gobain Ecosystem

Product Highlight



## SUSTAINABLE INSULATION

### Material Innovation

- Comfort
- Technical and Environmental performance
- Health & Safety
- Cost

### Energy Efficiency

### Greener Logistics

### Environmental Transparency

### General Roof Insulation

Tech Tank Roof Slab 20kPa

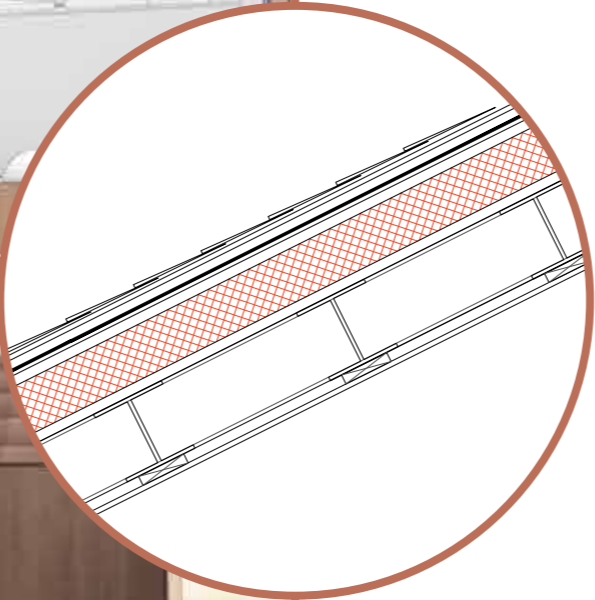
High Energy Efficiency



### General Ducting

CLIMAVER Neto

Air Tightness

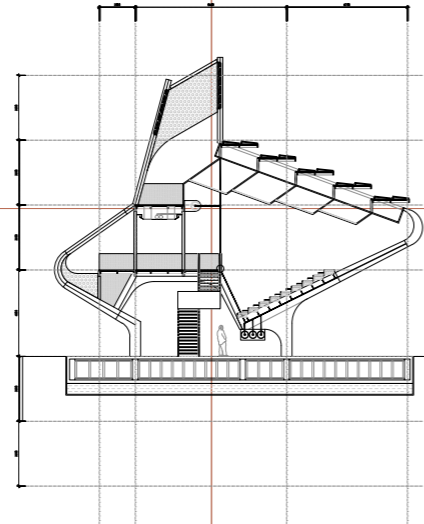
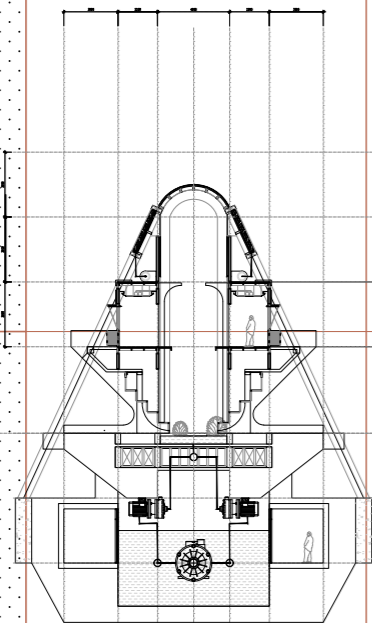
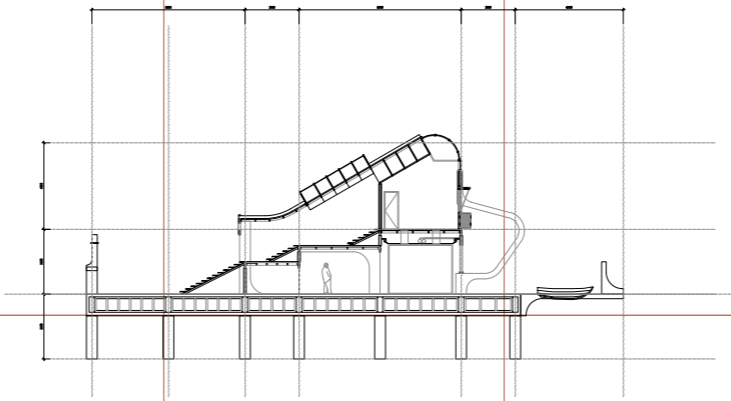




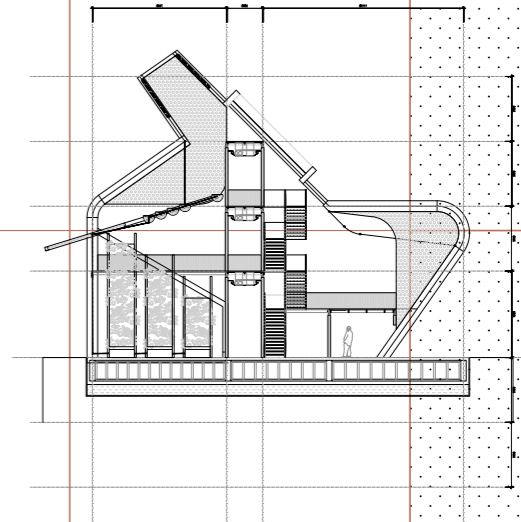
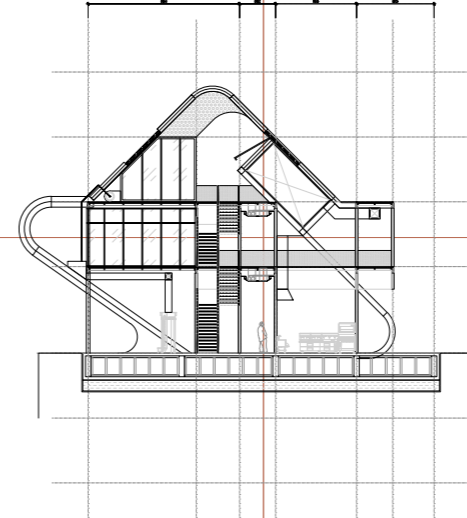
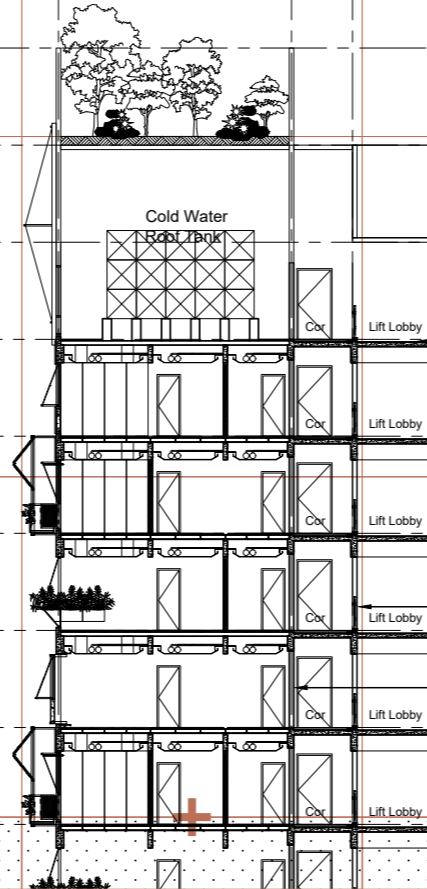
Floor and wall sealant & finishes



Ceiling and wall plasterboard



1 3125 2550 2250 2 3 2825



Ceiling acoustic panelling



Roof and wall insulation

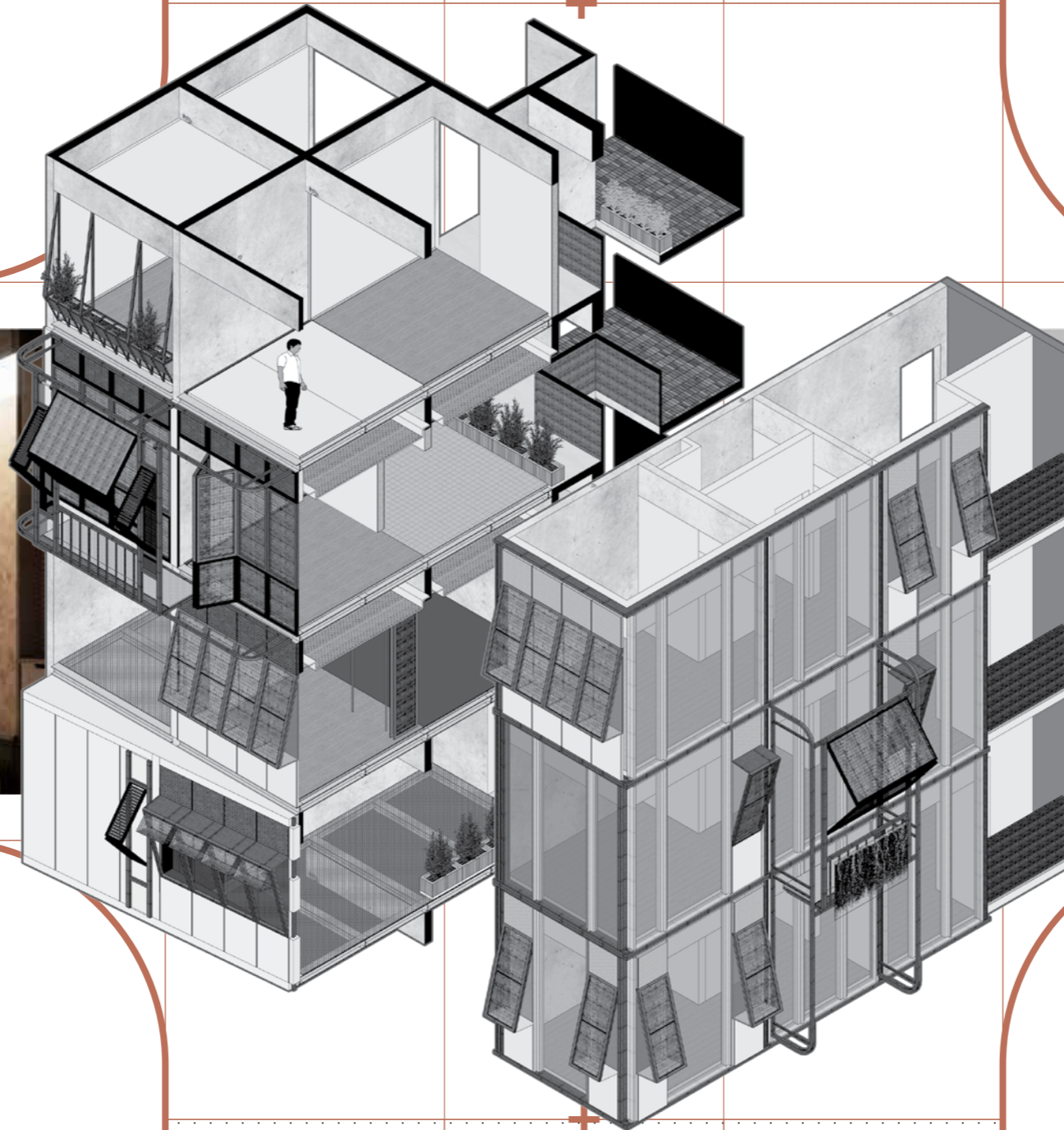
THE BUILT ENVIRONMENT



Creating secure and sealed connections



Shaping comfortable rooms and spaces



Effectively absorbing unwanted noise

THE LIVING SPACE



Insulating areas from heat and cold



**Strong barrier from weather elements**



**Lowering chemical pollution from VOCs**



**Minimizing noise pollution**

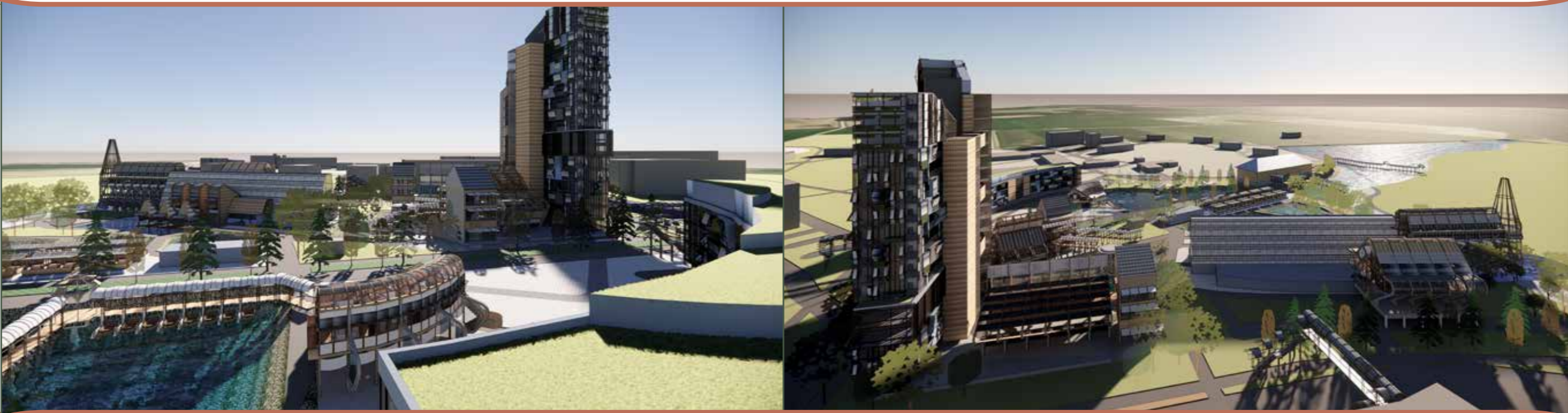


**Reducing carbon footprints**

**THE ECOSYSTEM**



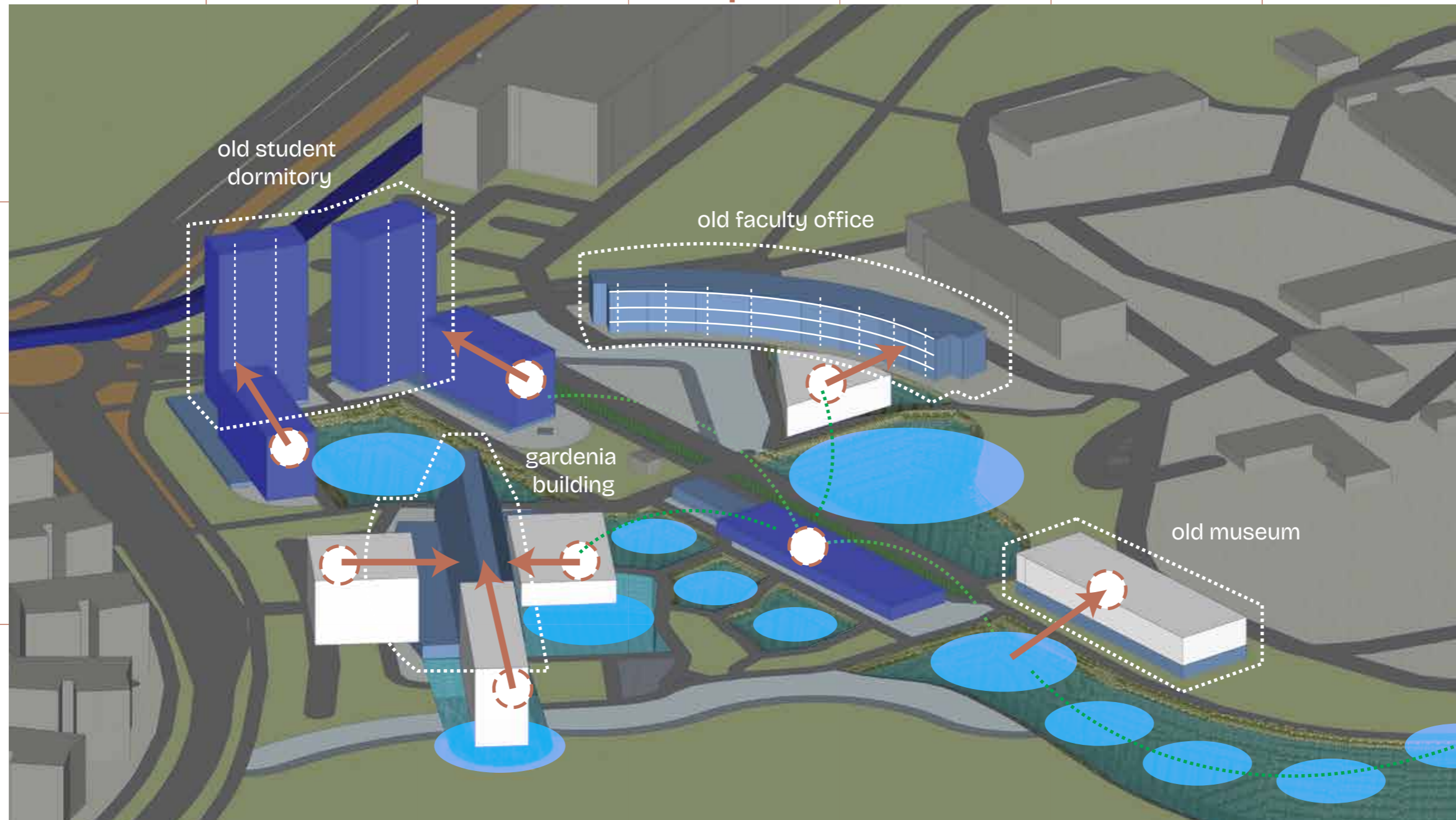
# SAINT-GOBAIN



**MAKING THE WORLD**  
A BETTER HOME

# The Transformation

implementing modularity & integrations



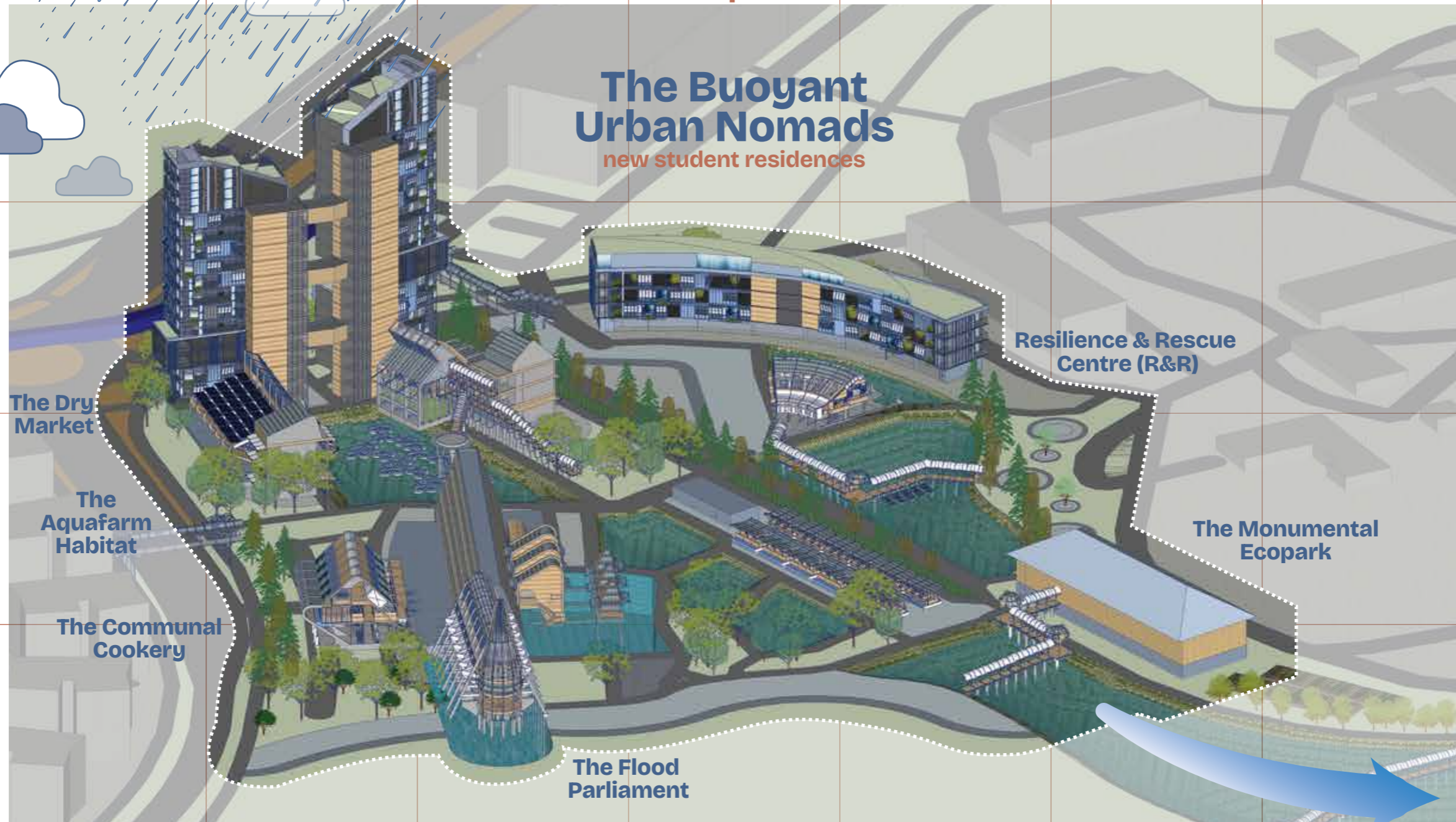
# The Transformation

implementing modularity & integrations



## The Buoyant Urban Nomads

new student residences

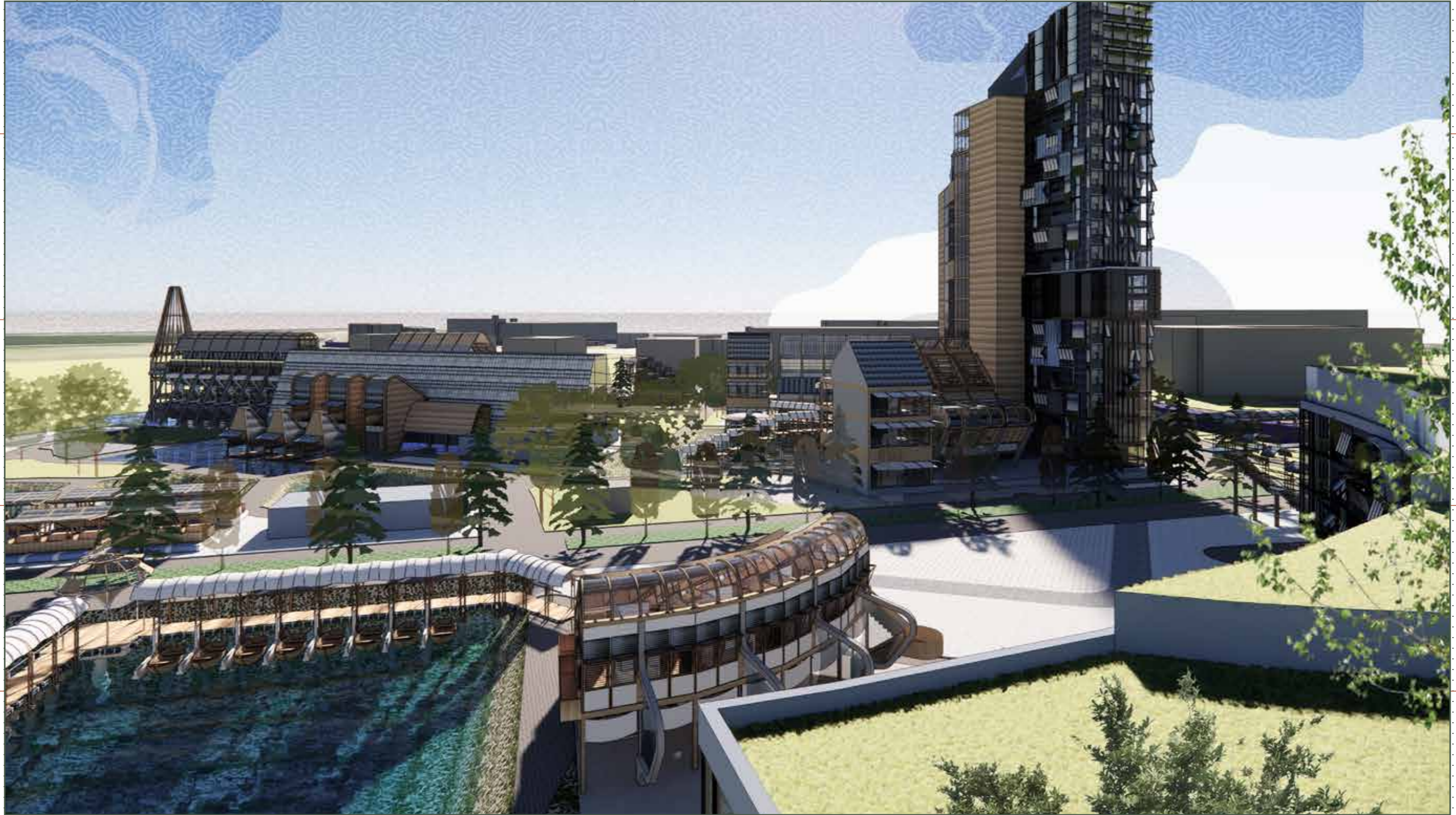


## Viikki - The Edu-Buoyancity

to Lammassaari

# Viikki - The Edu-Buoyancity

Visual Impression



# Viikki - The Edu-Buoyancity

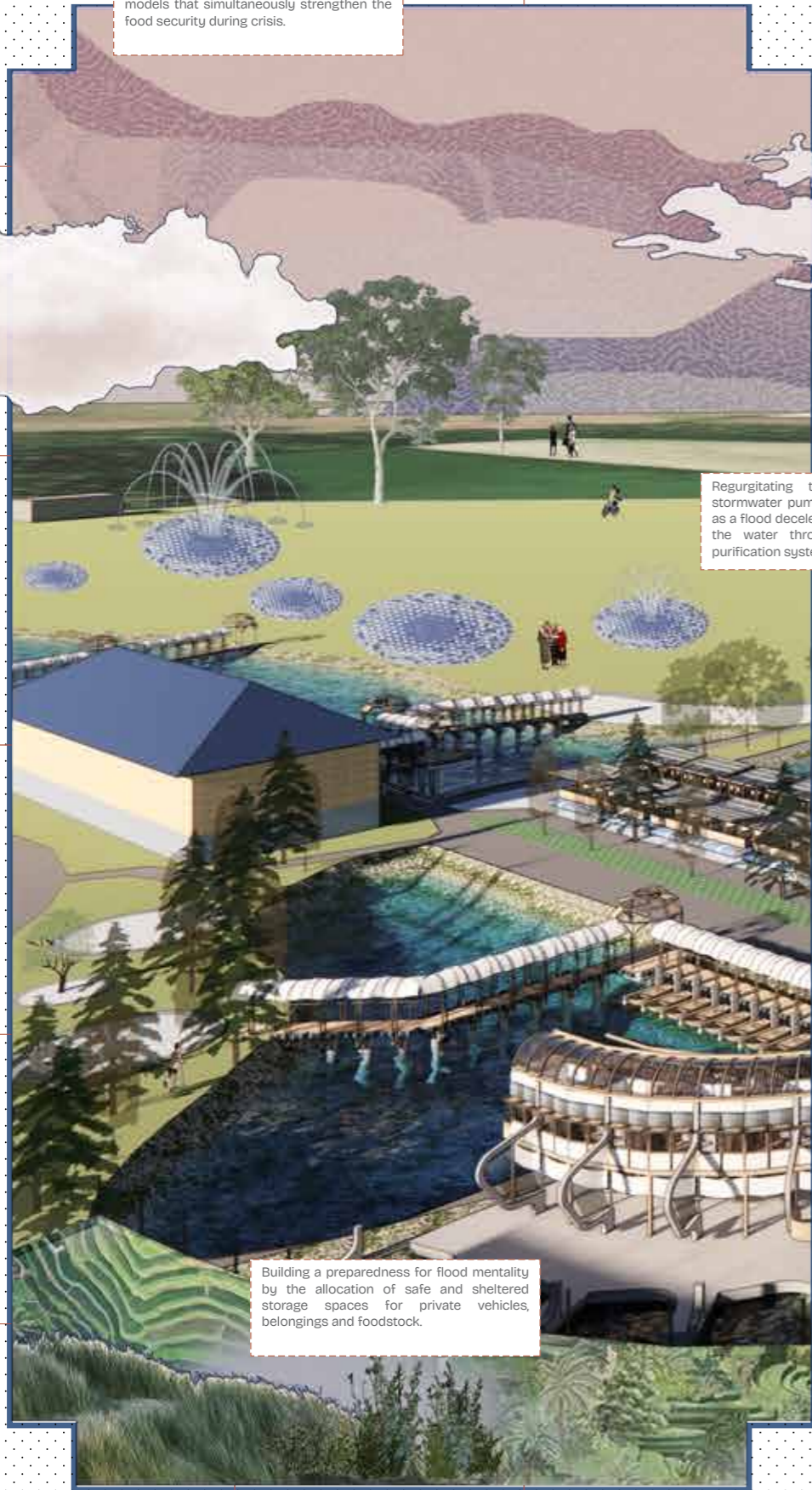
Visual Impression



# Viikki The Edu-BuoyanCity

Empowering the local community to learn and adopt resilient economic business models that simultaneously strengthen the food security during crisis.

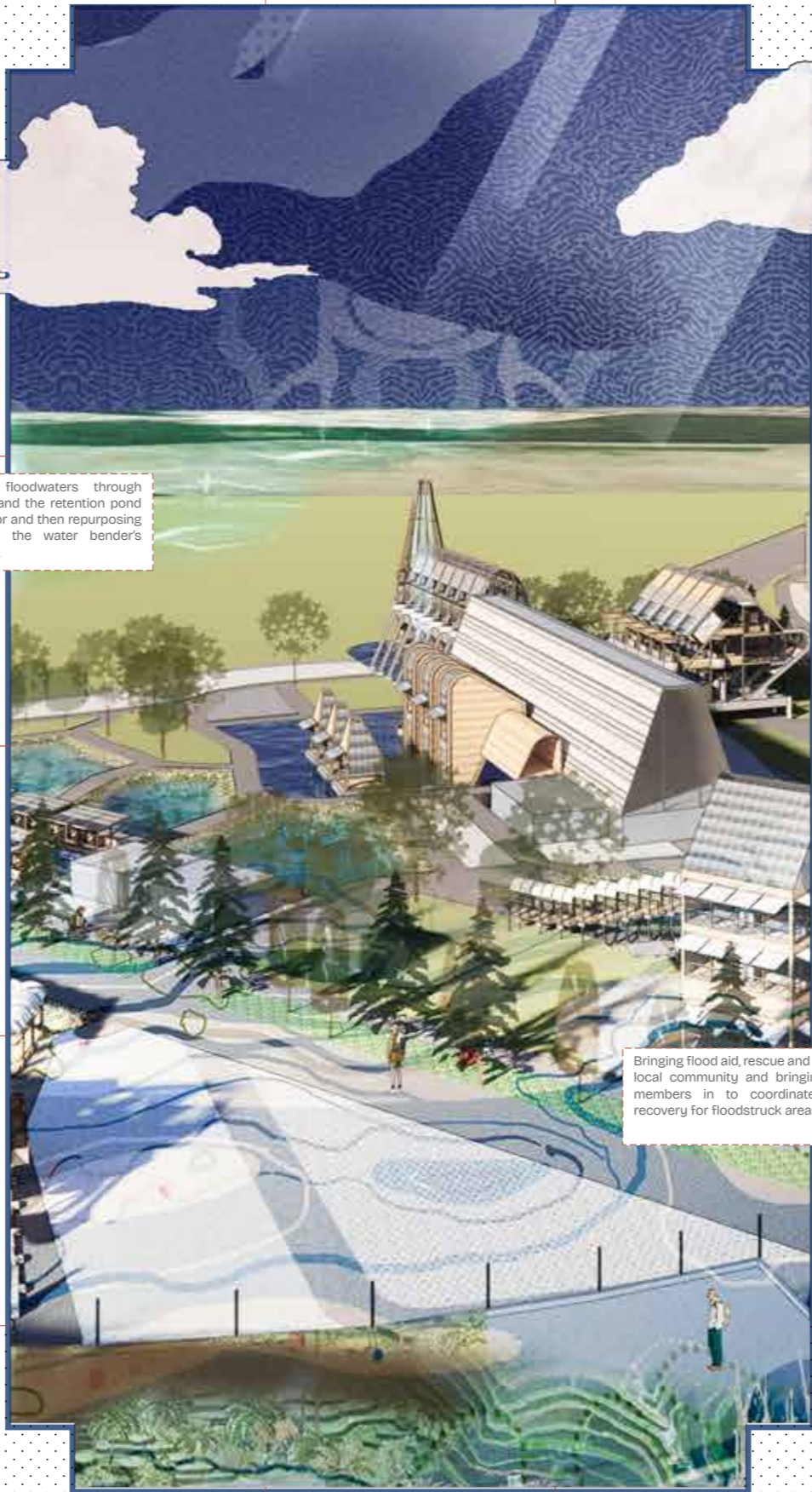
A collective and communal effort to rebuilding the food security banks from the energization of aquafarms and food preservation activities.



Regurgitating the floodwaters through stormwater pumps and the retention pond as a flood decelerator and then repurposing the water through the water bender's purification systems.

Building a preparedness for flood mentality by the allocation of safe and sheltered storage spaces for private vehicles, belongings and foodstock.

Pre Flood



Bringing flood aid, rescue and supplies to the local community and bringing community members in to coordinate refuge and recovery for floodstruck areas.

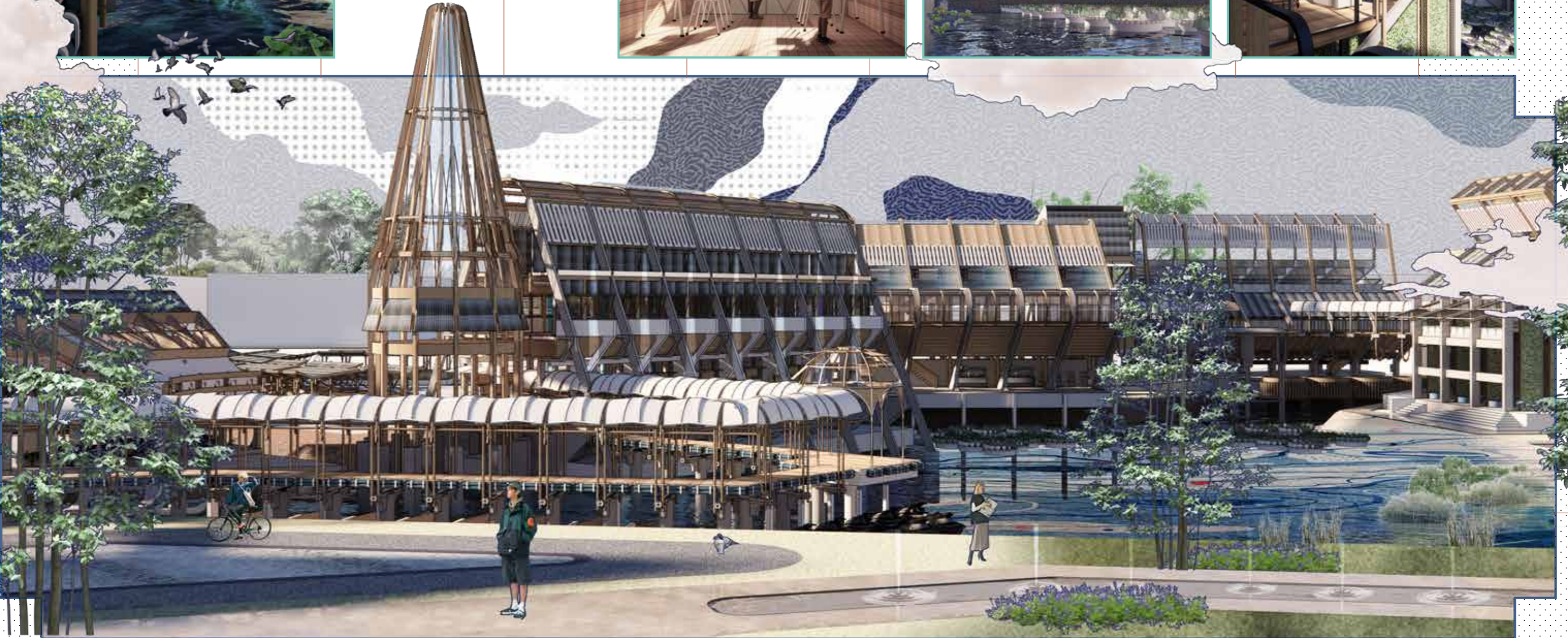
During Flood



Reviving and cleaning up the surrounding urban environment, soaking up and repurposing excess floodwaters and strengthening the coexistence of nature.

Post Flood

# Viikki The Edu-BuoyanCity



1. Monumental Ecopark
2. The Sampan Classrooms
3. River's Aquafarm
4. Research Laboratory
4. Spawning Stations
5. Research Archive
6. Research Discussion Rooms
9. The Kampung Kitchen