

Where Flows Weave into Circulation

How can architecture enhance the environment?

Conventional sustainable architecture has aimed to minimize environmental impact
—**moving from negative toward zero.**

However, in an era where sustainability is critical, should architecture not go further
—**shifting from zero to positive**, actively improving the environment itself?

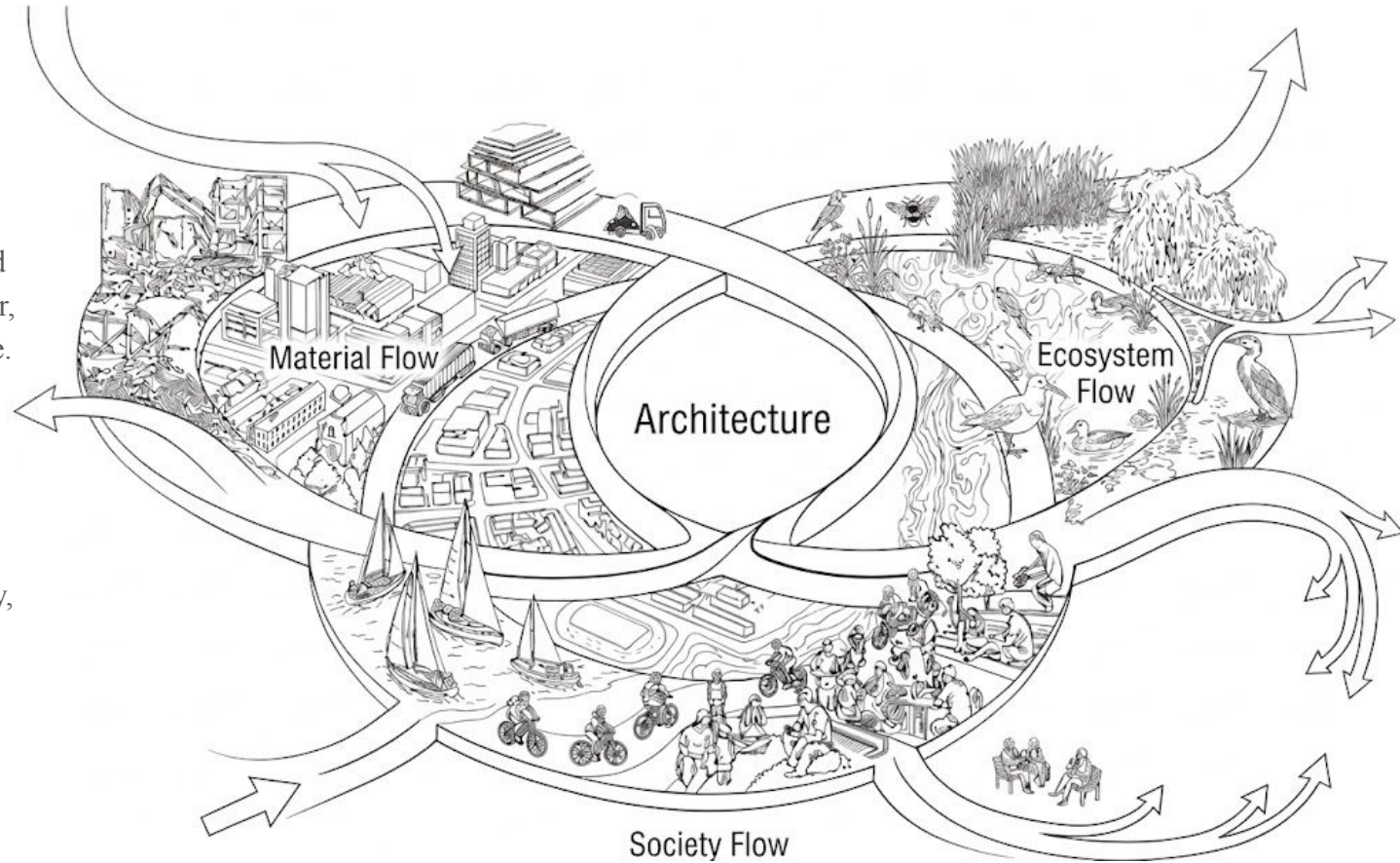
By redesigning **flows** of Material, Society, and Ecosystem.

Reconnecting fragmented relationships between environment, materials, and society through architectural space and systems.

From Latent to Activated Flows

In Belgrade, environmental and material flows are largely linear, resulting in pollution and waste.

By reconnecting and reconfiguring these flows through architecture, the project fosters a regenerative environment—not only locally, but across the city.



1-1 Material

Material Landscape of the city

Belgrade is composed of layered urban fabrics, where diverse materials exist across old and new districts.

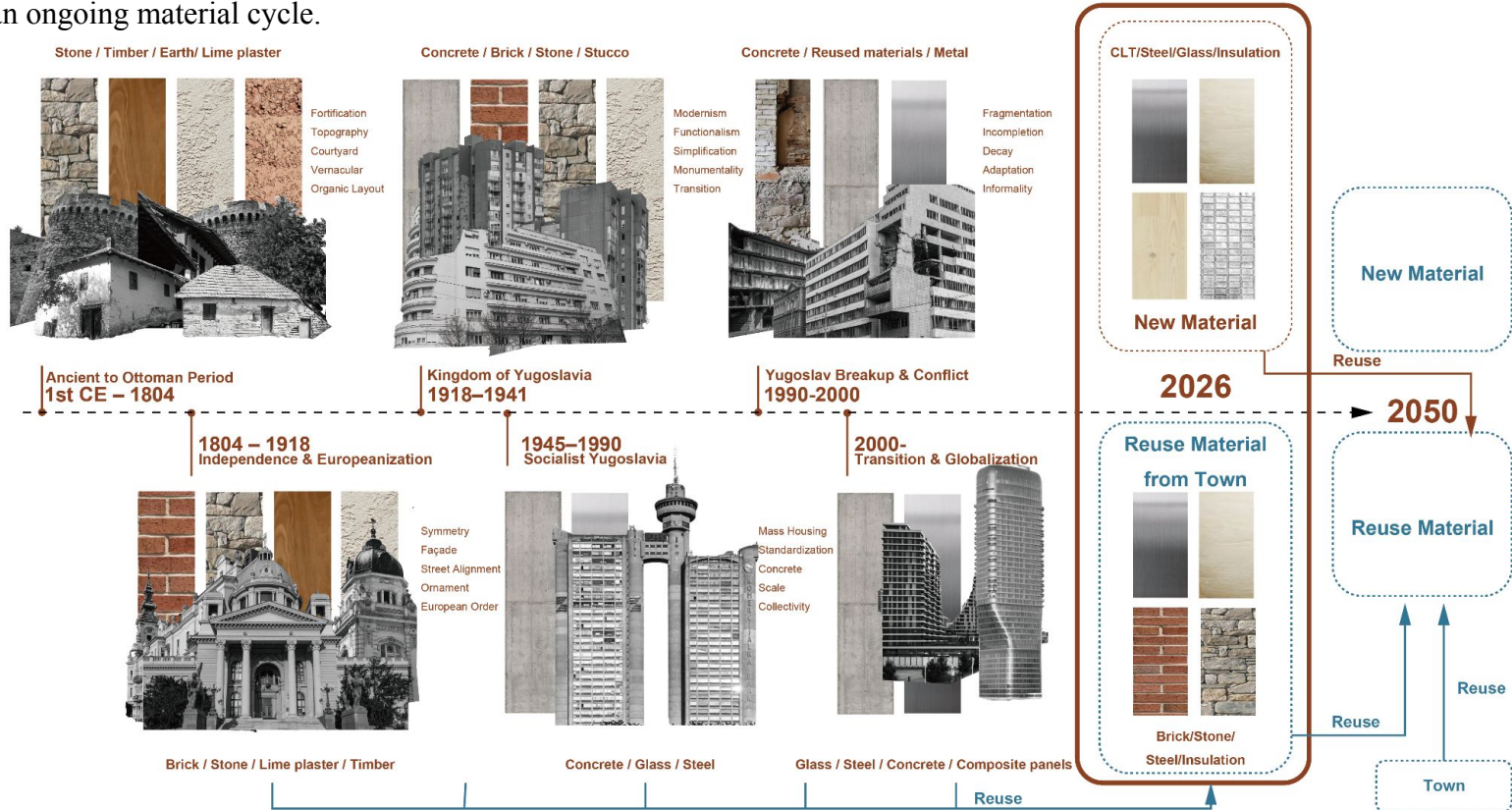
These materials form an existing resource embedded within the city.



1-2 Materials as a Continuum of History

Materials used throughout the city reflect its historical transformations.

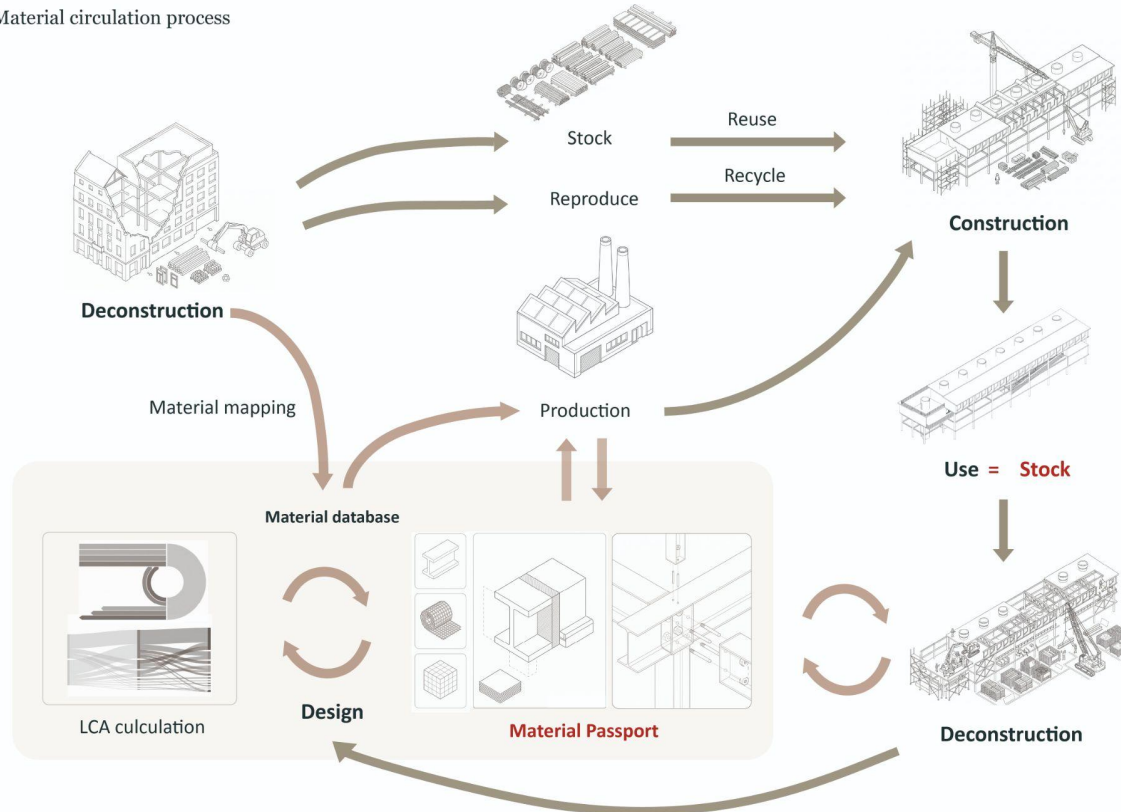
Rather than selecting from a catalog, this project identifies reusable materials from the urban context and redefines them as part of an ongoing material cycle.



1-3 Material Flow and Reuse System

A **material passport** is assigned at the moment of construction, enabling future reuse and exchange of components. This system allows materials—both existing and new—to circulate continuously across time.

Material circulation process

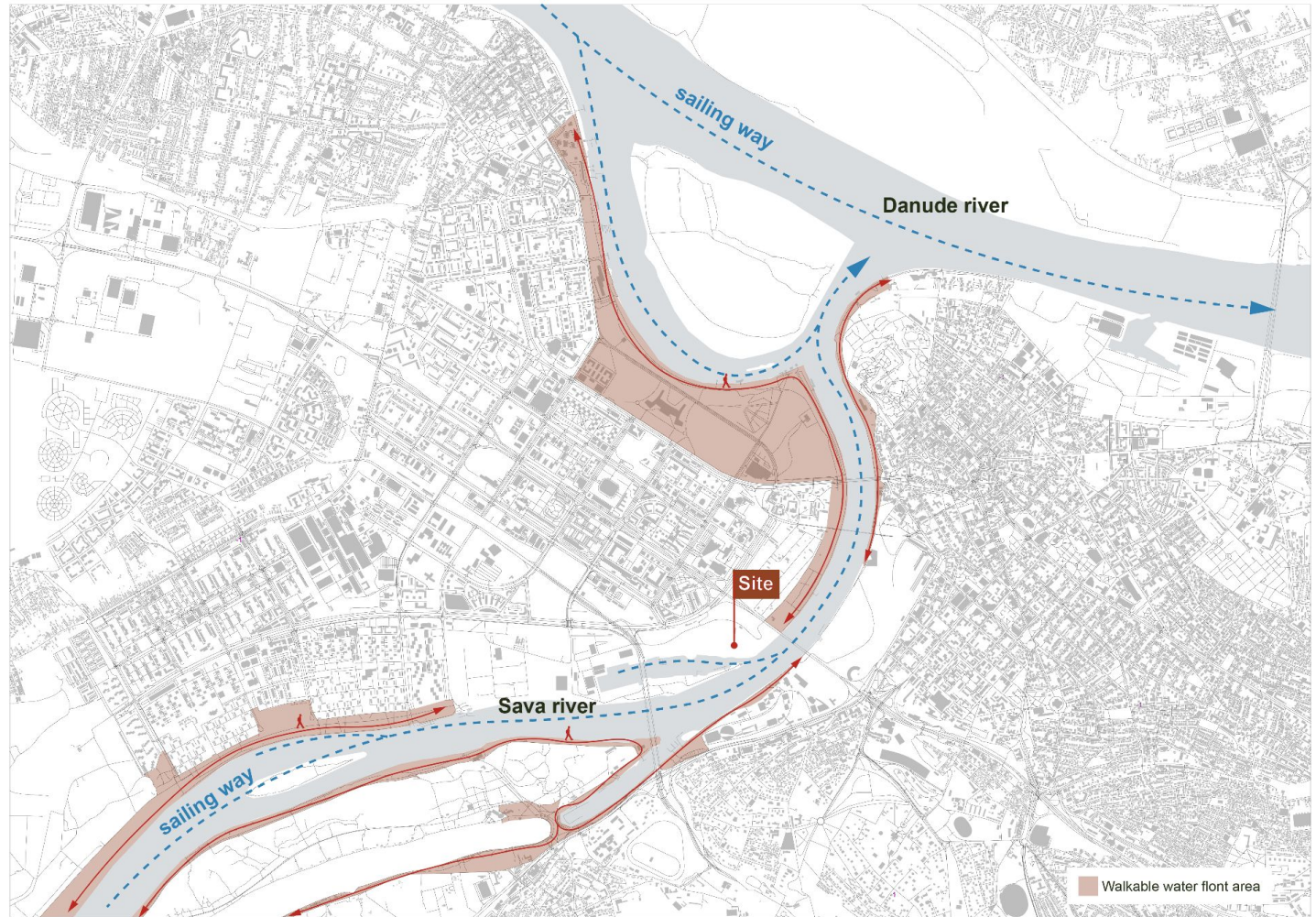


2-1 Society

A City Shaped by Water and Exchange

Belgrade has long developed through trade and river-based exchange, forming a network of waterfront spaces across the city.

These spaces represent an existing social relationship with water.

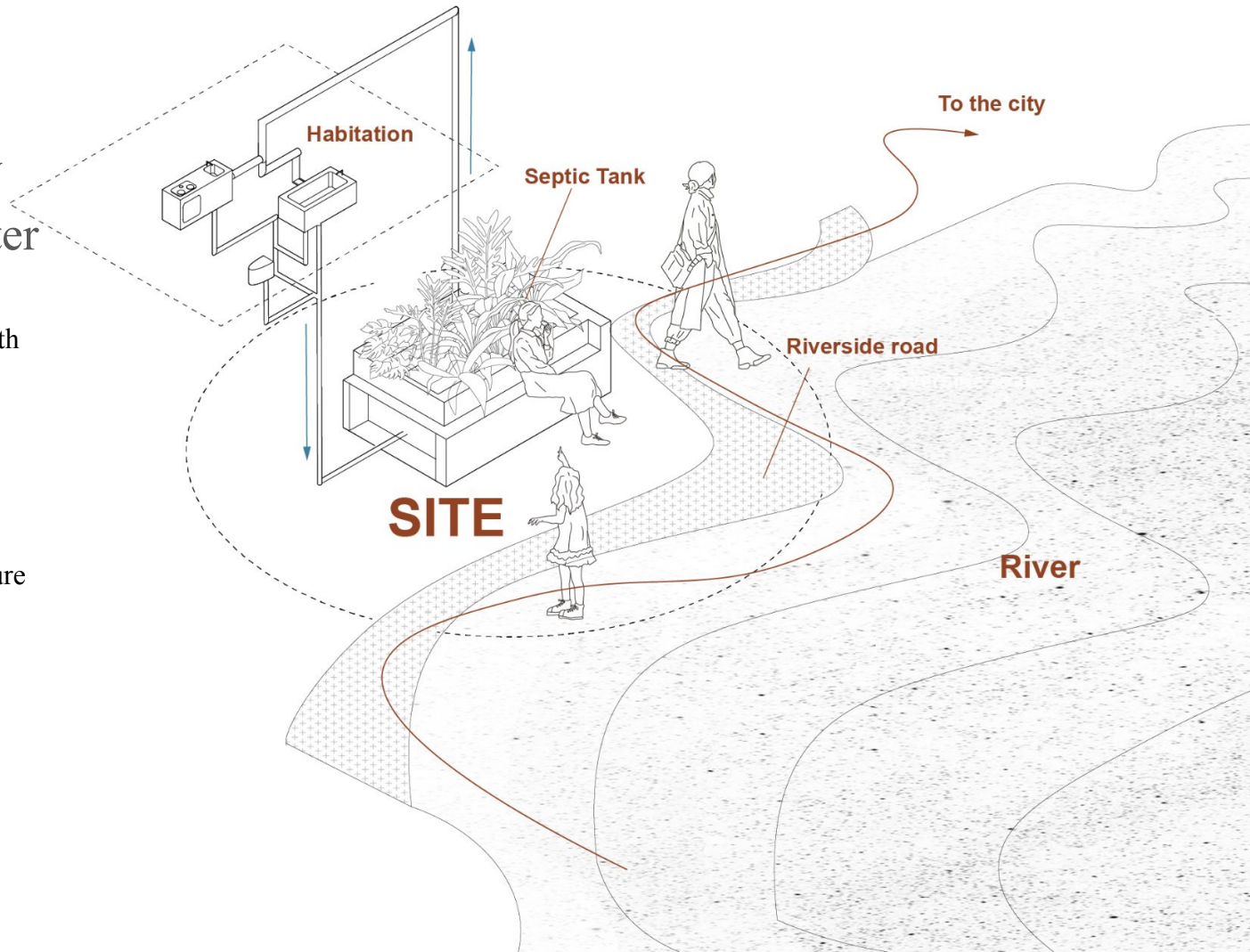


1-3 Society

Extending Everyday Interaction with Water

The project reconnects the site with surrounding waterfront spaces, creating a continuous network of movement.

Water is integrated into everyday life through visible purification systems, transforming infrastructure into shared spatial elements.

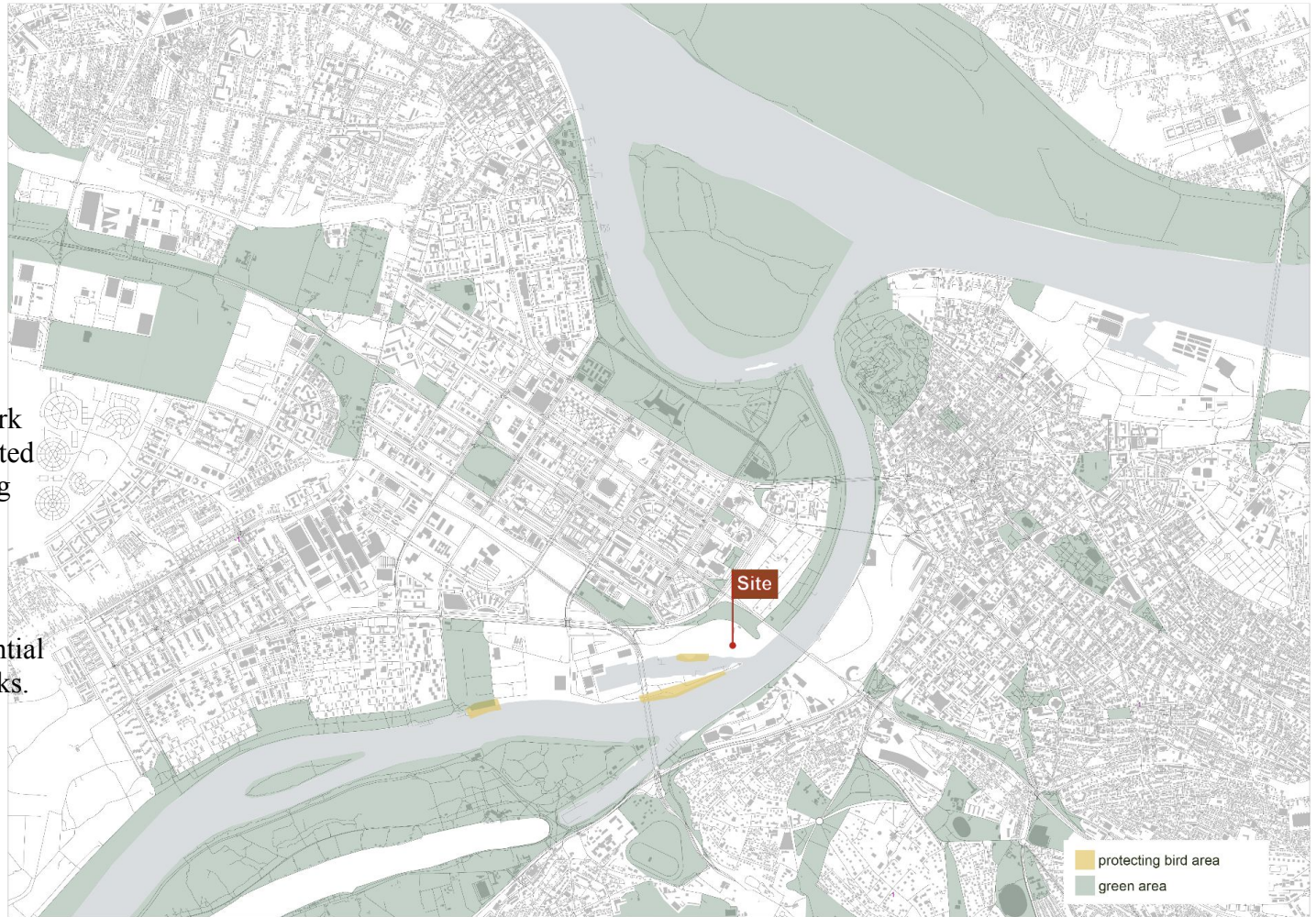


2-1 Ecosystem

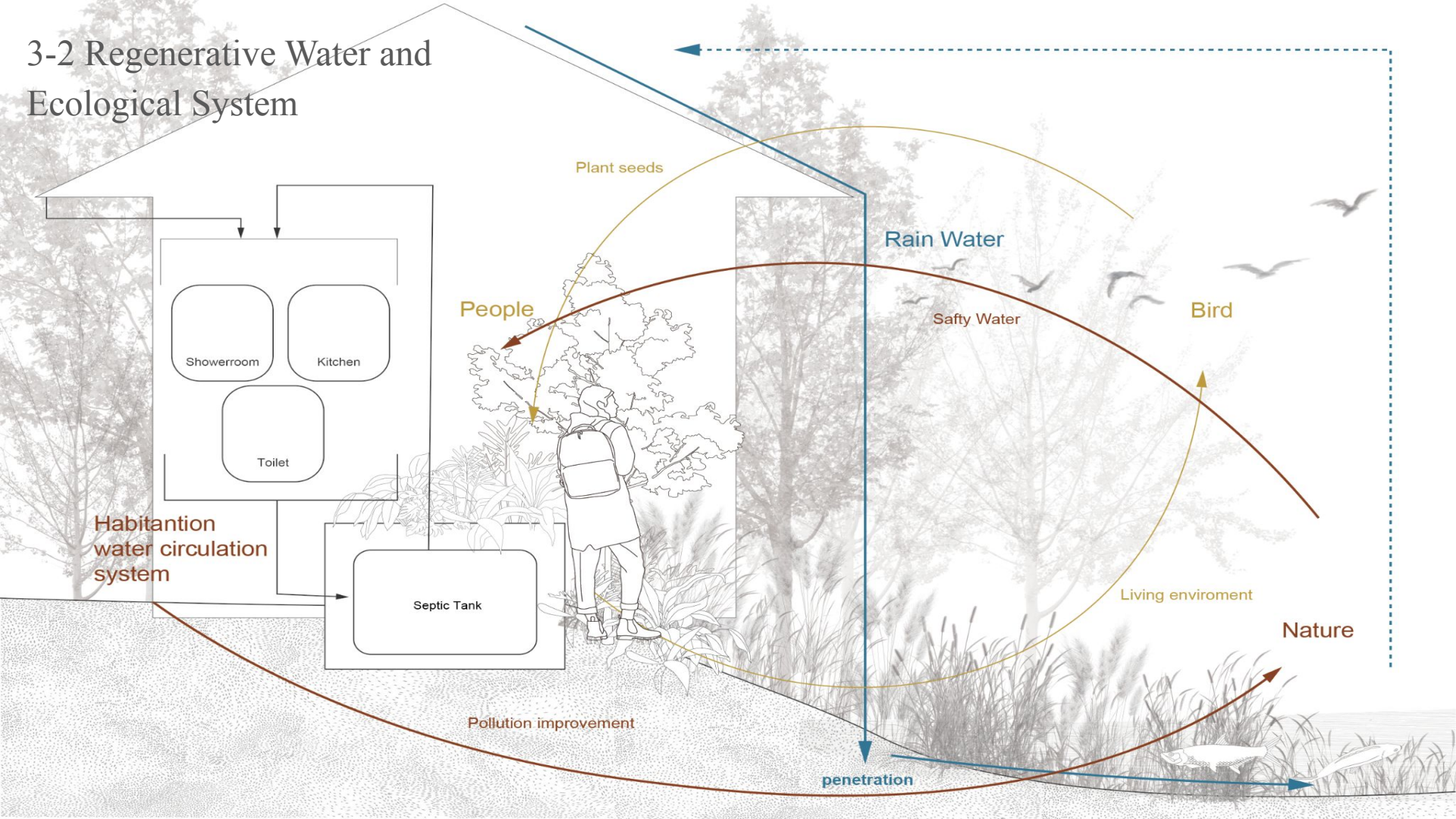
Ecological Network and Environmental Challenges

Belgrade contains a network of green spaces and protected habitats, reflecting growing environmental awareness.

However, water systems remain fragmented and polluted, limiting the potential of these ecological networks.



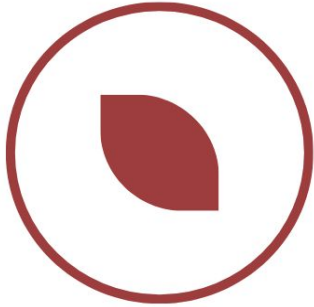
3-2 Regenerative Water and Ecological System



4, How to Design

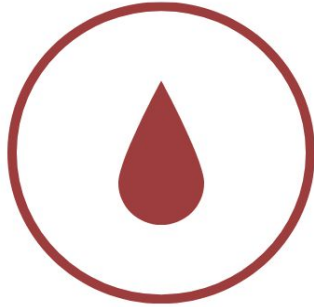


4-1, Ways for recreating flows



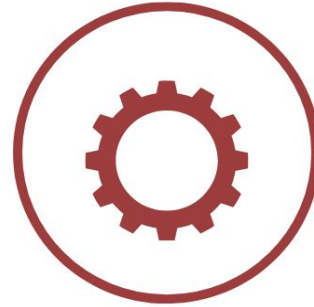
GROUND IS RELEASED

The ground is freed through
steel pipe piles



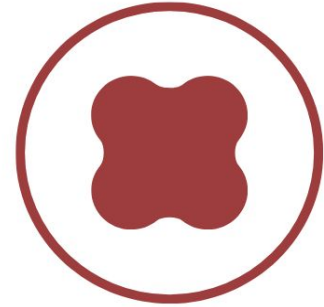
WATER IS REVEALED

Water circulation is made
visible through cores and
purification systems.



SYSTEMS ARE EXCHANGEABLE

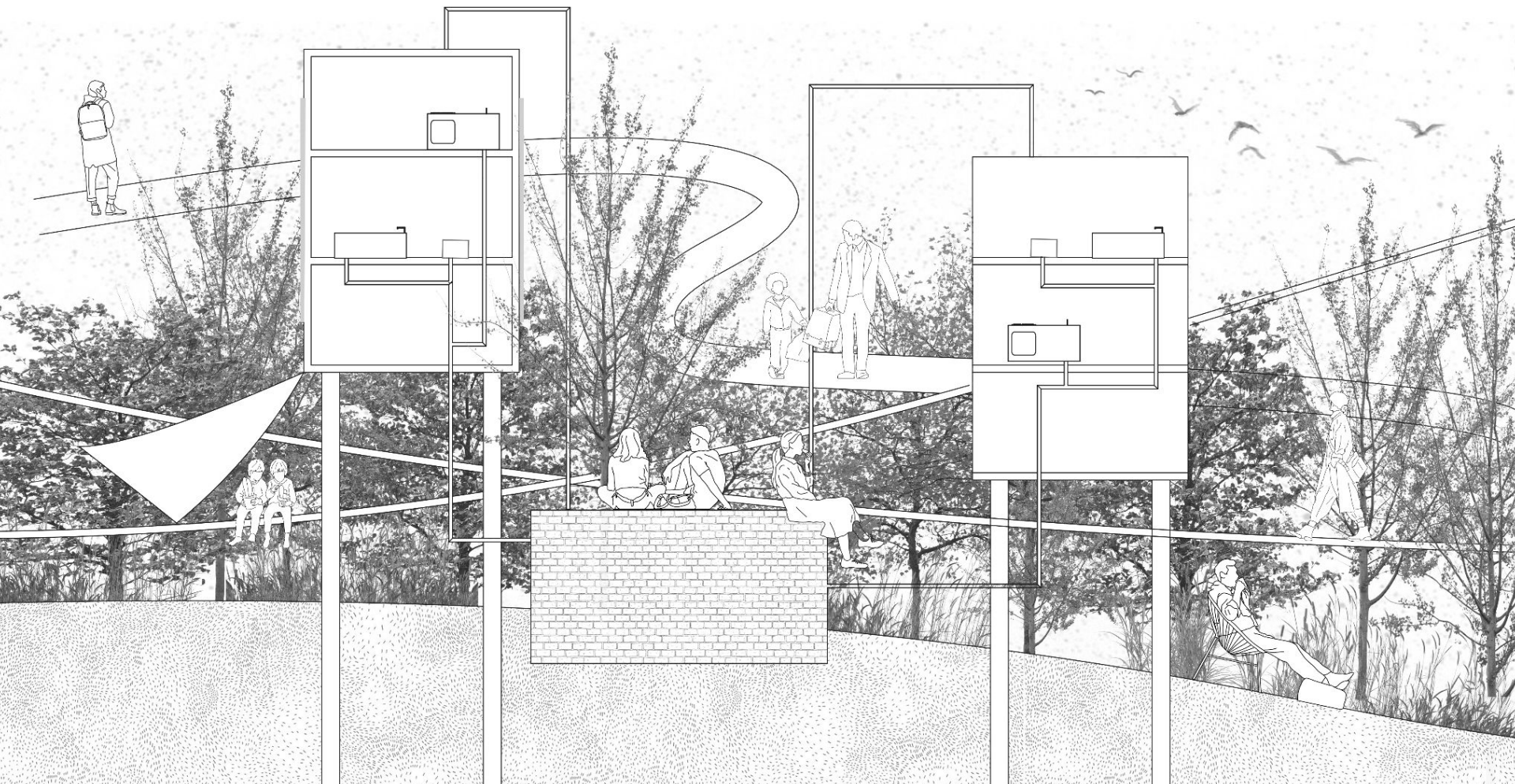
Construction systems allow
exchange, reuse, and
material cycles.
Bicycle Base
Boat Yard



SPACE IS OPENED

Plans and roofs mediate
between climate, people, and
surroundings.

4-2, Concept board



4-3,

Master plan



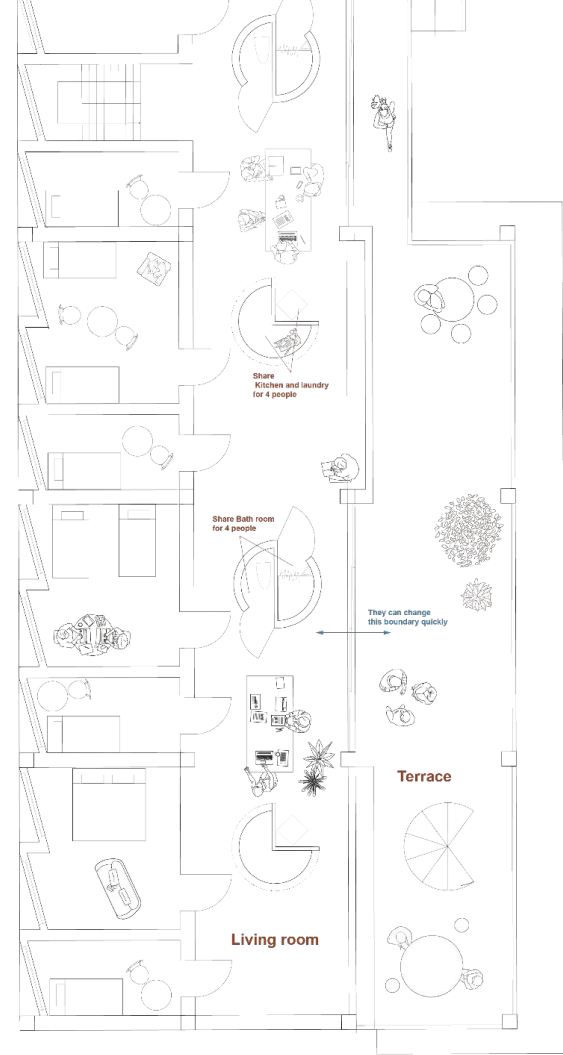
4-3, Functions



4-4, Athlete residence



4-4. Athlete residence_Plan



4-4.

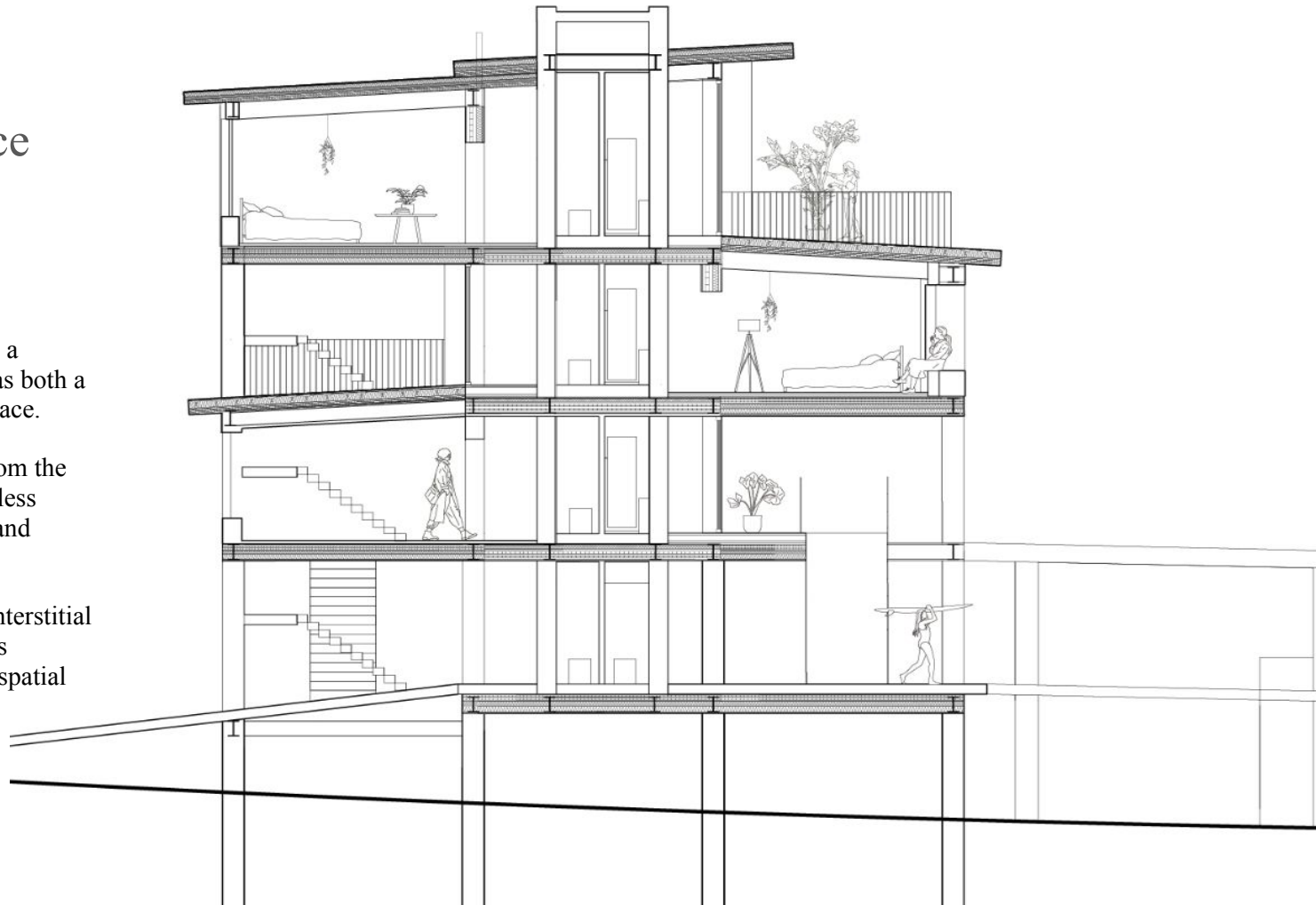
Athlete Residence

Section

The sloped roof is designed at a walkable height, functioning as both a balcony and an accessible terrace.

Continuous terraces extend from the living spaces, creating a seamless relationship between interior and exterior.

The shifts in levels generate interstitial spaces, where ramps and stairs intertwine to produce diverse spatial experiences.



4-4, Athlete residence



Corridor



Bedroom



Shared living space

4-5.

Sports and public facilities

A bicycle base is designed as part of the sports program, located within the open pilotis as an accessible entrance for the public.

It supports the exchange and maintenance of bicycle components, while also acting as a node for material reuse at a smaller scale



Bicycle hub

4-4, Sports and public facilities



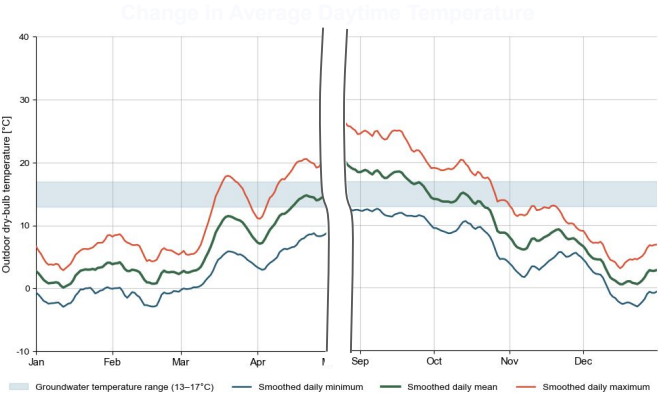
Basketball court

4-4.Sports and public facilities

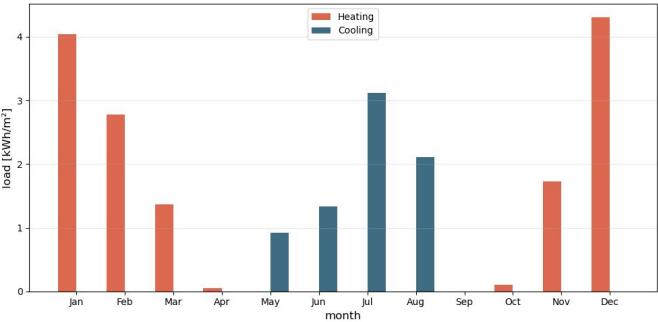


Lesson room

5-1.Climate Strategy : Heating Load

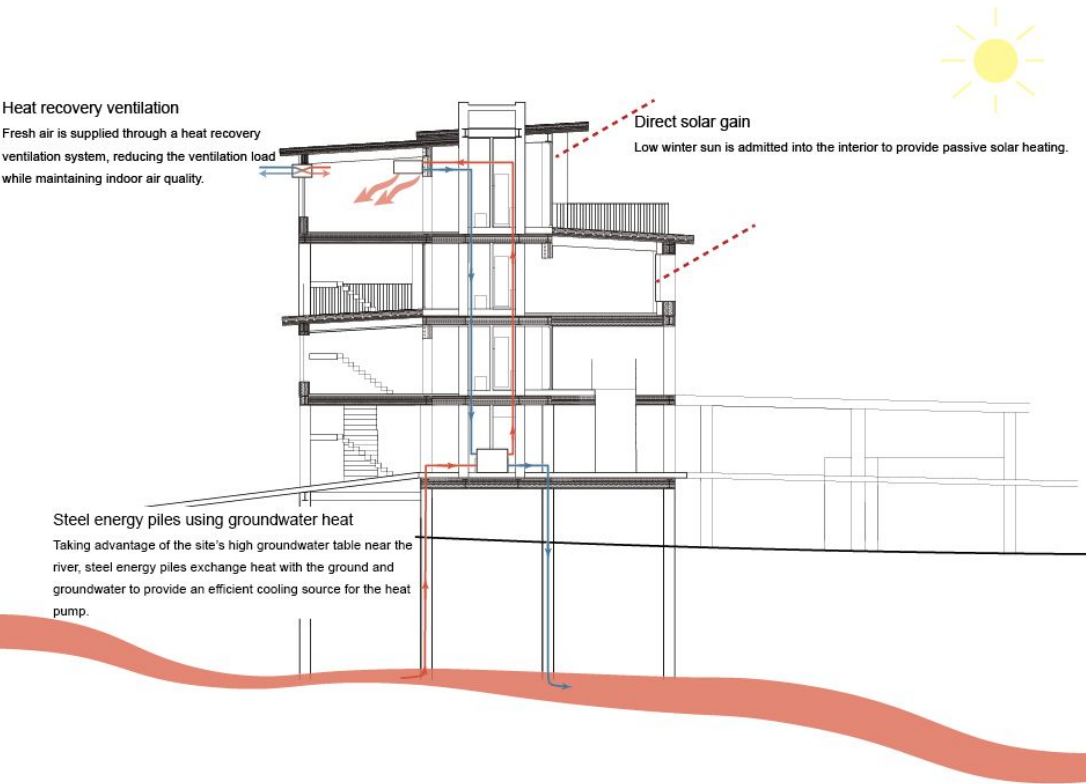


Compared with the severe winter outdoor air in Belgrade, groundwater remains thermally stable and is available in abundance. We therefore incorporated it into the active environmental system as a stable heat source for the building services.

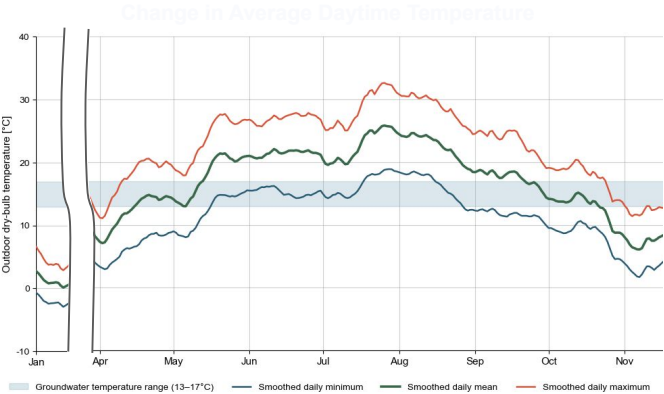


Annual energy demand for heating : 14.3kWh/m2

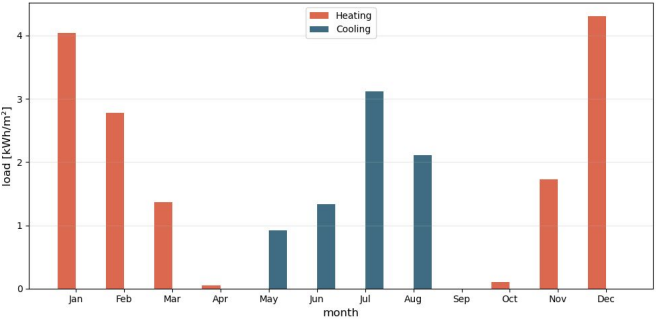
Heat exchange with groundwater can improve the heat pump's COP by providing a more stable and favorable heat source.



5-2.Climate Strategy : Cooling Load

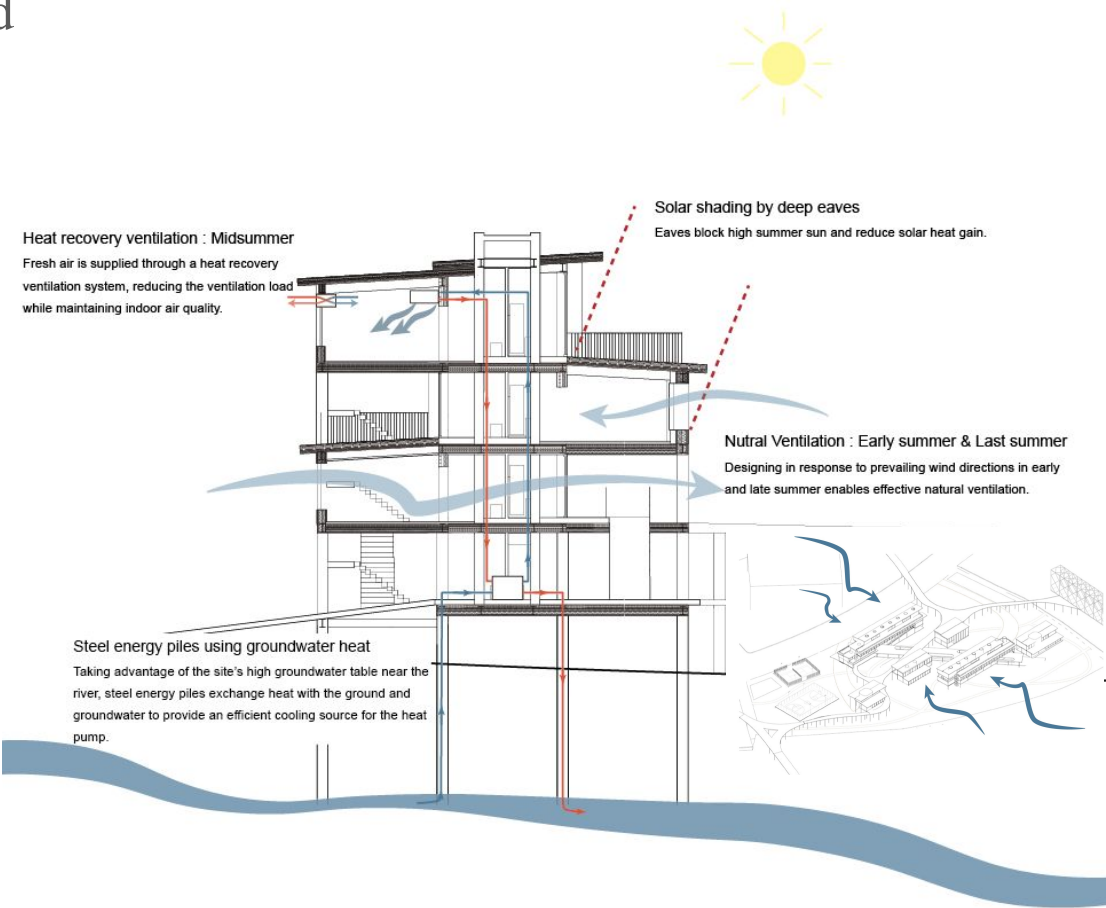


Although Belgrade experiences many relatively cool days throughout the year, there are also days when temperatures rise above 25°C. For such hot days, the building is equipped with efficient active environmental systems, while during the intermediate seasons it is designed to actively capture natural ventilation.

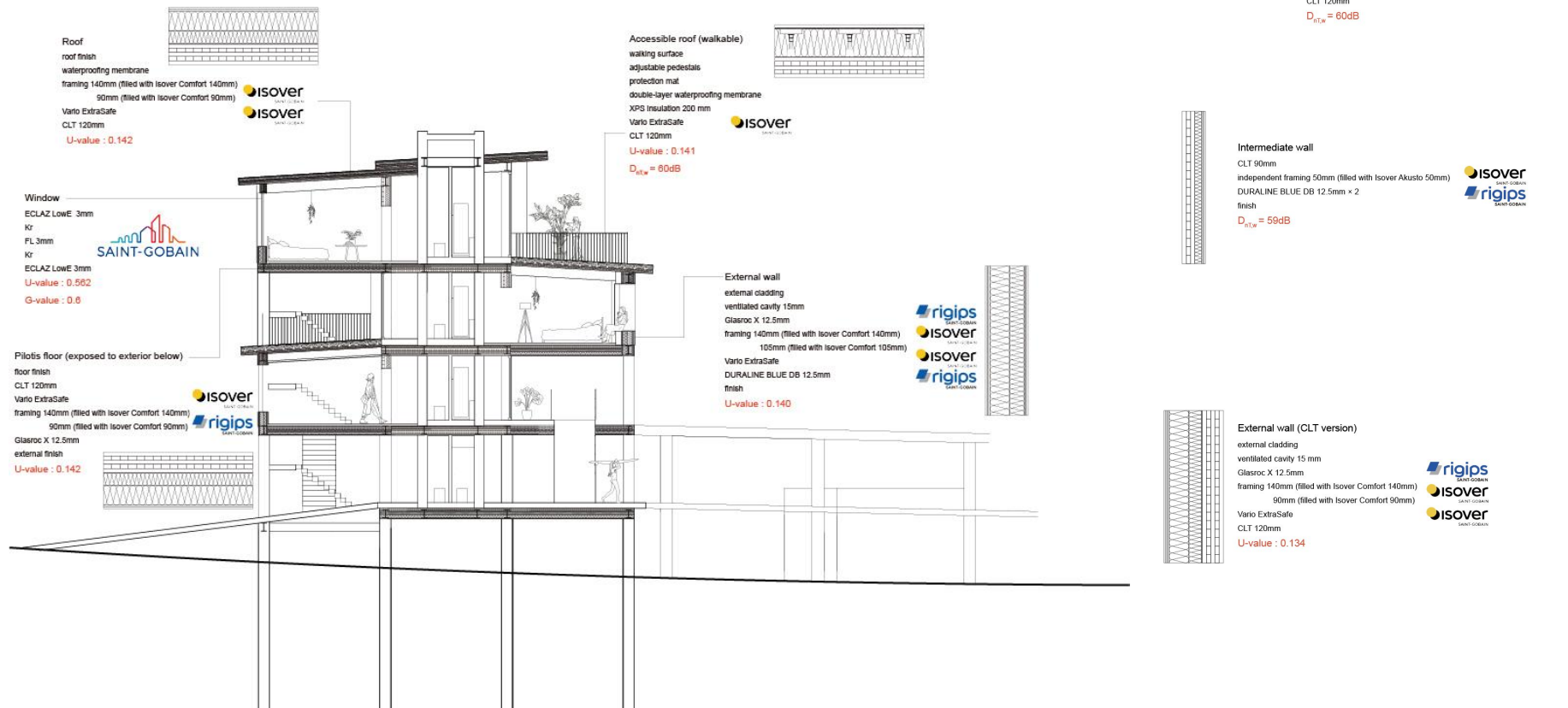


Annual energy demand for cooling : 7.4kWh/m²

Heat exchange with groundwater can improve the heat pump's COP by providing a more stable and favorable heat source.



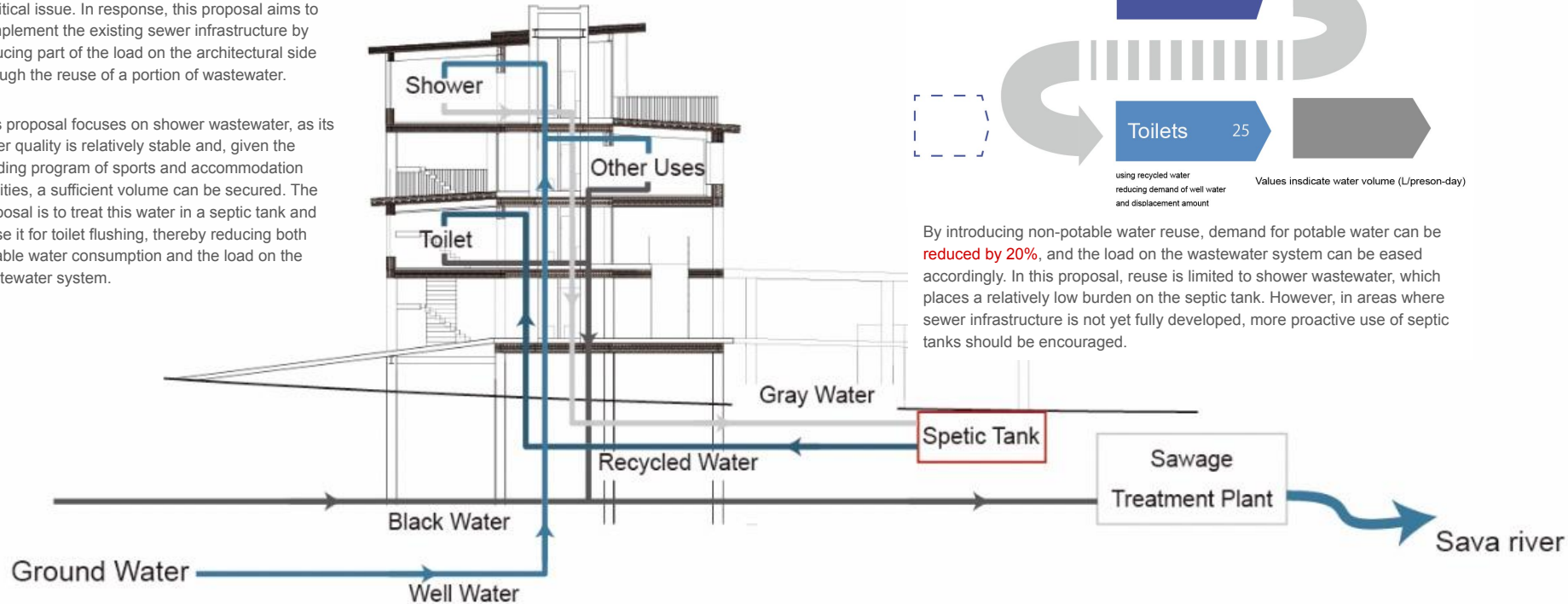
5-3.Climate Strategy : Insulation



5-4.Climate Strategy : Water Manegement

In Belgrade, the development and renewal of wastewater treatment facilities are progressing, yet reducing the burden on the river environment remains a critical issue. In response, this proposal aims to complement the existing sewer infrastructure by reducing part of the load on the architectural side through the reuse of a portion of wastewater.

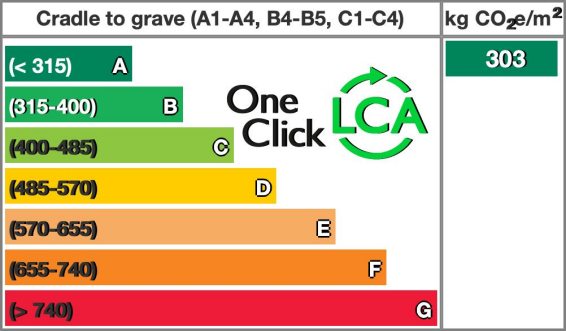
This proposal focuses on shower wastewater, as its water quality is relatively stable and, given the building program of sports and accommodation facilities, a sufficient volume can be secured. The proposal is to treat this water in a septic tank and reuse it for toilet flushing, thereby reducing both potable water consumption and the load on the wastewater system.



By introducing non-potable water reuse, demand for potable water can be **reduced by 20%**, and the load on the wastewater system can be eased accordingly. In this proposal, reuse is limited to shower wastewater, which places a relatively low burden on the septic tank. However, in areas where sewer infrastructure is not yet fully developed, more proactive use of septic tanks should be encouraged.

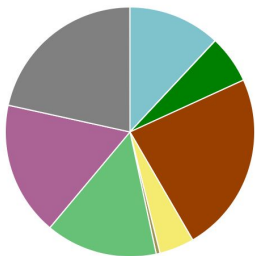
5-5.Climate Strategy : Key Environmental Impacts

Embodied Carbon Impact at the Upfront Stage

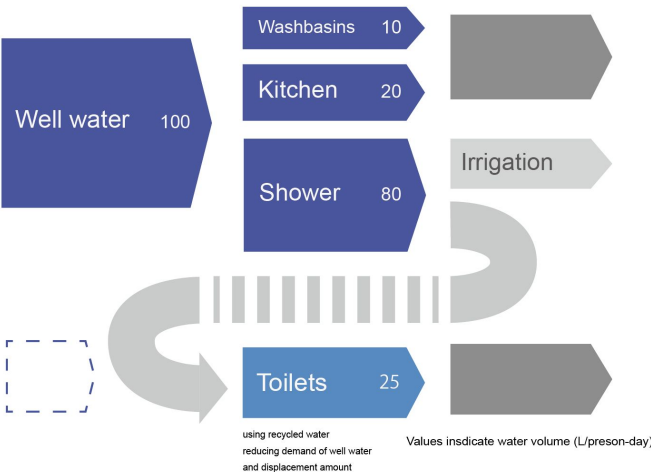
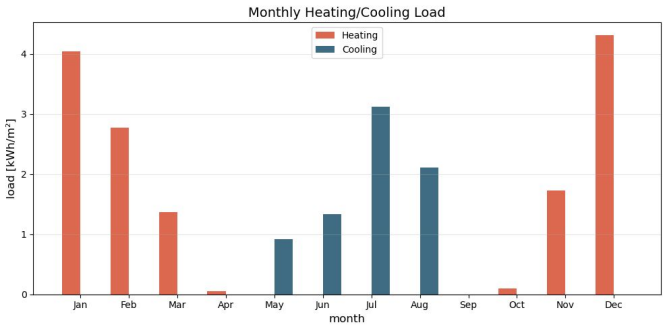


Global Warming Potential total kg CO₂e - Classifications

- 1.1 Foundations (substructure) - 12.0%
- 1.2 Load bearing structural frame - 0.0%
- 1.2.3 External walls - 6.2%
- 1.3.1 Ground floor slab - 23.4%
- 1.3.2 Internal walls, partitions and doors - 4.5%
- 1.3.3 Stairs and ramps - 0.5%
- 1.4.2 Façade openings - 14.5%
- 2. Core (fittings, furnishings and services) - 17.3%
- Construction site scenarios - 21.6%



Operational Carbon Impact



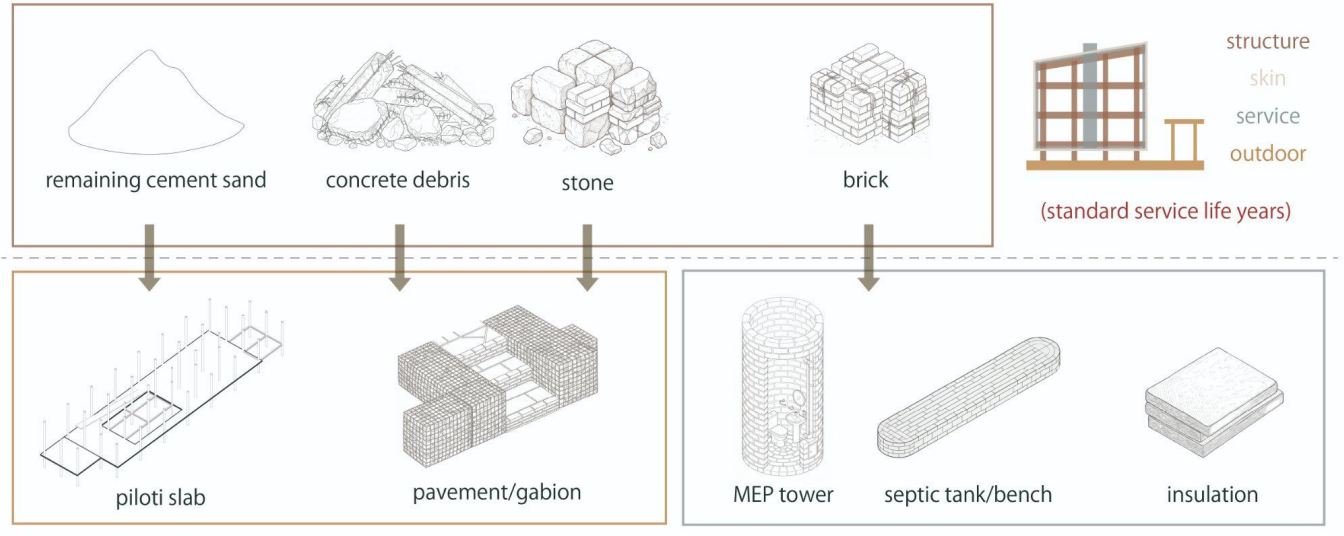
6, Material reuse

This section describes the reusable materials selected for this design.

We plan to reuse a variety of materials, ranging from sand sourced from the site of an existing cement factory, to concrete rubble and debris from construction demolition sites. Bricks and insulation materials salvaged from urban architectural demolitions are also slated for reuse.

For major building materials such as CLT and cement panels, we conducted a comparative analysis of their standard lifespans, prioritizing materials that facilitate future reuse.

Reuse material



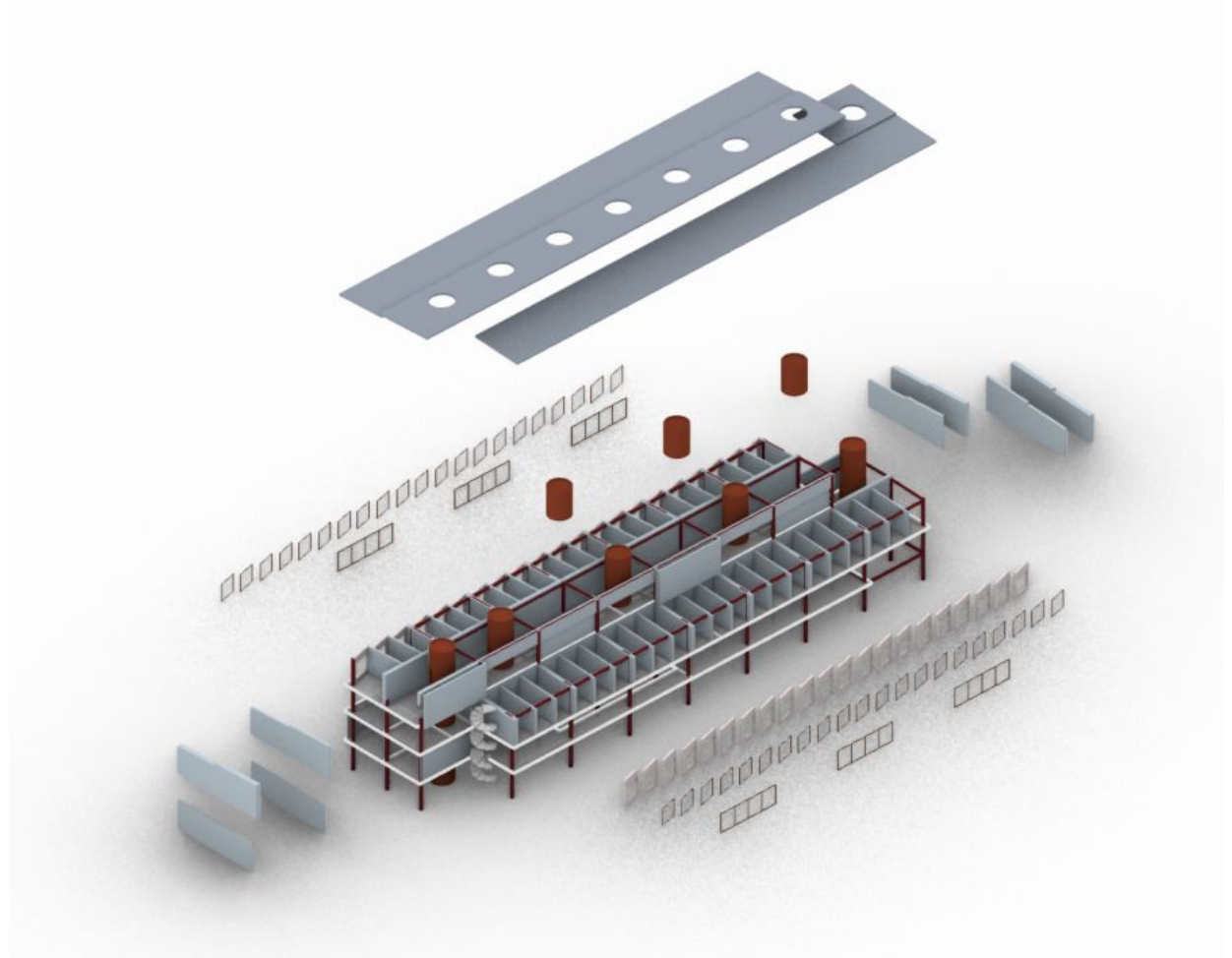
New material for reuse



6. Material reuse

Habitation wing especially demonstrates the optimization of disassembly and reuse. To ensure ease of dismantling while maintaining the quality of salvaged materials, prioritizing dry construction from the structure to the finishing is essential.

The structure is composed of a steel frame and CLT panels, is joined with bolts and metal hardware. By following the reverse process of construction rather than using destructive heavy machinery, the potential for high-quality material reuse is significantly increased.



7. Renovation

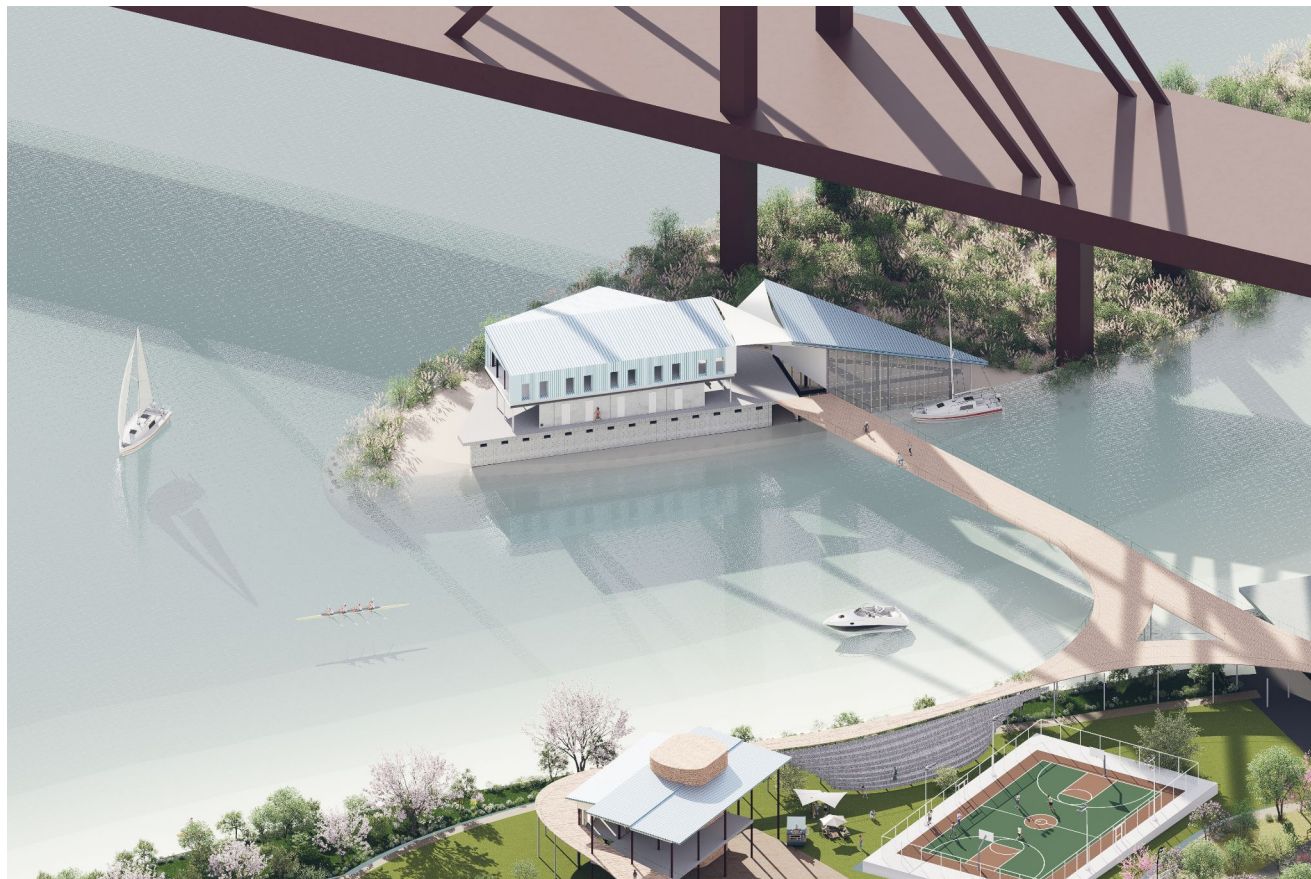
Visible Repair and Storage Hub

The project renovates a yacht club located on a river island, transforming it into a visible hub for storage and repair.

It serves as a base for storing equipment and materials for yachts and water sports, while exposing the processes of maintenance and reuse.

By aligning the axis of the existing structure with the new circulation, the former terrace is redefined as a new entrance.

Stored components are visible from the bridge, while the interior void reveals the repair of boats, making cycles of use and reuse perceptible.

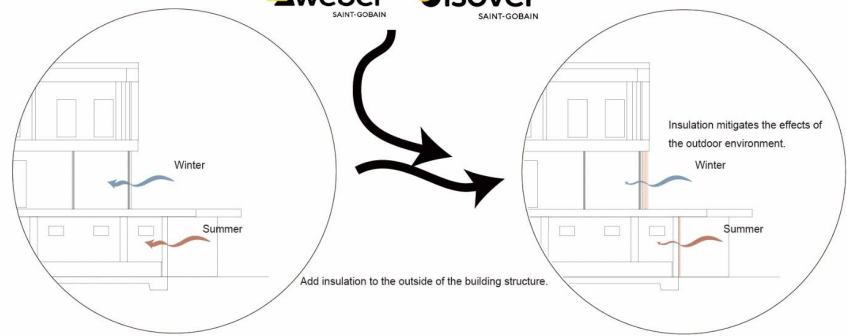
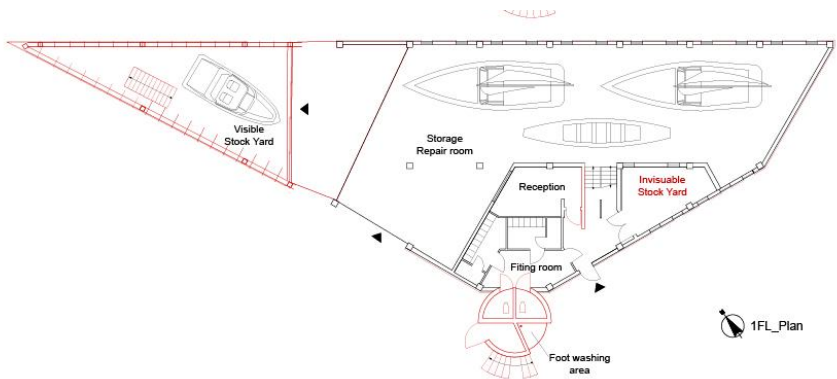
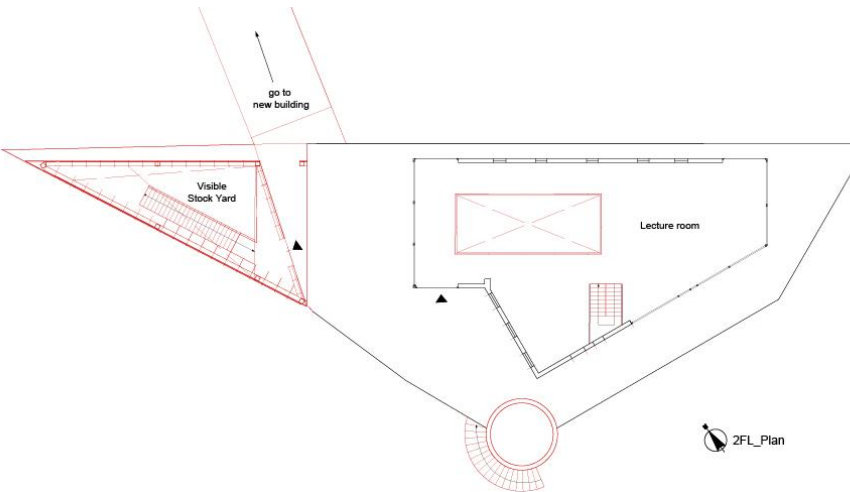


7.Renovation

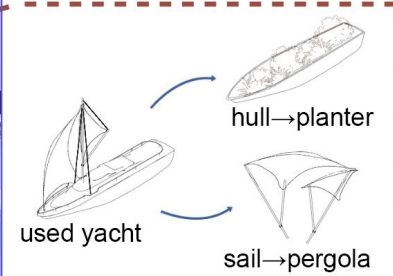


Yacht club and visual stock yard

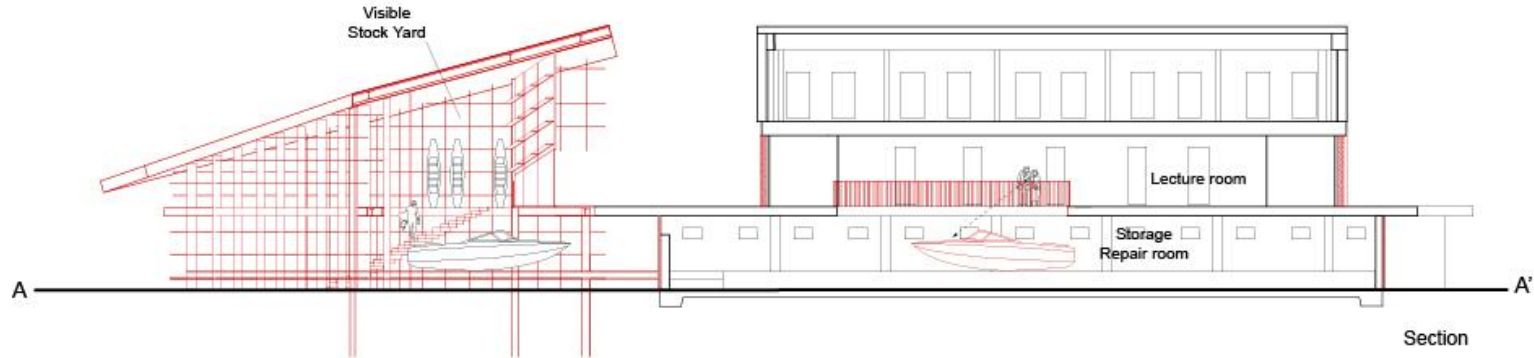
7.Renovation_Plan



7.Renovation_Section and transportation strategy



Sails that have finished serving their original role are removed through the Visible Stock Yard and repurposed as pergolas, providing shade from the sun and creating places for people to gather.



8. Phased and Parallel Construction

The project proposes a phased and parallel construction process, where time-intensive elements such as steel pipe piles and landscape are implemented first.

While construction continues, the site remains partially open and active.

As a result, vegetation is already established by the time of completion, allowing environmental and social flows to emerge more rapidly.



Phase1;

Soil remediation

Restoration of the riverside vegetation

Construction of the sports facilities on the west side



Phase2;

Construction of the building clusters

Renovation of the yacht club



Phase3;

Architecture, landscape, and the ecosystem will fully align, completing the vision proposed in this project