Sustainable Sites

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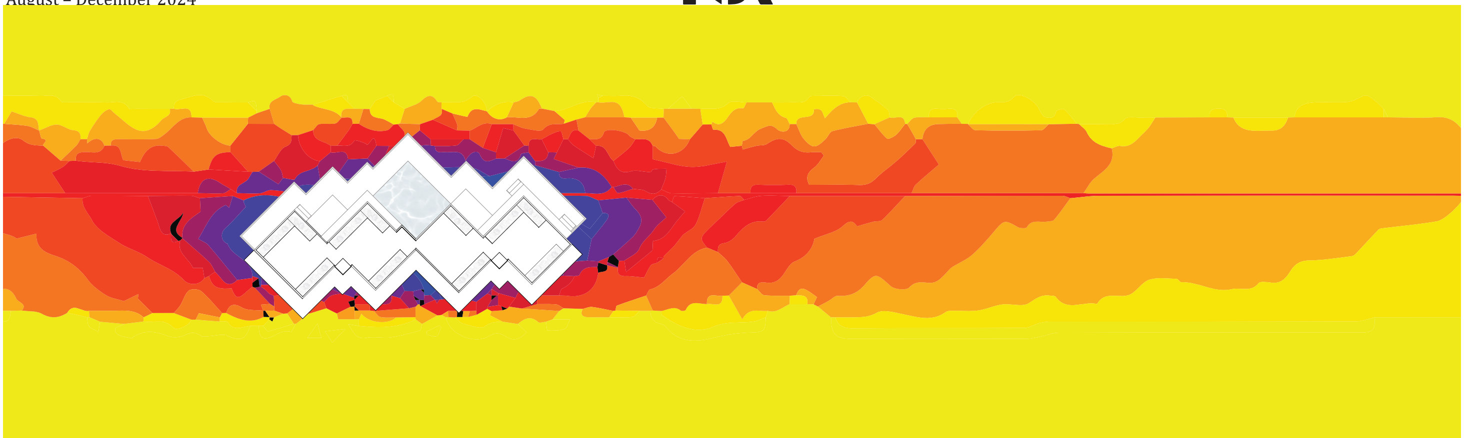
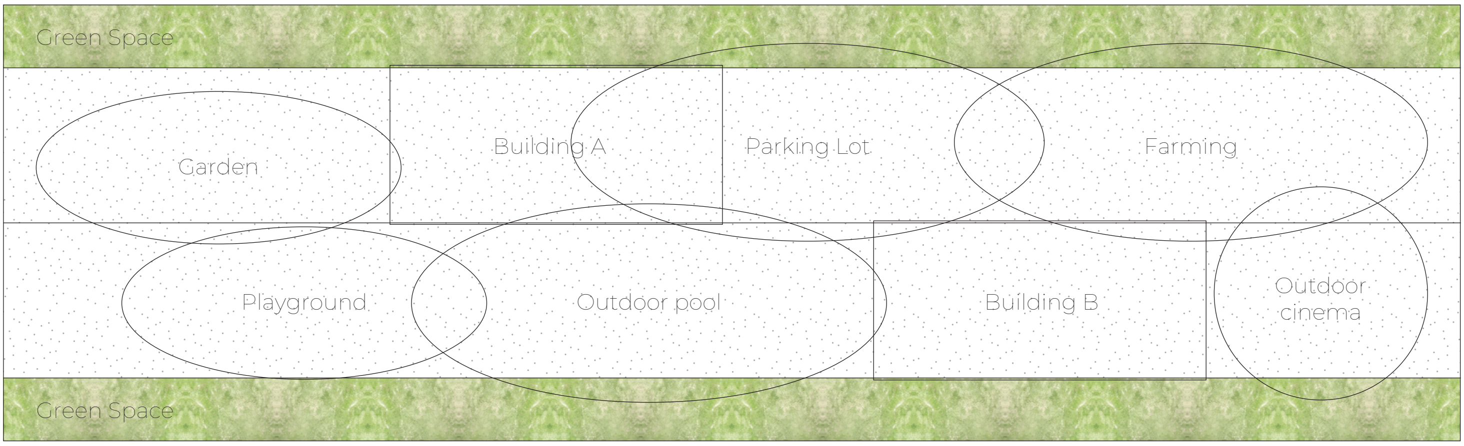


Sunlight Study

During March, June, and September, the site experiences consistent sunlight levels throughout the day due to its open context. The surrounding environment provides minimal shading, with only the areas immediately adjacent to the building offering any significant shadow. As a result, the majority of the site remains exposed to direct sunlight, highlighting the need for strategic shading or cooling interventions to enhance comfort and sustainability.



Initial Planning

The sunlight analysis informs the landscape design strategy for the site, emphasizing the integration of green spaces both top and bottom of the areas. These green spaces enhance the environment by improving air quality, reducing heat, and offering natural shading to protect the site from excessive sunlight exposure.

To further minimize solar radiation throughout the site, two key building strategies are employed: strategically placed overhangs or cantilevers to provide shade, and the incorporation of vertical greenery or green facades on the buildings to diffuse sunlight and cool the surrounding areas. Together, these approaches create a more sustainable and comfortable environment for the site.

August – December 2024

Master Plan

In the masterplan, I aim to maximize green spaces to support future residential development while enhancing sustainability. By incorporating a variety of eco-friendly materials in both hardscape and softscape design, the site benefits from improved environmental performance. Examples include the use of turf blocks, permeable pavements, and other innovative materials that facilitate stormwater management by collecting runoff for future reuse. These strategies not only create a functional and aesthetically pleasing landscape but also contribute to long-term resource efficiency and environmental resilience.

Acacia auriculiformis

A fast-growing, hardy tree ideal for shade and reforestation. It thrives in poor soils, tolerates drought and salinity, and improves soil fertility by fixing nitrogen.

Plumbago auriculata

A low-maintenance shrub known for its vibrant blue flowers. It thrives in full sun, attracts pollinators, and is drought-tolerant, making it ideal for tropical landscapes and as a ground cover or hedge.

Cymbopogon citratus

or Lemongrass, is a hardy, aromatic grass that thrives in tropical climates. It's drought-tolerant, easy to maintain, and helps improve soil quality. Known for its fragrant leaves, it also repels pests and attracts beneficial insects.

Sustainable Sites	
Project Site	12000 m2
Green Area	3600 m2
Is the green area enough for the project site?	yes
Open Space	3000 m2
Vegetated area within the open space	4800 m2
Does the open space contain enough vegetated area?	yes

Heat Island Effect Calculation	
Method 1) Standard non-roof or roof calculation	
Total site paving area	2500 m2
Total roof area	1500 m2
Hardscape area on ground (SR or SRI < 0.33 or 33)	1500 m2
Vegetated area on ground	3500 m2
Area of vegetated roof measures	1000 m2
Heat Island Effect by the non-roof and roof design	4333
Heat Island Effect of Total Surface	4000
Result	Successful!

Rainwater Management					
Klong Toei station's 98th percentile rainfall					1.77 inches
Project site area					12,000 m2
Category	Types of material	Area (m2)	Area (ft2)	Run-off Coefficient	Captured run-off (ft3)
Roof	Concrete roof	1,704	18,342	0.9	2,435
	Paved terrace and balcony areas	1,200	12,917	0.8	1,524
	Green roof area (flat)	891	9,591	0.1	141
Ground	Permeable pavement	1,000	10,764	0.35	556
	Vegetation (green)	700	7,535	0.1	111
	Lawns (flat)	1,000	10,764	0.15	238
		Total site area		m2	6,495
		Total run-off		ft3	11,500
				m3	326

Outdoor Water Use Reduction		
Average monthly rainfall for the site's peak watering month	11.68	mm/month
Peak watering demand	115	mm
Peak watering month (ETo)	127	mm
Landscaped area	6,800	m2
Landscape water baseline	863,600	l/month
Landscape water allowance	604,520	l/month

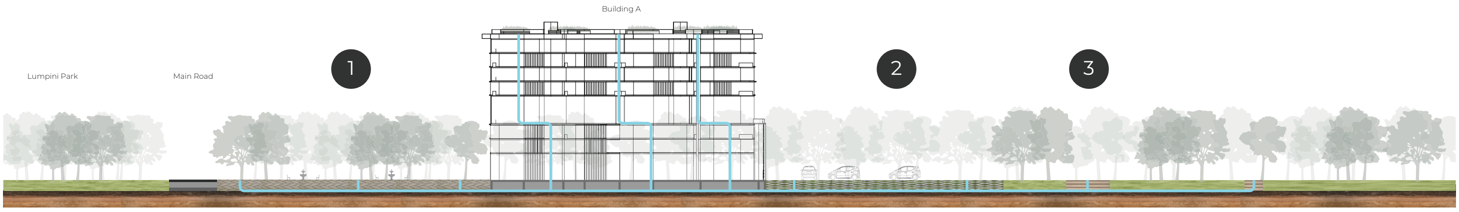
Plant Type or Landscape Feature	Hydrozone or Landscape Feature Area (m2)	Water Requirement	Landscape Coefficient (KL)	Irrigation Type	Distribution Uniformity (DULQ)	LWRH (l/month)
Trees	2,500	Mid	0.5	Drip (standard)	70%	216,357
Shrubs	200	Low	0.2	Micro spray	70%	6,423
Groundcover	3,500	Low	0.2	Micro spray	70%	112,400
Turfgrass	700	Low	0.6	Micro spray	70%	73,280
Total hydrozone or landscape feature area (m2)					6,900	
Landscape water requirements based on the site's peak watering month (l/month)					408,460	
Outdoor water saving (%)					33%	

	mm/month
Landscape water baseline	876,300
Landscape water allowance	613,410
Landscape water requirements	408,460

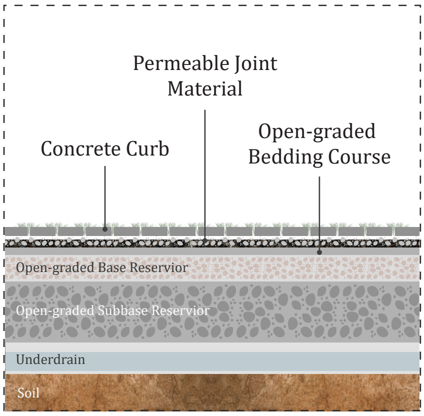
The calculation of the heat island effect, rainwater management, and outdoor water use reduction plays a critical role in creating a sustainable and efficient building and site. By analyzing the heat island effect, strategies such as reflective materials, green roofs, and increased vegetation can be implemented to lower ambient temperatures, improving comfort and reducing cooling energy demands. Effective rainwater management, including permeable surfaces and storage systems, mitigates flooding risks, promotes groundwater recharge, and ensures water availability for non-potable uses. Reducing outdoor water waste through efficient irrigation systems and drought-resistant landscaping minimizes resource consumption and supports long-term sustainability. Together, these measures enhance the environmental performance of the site, contributing to a resilient, eco-friendly, and cost-effective design.

Section A

Scale 1 : 1500

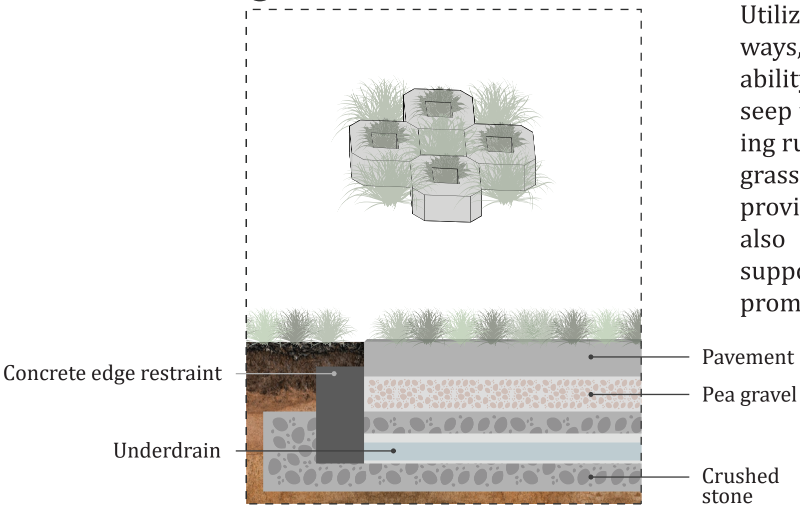


1 Permeable Pavement



I incorporated permeable pavement for most pedestrian walkways, designed with small gaps between the concrete where grass can grow. This not only enhances the aesthetic but also ensures effective water runoff collection. The permeable surface allows rainwater to seep through, while an integrated piping system beneath ensures efficient water collection for future use, supporting sustainable water management on-site.

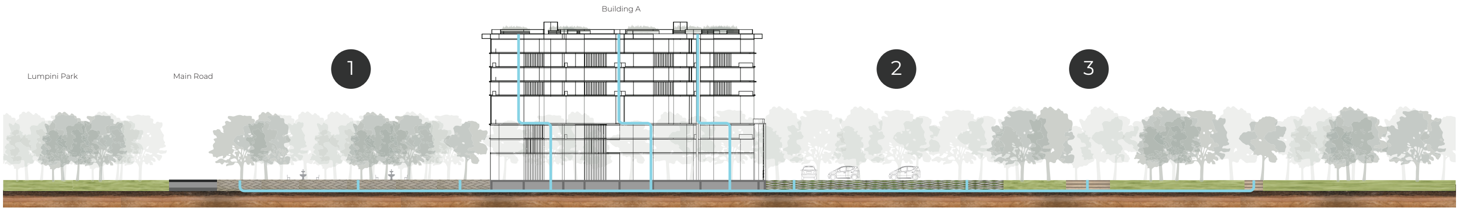
2 Turf Block



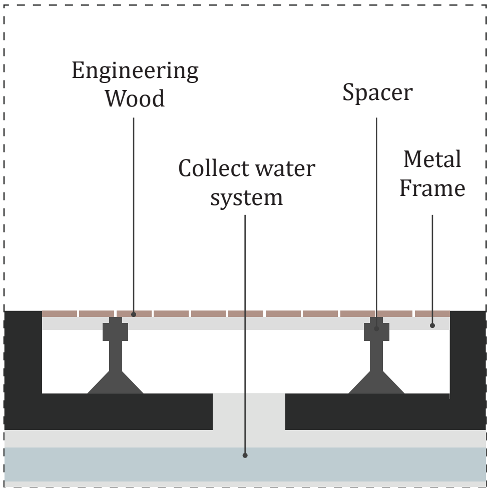
Utilized for street roads, parking lots, and driveways, offering both functionality and sustainability. These permeable blocks allow water to seep through their structure, effectively managing runoff and reducing the risk of flooding. The grass-filled gaps between the blocks not only provide a visually appealing, green surface but also aid in water infiltration and collection, supporting efficient water management and promoting groundwater recharge.

Section A

Scale 1 : 1500



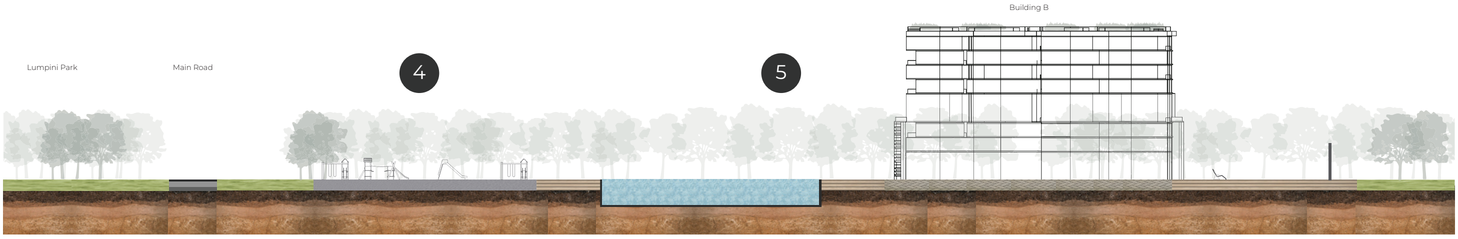
3 Enginerring Wood



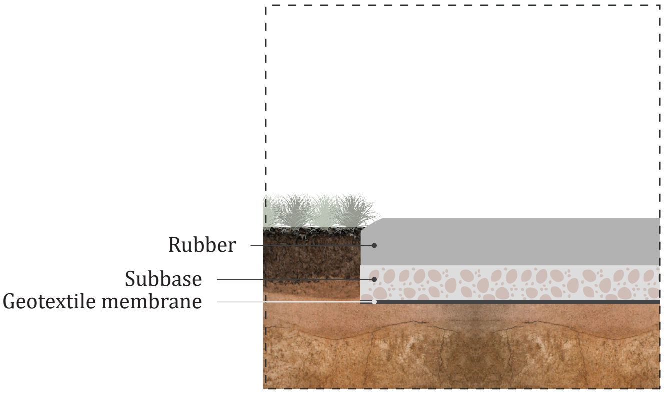
Engineered wood decking is utilized for pool decks, outdoor cinemas, and farming walkways, offering both durability and sustainability. The design features a wooden surface supported by a metal frame, with spacers creating gaps for water to pass through. Beneath the deck, an integrated water collection system efficiently captures runoff, promoting effective water management. This system not only enhances the functionality of the decking but also contributes to the site's overall sustainability by reusing collected water for various purposes.

Section B

Scale 1 : 1500



4 **Rubber**



Rubber materials are used in the children's playground to provide a safe and durable surface. The design includes a subbase for stability and a geotextile membrane to enhance drainage and prevent soil erosion. This combination ensures a resilient and shock-absorbing surface that minimizes injuries, while also effectively managing water runoff, making it both practical and environmentally friendly.

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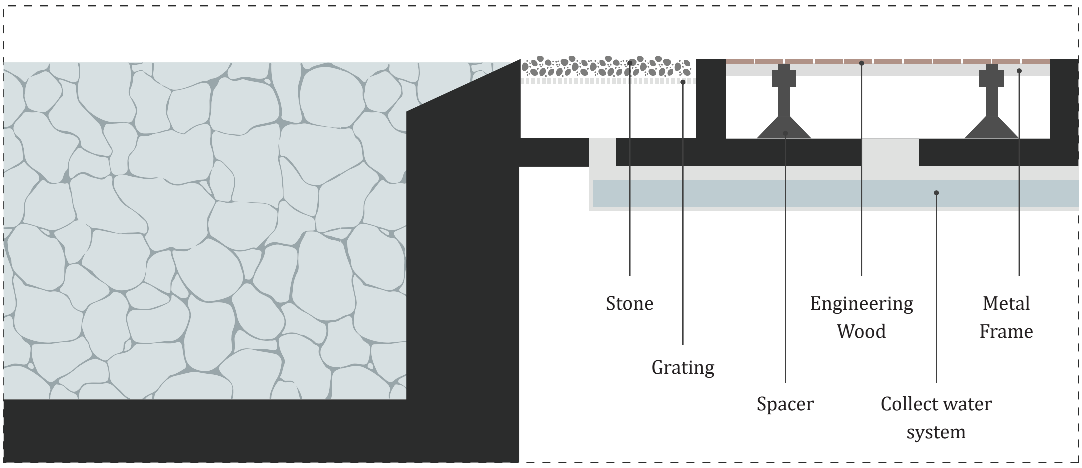
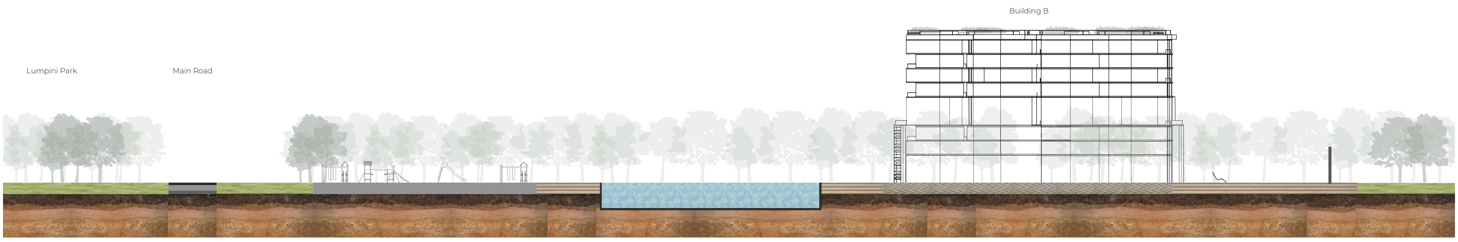


In the swimming pool area, grating spaces are installed beside the pool deck to efficiently collect overflow water. These grates direct the water into the same integrated piping system used for the pool deck, ensuring seamless water management. This design not only prevents pooling and enhances safety but also promotes sustainability by channeling the collected water for reuse or proper drainage, aligning with the overall eco-friendly strategy of the site.



The condo project located at 77/2 Witthayu Road successfully addresses the challenges posed by the urban environment and climate factors, with a focus on sustainability and occupant well-being. By carefully selecting the final massing form based on solar radiation analysis, the design minimizes heat exposure while optimizing views of the adjacent Lumpini Park. The integration of fixed and sliding vertical louvers ensures adaptable shading, reducing solar gain and enhancing thermal comfort throughout the day.

Additionally, the inclusion of green walls promotes natural ventilation and improves air quality, aligning with biophilic design principles to foster a healthier and more enjoyable living environment. The project's design not only responds to the immediate context but also contributes to long-term environmental resilience, providing a comfortable space that respects both human needs and the surrounding ecosystem.

This condo design exemplifies a harmonious balance between modern urban living and nature, setting a precedent for future developments in Bangkok's urban landscape.