



## **Greenery Intensification**

Greenery intensification is designed to work in architectural tandem with the modular spine, wrapping around its elevated structure to blur the boundary between built and natural. Tree clusters are positioned to frame views, cast shade on gathering spaces, and guide movement between nodes while layered vegetation acts as a living insulation system, cooling surrounding air and reducing solar gain on adjacent built surfaces. Planting is densified within the site boundary to foster a self-contained ecosystem, limiting sprawl and reinforcing spatial cohesion.

### Landscape Strategies



## Natural Filtration System + Water Retention

The bioswale and retention ponds are strategically integrated into the architecture to manage water ecologically while reinforcing the spatial logic of the site. The bioswale weaves beneath the elevated spine, guiding stormwater through a planted filtration channel that mimics natural hydrological flows. Retention ponds are positioned at key collection points to slow runoff, allow sedimentation and support biodiversity. These water-sensitive features are calibrated with building modules and pathways to form a continuous circuit by cleansing, storing and reusing water within the site.





Self Sufficiency



# **Cross Ventilation**

Cross ventilation is optimized through operable doors that can be rotated to face the prevailing wind direction, enhancing indoor air movement. The perforated doors allow airflow when closed during rain but preserve outward views and a sense of connection to the surrounding landscape. The elevated design facilitates a secondary cross ventilation path beneath the deck, where cooler air flows under the structure, an advantage not achievable in conventional grounded designs. Additionally, the architec-ture employs the stack effect through its butterfly roof design, enabling hot air releasing from internal loads to escape.







**Clean Energy Harvesting and Battery Storage** 

A hybrid photovoltaic-thermal (PV-T) system utilizing high-efficiency

monocrystalline cells is deployed to simultaneously produce electricity and capture waste heat that would otherwise be lost. By removing excess

heat, the PV panels operate at a lower temperature, which improves the performance by additional 3 - 4%. The recovered thermal energy is repur-

posed to preheat water for cooking and hygiene needs. Simulations indi-

Mist Catcher

Landscape

Garden

## Flood Mitigation

The Spine is lifted on stilts, allowing stormwater to flow beneath while maintaining uninterrupted access and usability during heavy rain. Surrounding ground levels are carefully contoured to channel runoff toward bioswales and retention ponds, preventing waterlogging and erosion. This topographical layering protects key communal spaces from flood risks and reinforces The Spine's role as a sheltered and accessible in all weather conditions.





## **Rain Water Harvesting + Filtration**

The butterfly roof serves as the rainwater catchment area and directs the rainwater to flow into the gutter which is positioned in the center. Rain-water is then channeled through gravity-fed multi-stage water filtration system which is mounted to the vertical timber column. The water filtration system includes sand and sedimentation filters, activated carbon filters and UV disinfection unit. Water is then stored in the timber barrels, traditional in appearance but innovative in function. Inspired by the "Hippo water roller" concept, these timber barrels are mobile, allowing residents to conveniently transport water back to their homes.



