Green Strategies For Building Design (ARC61804)

ASSIGNMENT 2

PASSIVE GREEN BUILDING STRATEGIES REPORT

Integrated with Architectural Design Studio Projects - ADIV



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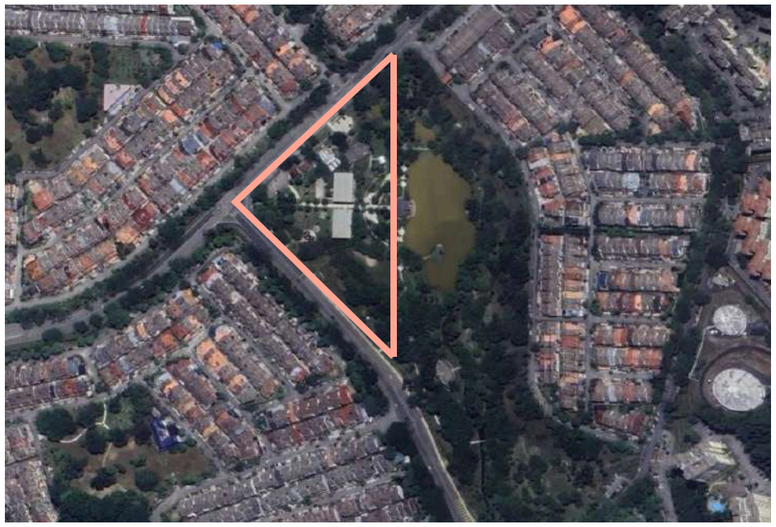
1.0

SITE INTRODUCTION & CLIMATIC ANALYSIS

1.0 SITE INTRODUCTION

SITE BACKGROUND

Key Plan - Taman Wawasan Puchong





Taman Wawasan is a well-planned freehold township in Puchong, developed by Setia Promenade Sdn Bhd (S P Setia). It is strategically positioned between Bandar Puchong Jaya and Bandar Puteri Puchong, offering seamless access via key highways such as LDP, KESAS, ELITE, and the North-South Expressway. Public transport is also accessible, with the Pusat Bandar Puchong LRT station located nearby along the Sri Petaling Line.

The site sits at approximately 49 meters above sea level and features predominantly flat terrain, making it suitable for development and recreational use. The selected site for this project is located within the township's central recreational area, covering about 38,800 square meters, and serves as an important green and social space for the surrounding community.

Location

Address :
Taman Wawasan Recreational Park, Persiaran Wawasan, Taman Wawasan, 47100 Puchong, Selangor

3°02'01.0"N 101°37'27.9"E

- Accessible via Persiaran Wawasan.
- Surrounded by residential areas, schools, and local amenities.

Description

Taman Wawasan Recreational Park in Puchong is a 25-acre sustainable urban green space featuring a scenic lake, mature trees, and a looped 1.4 km paved trail. Designed to support recreation and wellness, it includes courts for basketball and futsal, children's playgrounds, fitness stations, and family picnic areas. With accessible facilities and eco-conscious elements like recycling bins, this park offers both a serene retreat and a vibrant hub for community activity.

LEGENDS

Main road
- A — From **Jalan Serindit** to **Taman Wawasan**
- B — From **LDP Highway** to **Taman Wawasan**
- C — From **Baitul Amin Mosque** to **Taman Wawasan**

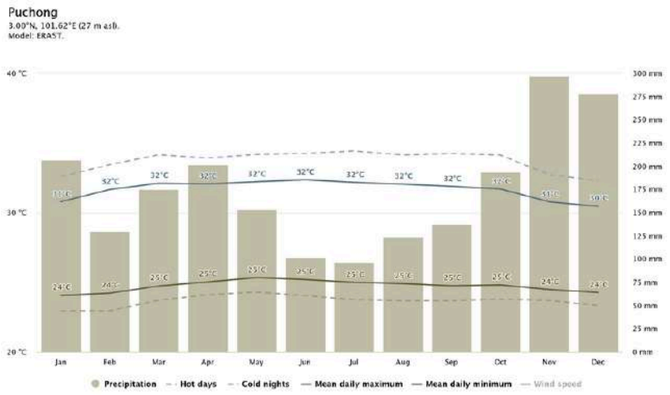
Secondary road : From **Main road** to **Residential / Commercial area**

- 1 Landmark
- 2 North site
- 3 South site
- 4 Water bodies
- 5 Residential areas
- 6 Approximate 1km from LRT Pusat Bandar Puchong

1.0 SITE INTRODUCTION

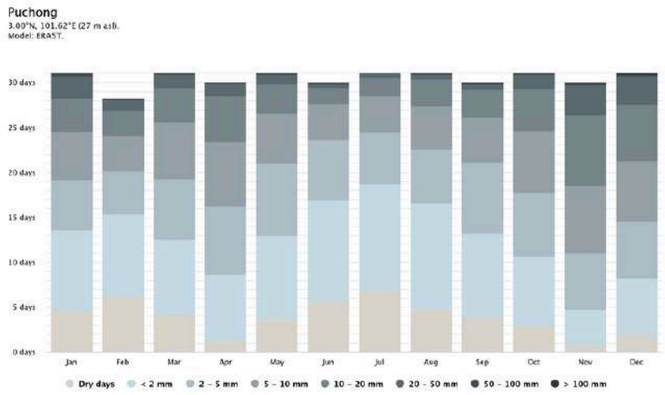
CLIMATIC ANALYSIS

TEMPERATURE



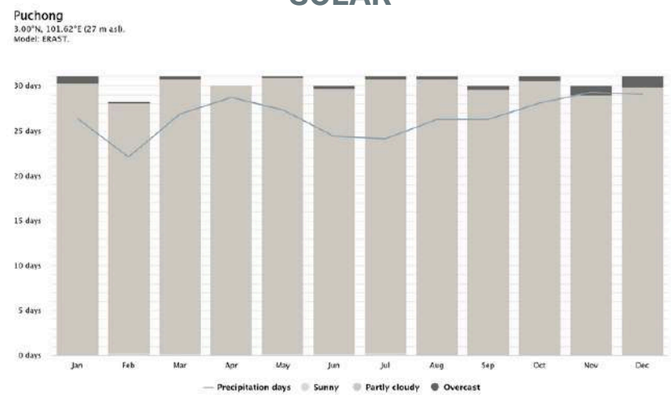
Puchong experiences hot weather year-round, with average highs around 32°C and overall temperatures near 30°C. As the thermal comfort level is 25°C, implementing heat reduction strategies is crucial. Temperatures slightly drop towards year-end, offering minimal relief.

PRECIPITATION



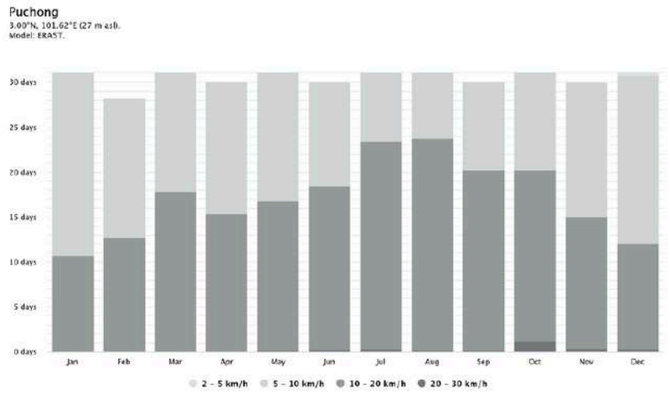
The site receives a high amount of rainfall, averaging around 100 mm per month, with the wettest period from October to January. This makes it suitable for integrating a rainwater harvesting system into the design.

SOLAR



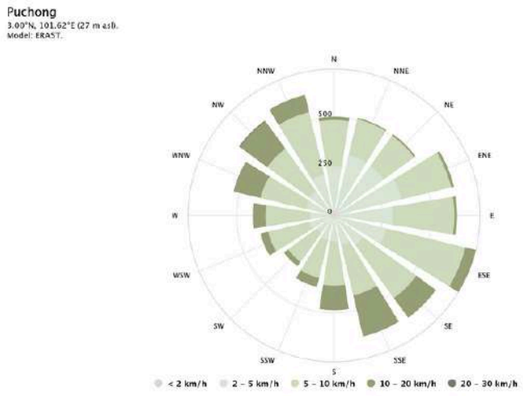
Although the site often experiences partly cloudy conditions, its tropical climate ensures steady solar exposure throughout the year. This makes it well-suited for the implementation of solar power systems, such as photovoltaic panels, to harness renewable energy.

WIND SPEED



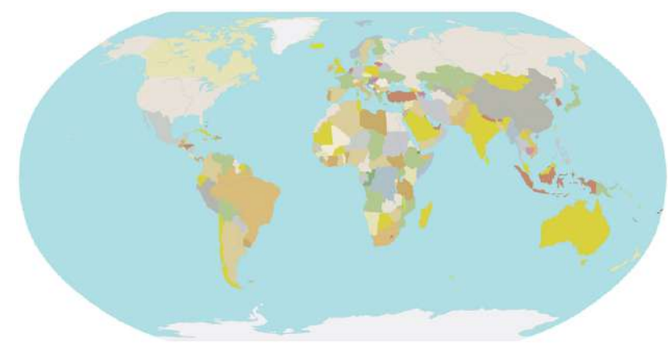
The site experiences stronger winds during July to August due to the monsoon season, with peak wind speeds reaching up to 15 m/s, which may not be ideal for comfort. However, with an average wind speed of 10 m/s, there is good potential to apply natural ventilation strategies in the design.

WIND ROSE



The site receives prevailing winds from the north and southeast, which supports the implementation of natural ventilation strategies. Additionally, moderate and consistent wind flows in from the west, offering further opportunities for passive cooling through design orientation.

REGION



Malaysia's tropical climate results in consistently hot and humid conditions year-round, with only slight temperature variations between seasons and day/night. Therefore, it is essential to apply heat reduction strategies and ensure effective ventilation to manage indoor humidity levels.

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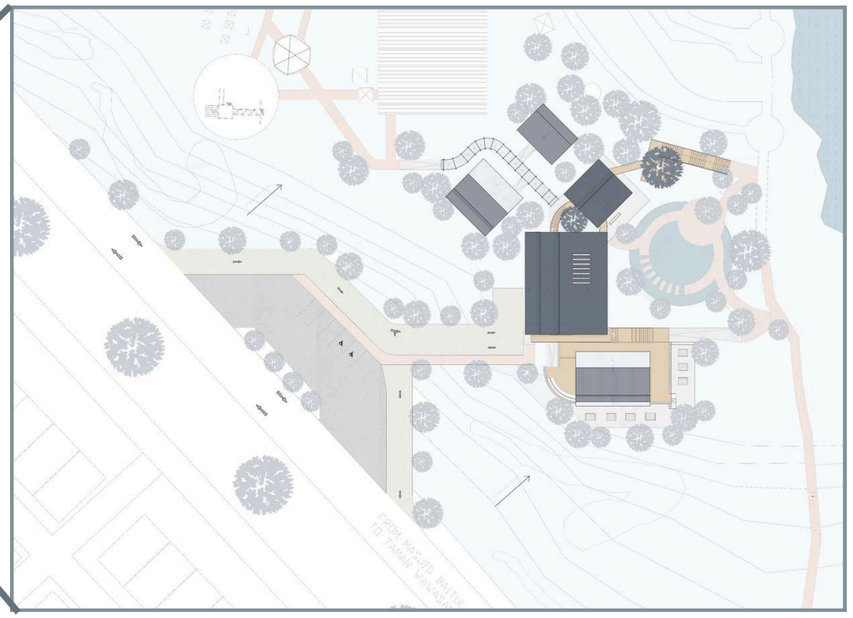
MYREKA-REASI CLUSTER - PROJECT INTRODUCTION & ORTHOGRAPHIC DRAWINGS

2.0 MYREKA-REASI CLUSTER

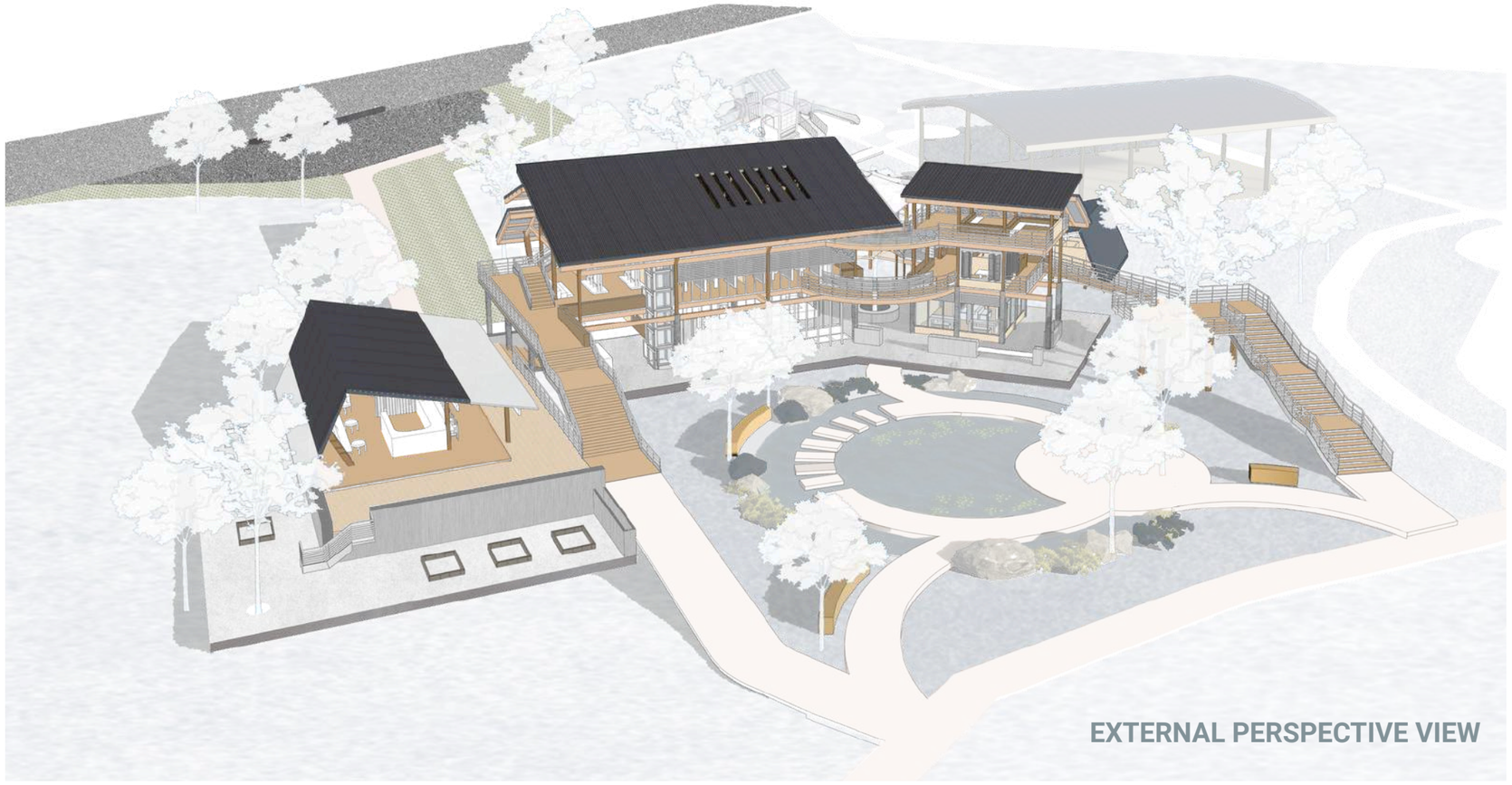
PROJECT INTRODUCTION



SOUTH SITE



SITE PLAN [N.T.S]



EXTERNAL PERSPECTIVE VIEW

MyReka-reasi CLUSTER

MyReka-reasi CLUSTER is a design project focused on creating a sustainable, community-centered space within the Taman Wawasan Recreational Park. The proposal emphasizes inclusive and creative recreational activities, integrating both indoor and outdoor spaces that promote learning, interaction, and well-being. The design prioritizes passive green strategies such as natural ventilation, daylighting, and the use of eco-friendly materials, aligning with the park's natural context and tropical climate.

Site Chosen :
South Site

Building Height :
2-3 storeys in variations of the cluster typologies

Approximate Floor Area :
Indoor - Approximately 900 sqm of net floor area
Outdoor - Not included in the 900 sqm

2.0 MYREKA-REASI CLUSTER

CONCEPT AND DESIGN INTENTION

TARGET USERS



Local families and residents



Elderly



People engage in creative, social and wellness activities

DESIGN INTENTION



Responding to Community Needs



Creating Active Social Interaction



Promoting Sustainable and Creative Living



Giving Identity to the Place

PROJECT NAME : WAWASAN KREASI

DESIGN CONCEPT

Wawasan Kreasi is a nature-inspired recreational hub designed to reconnect people through creativity, calmness, and community engagement. The design embraces inclusivity and identity by offering open, flexible spaces that support both quiet reflection and hands-on, collaborative workshops. Blending built form with natural elements, the hub creates a welcoming environment where people of all ages and backgrounds can come together, express themselves, and grow through meaningful activities.

MAIN FOCUS ACTIVITIES



DIY Workshop



Gardening Workshop



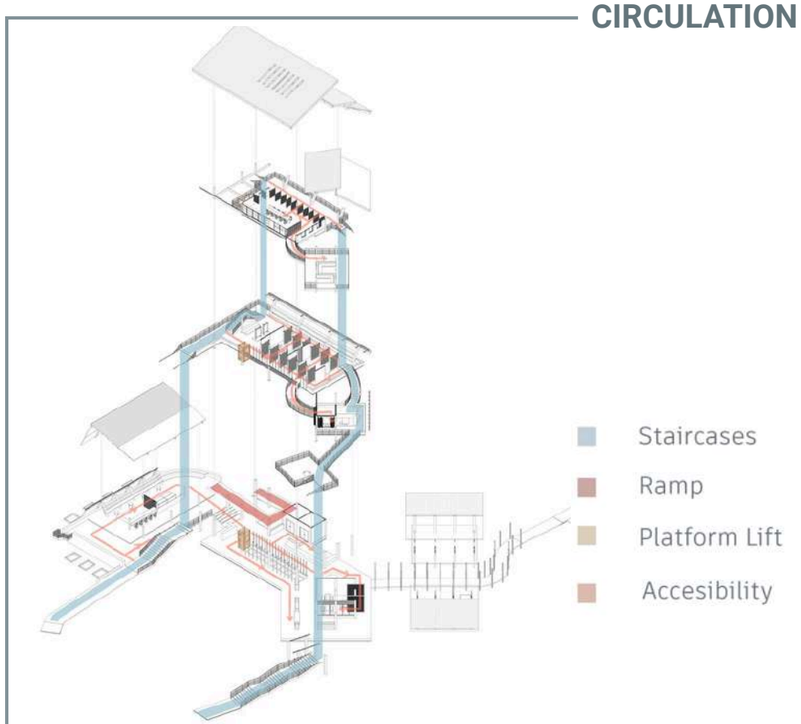
Therapy Workshop

PROBLEM STATEMENT



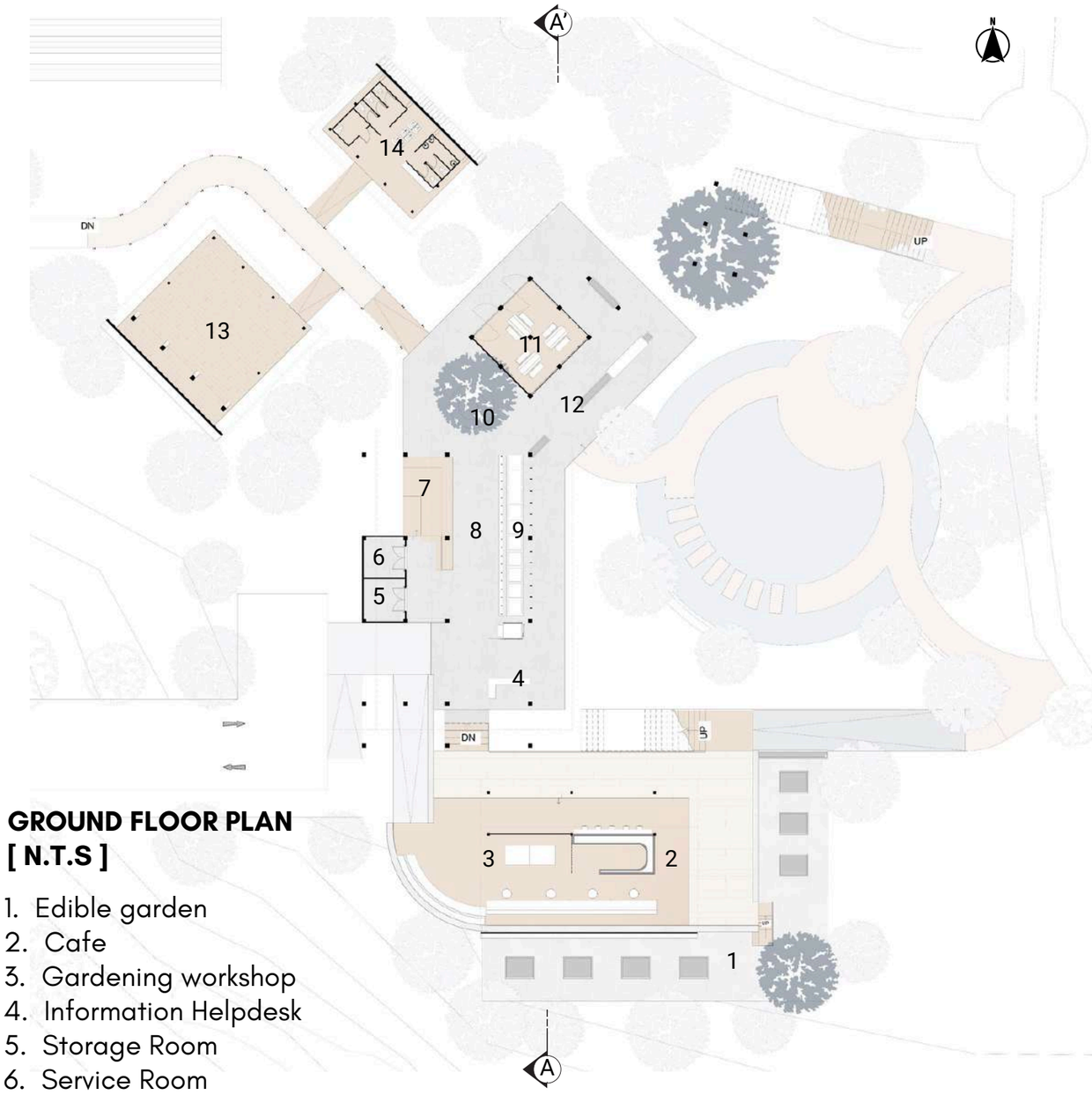
Interviews with park users revealed a need for more engaging activities, communal gathering spaces, and sheltered areas to rest. The existing facilities lack variety and comfort, limiting opportunities for social interaction and meaningful recreation.

CIRCULATION



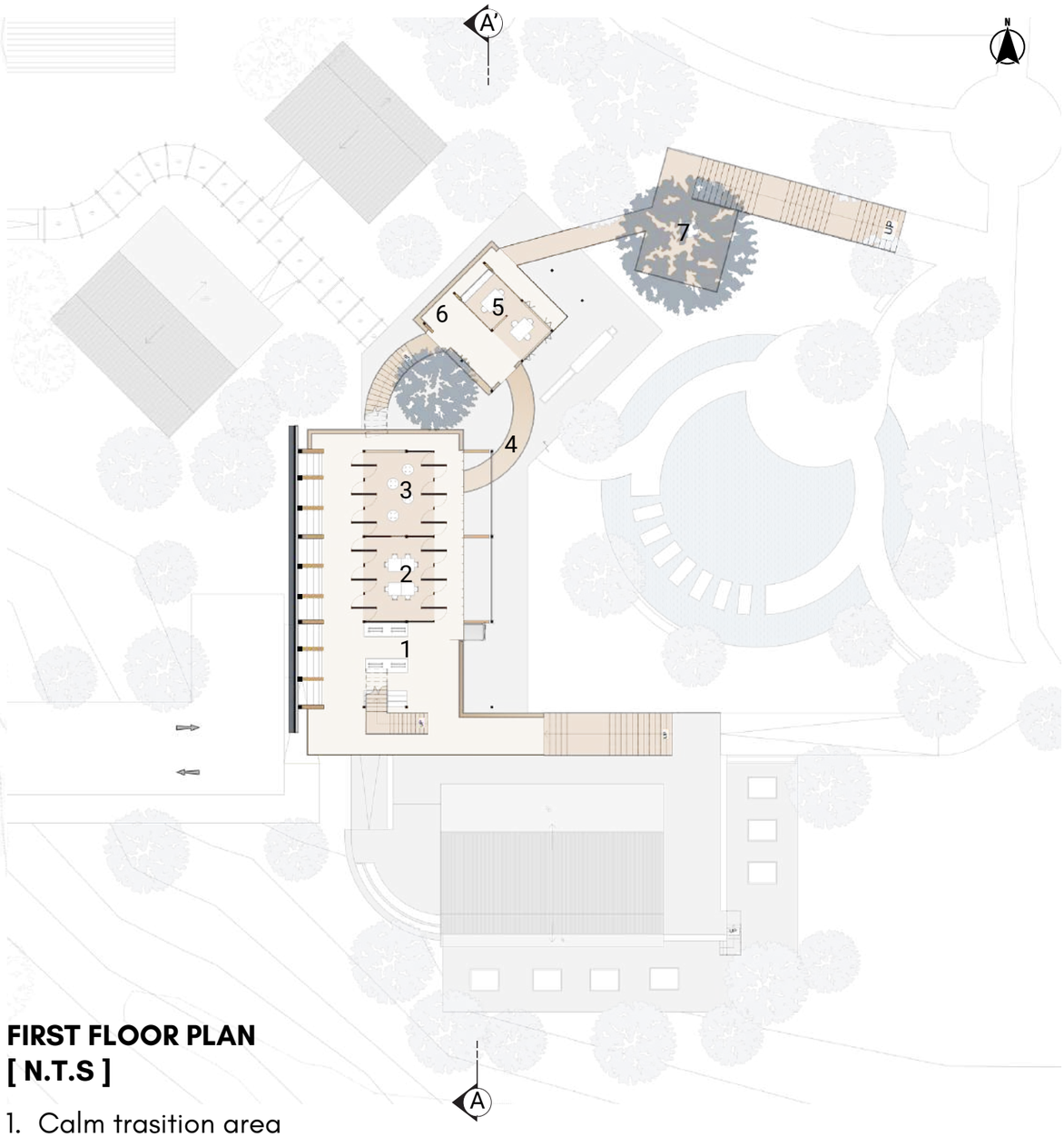
2.0 RECREATIONAL HUB

ORTHOGRAPHIC DRAWINGS



GROUND FLOOR PLAN
[N.T.S]

1. Edible garden
2. Cafe
3. Gardening workshop
4. Information Helpdesk
5. Storage Room
6. Service Room
7. Social Lounge
8. Connecting path
9. Sensory walkway
10. Indoor seating area
11. Multi-purpose workshop room
12. Corridor with seating
13. Open Deck
14. Toilet

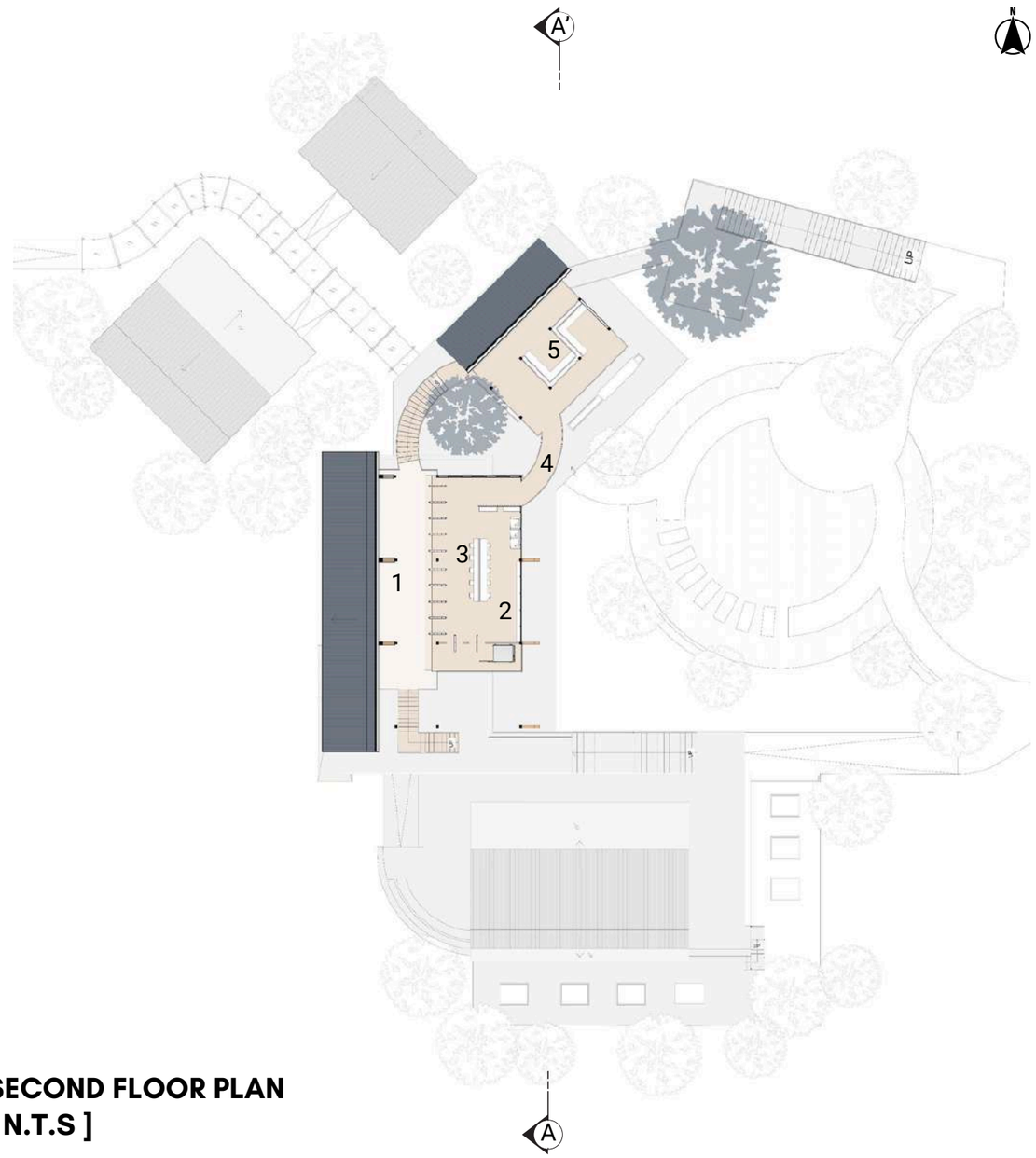


FIRST FLOOR PLAN
[N.T.S]

1. Calm trasition area
2. Therapy workshop room
3. Activity room
4. Link bridge
5. Community sharing corner
6. Open view deck
7. Open roof platform

2.0 RECREATIONAL HUB

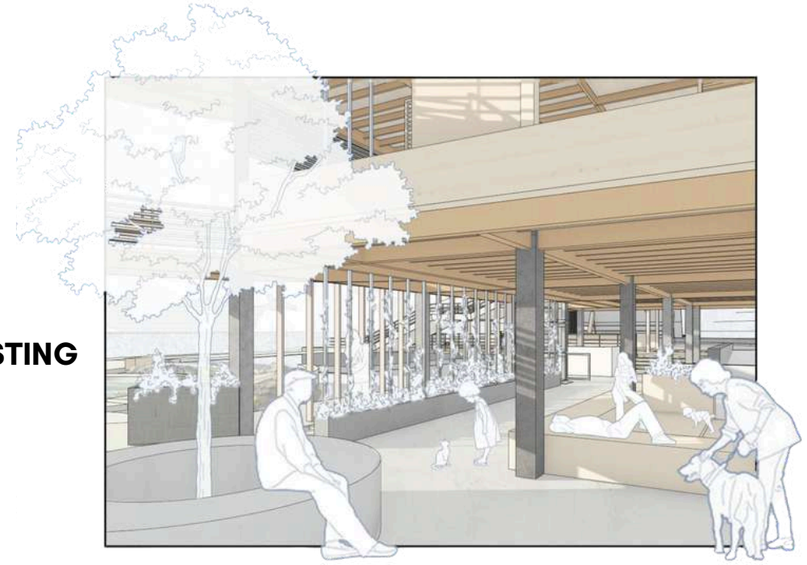
ORTHOGRAPHIC DRAWINGS



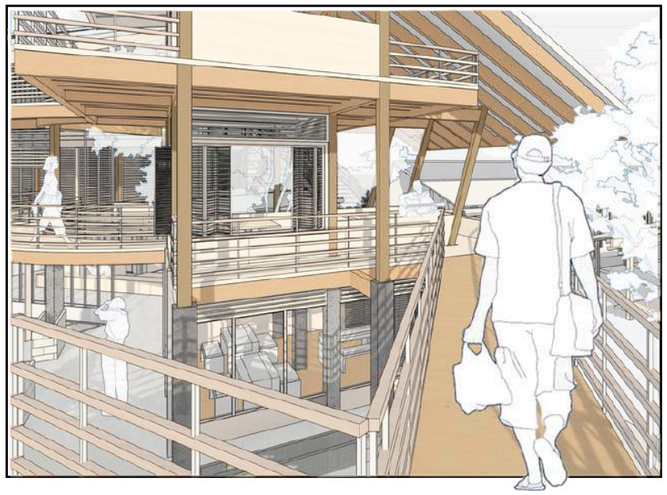
SECOND FLOOR PLAN
[N.T.S]

1. Meditation area
2. Mini indoor library
3. Study and reading zone
4. Link Bridge
5. Quiet zone

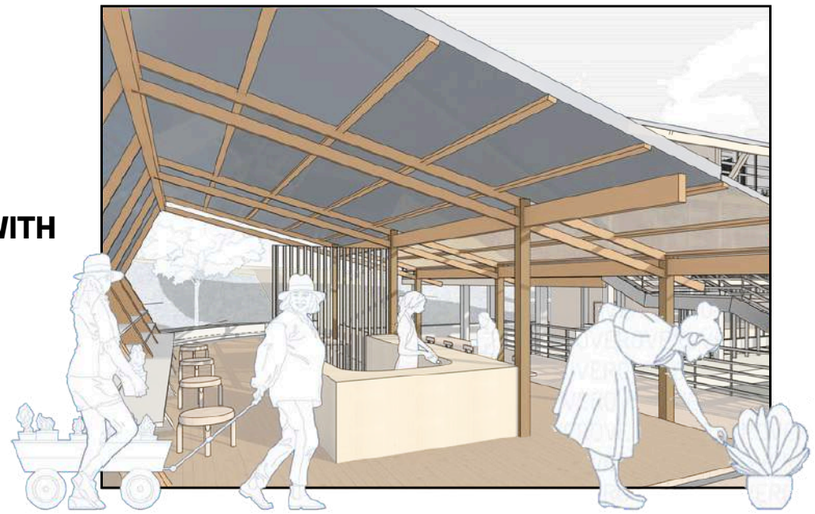
INTERIOR VIEW



SOCIAL LOUNGE AND RESTING AREA



COMMUNITY SHARING CORNER

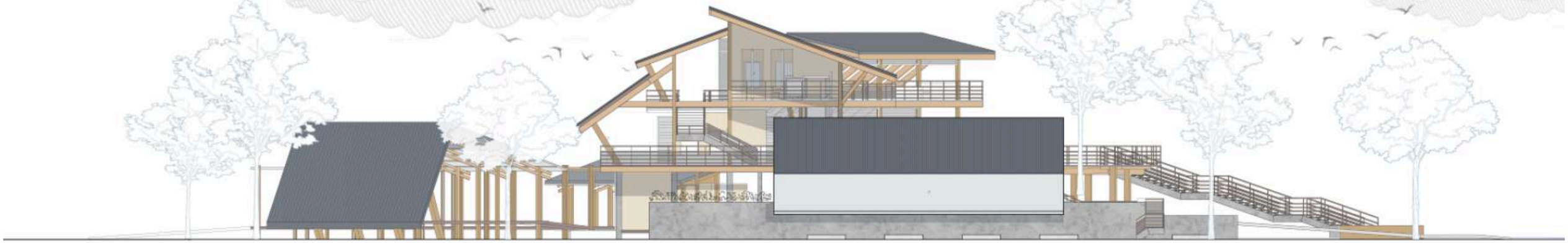


GARDENING WORKSHOP WITH CAFE

2.0 RECREATIONAL HUB

ORTHOGRAPHIC DRAWINGS

SOUTH ELEVATION [N.T.S]



WEST ELEVATION [N.T.S]

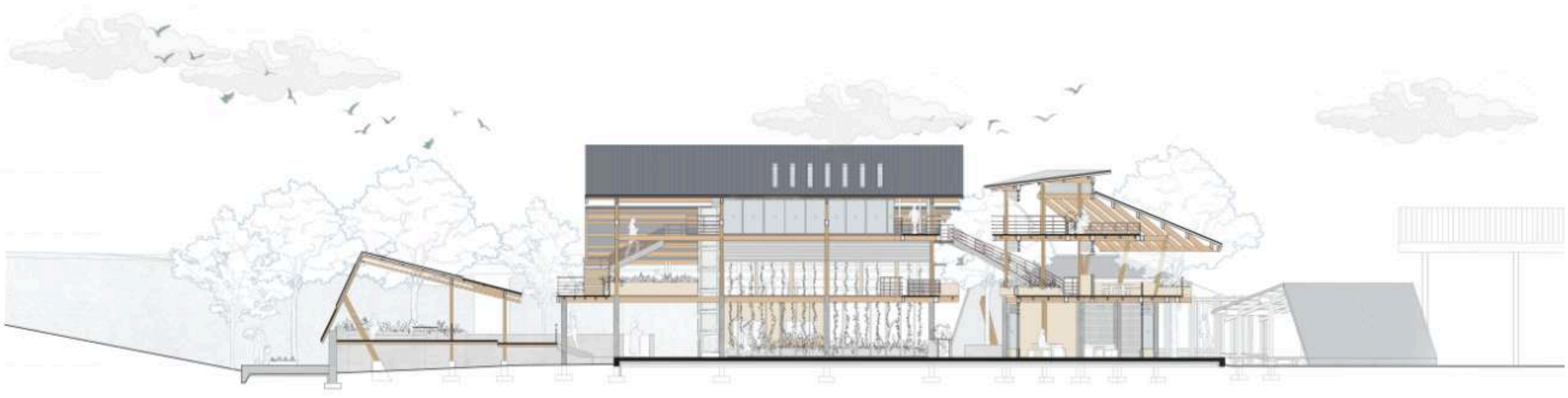


NORTH ELEVATION [N.T.S]



ORTHOGRAPHIC DRAWINGS

SECTION A - A'



SECTIONAL PERSPPECTIVE

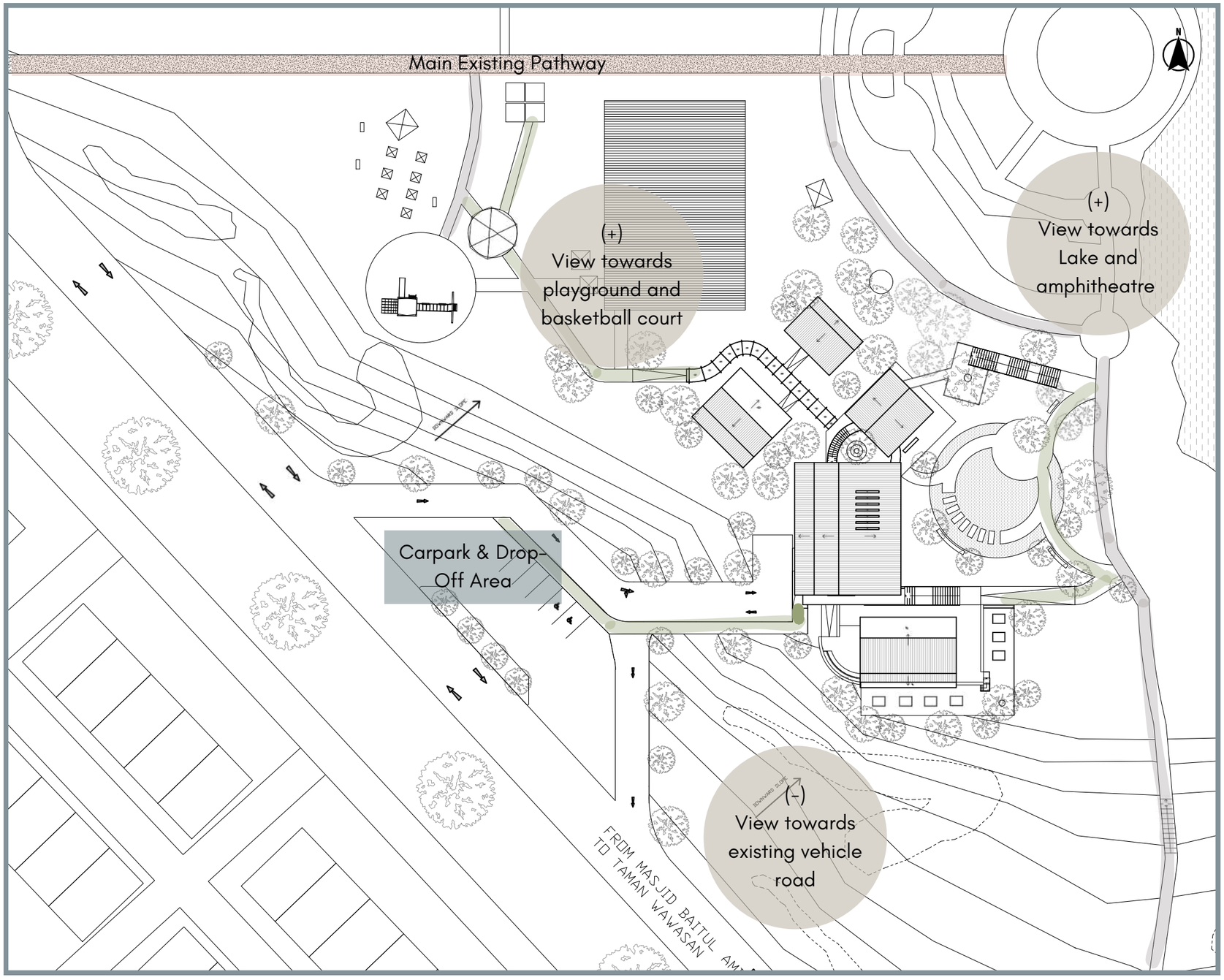


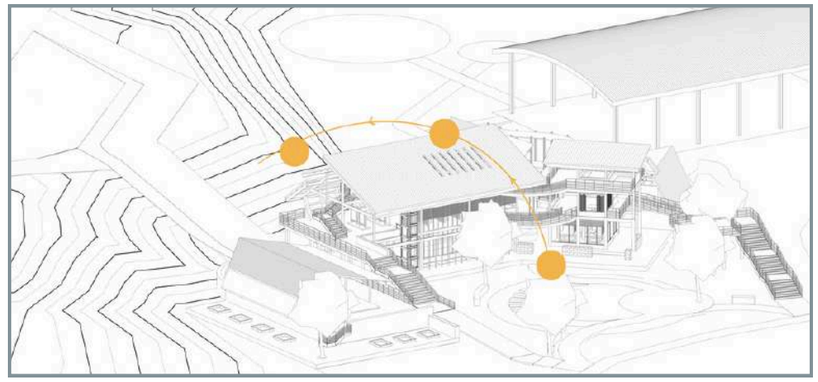
3.0

SITE PLANNING

3.0 SITE PLANNING

3.1 SITE CONTEXT





Sun Path & Solar Exposure

- The site receives consistent sunlight throughout the year due to Malaysia's tropical location.
- Morning sun comes from the east, while the west side receives intense afternoon heat.
- *Orientation:*
  East-West axis, front facing east.
- The east-facing front receives morning sunlight, while the west side is exposed to harsh afternoon sun. To counter this, the design integrates shading devices, vegetation buffers, and roof overhangs on both facades to reduce solar heat gain and improve thermal comfort.

Tree Coverage:

- Existing mature trees around the site offer natural shading and help lower the temperature of the surrounding microclimate, especially during midday sun.

Accessibility and Connectivity

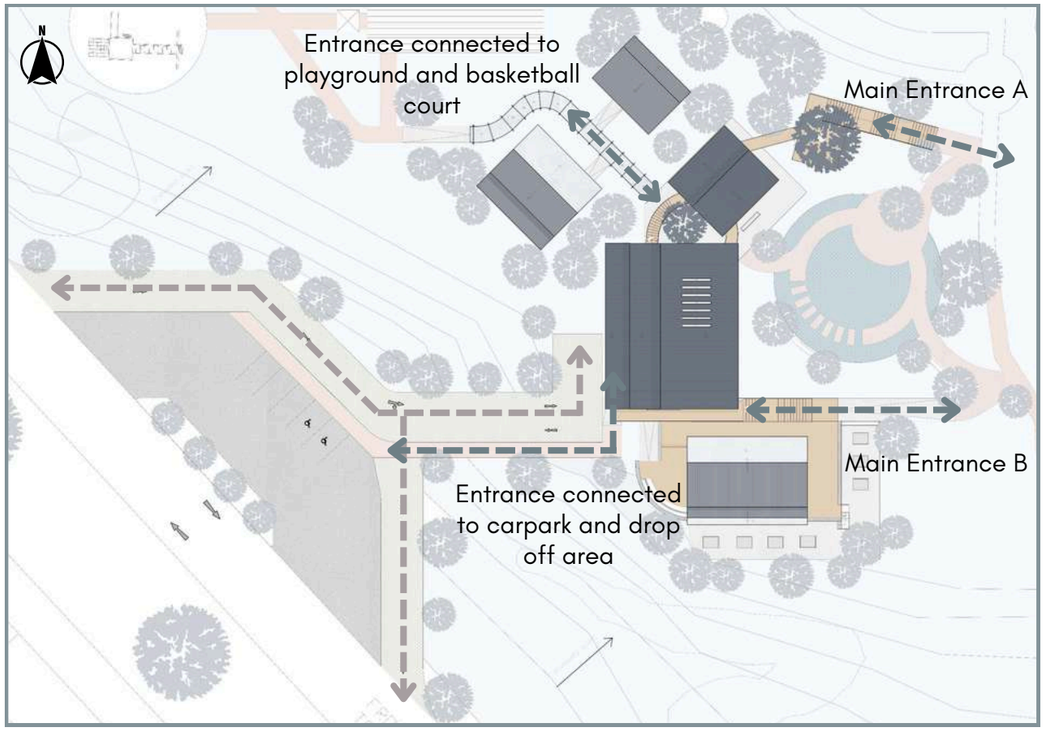
- The orientation also supports clear access from the main circulation path, enhancing wayfinding and user flow from the south park entrance.

The site is well-shaded by existing trees, offering natural protection from direct sunlight, especially from the east and west. The sun path travels overhead throughout the day, making heat reduction strategies essential. Accessibility is enhanced through existing and proposed pedestrian paths, allowing smooth connection across the site.

3.0 SITE PLANNING

3.1 SITE CONTEXT

SITE RESPONSE



Vehicle Entrance

Pedestrian Entrance

Accessibility

Main Entrance A :

- Connected to the existing secondary path, which branches from the park's main pedestrian spine.
- Ideal for joggers, casual strollers, and visitors from the amphitheater.

Main Entrance B :

- Located near a steep slope, this entrance is accessed via an existing staircase connected to a secondary path.
- Convenient for users approaching from the upper zones of the park.
- The path is upgraded with ramps to support diverse mobility needs.

Entrance to Playground & Basketball Court

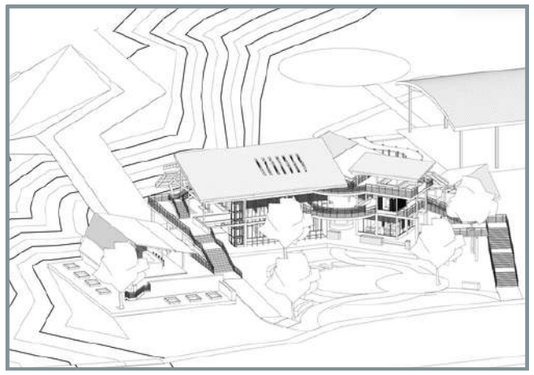
- Positioned near the recreational activity zone—especially for Zumba, Tai Chi, and community exercise groups.
- An open deck has been introduced here, offering a more dedicated space for active seniors and children.

Entrance to Playground & Basketball Court

- Located at the top of the sloped terrain to accommodate vehicular access.
- A new pathway connects the drop-off and car park directly to the building entrance.

MASSING STRATEGIES

Building Form

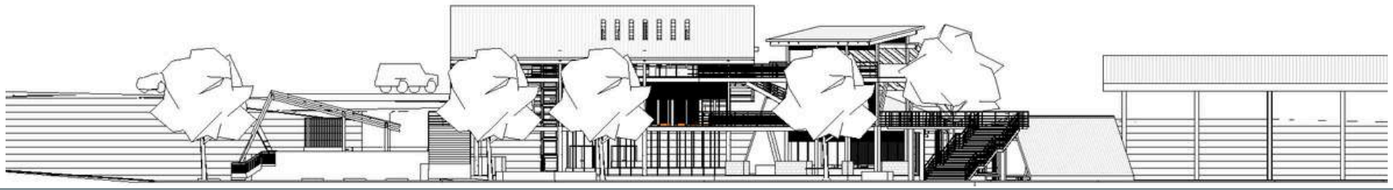


The building form is derived from the existing pedestrian paths of the park, resulting in a linear cluster typology. It is oriented along the east-west axis to respond to sun movement, with shaded openings on both ends to reduce heat gain. The form branches out to create semi-open courtyards, allowing cross ventilation and visual connection to the trees. Spaces are zoned in layers, from active outdoor decks to quieter indoor workshop areas, creating a natural transition between activities.

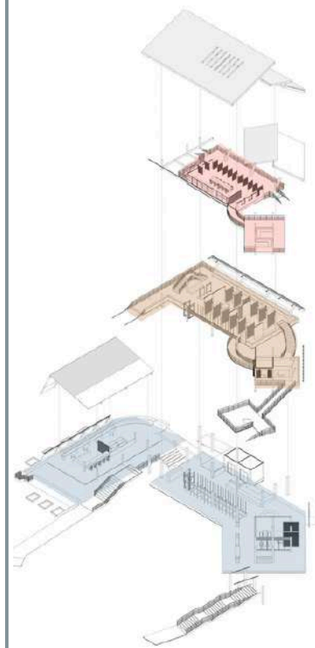
Elevated Design Benefits

- Better Ventilation: Enhances airflow for thermal comfort.
- Wider Views: Overlooks greenery & open courts from decks.
- Flood Resilience: Reduces waterlogging during heavy rain.

The building is elevated above the basketball court, following the site's natural slope. This creates visual prominence and highlights the hub as a key focal point in the park's south zone.



Spatial Planning



Enclosed Space which secluded and acoustically calm zone for focused use

Semi-open spaces designed for low-movement yet sound-producing activities

Open to public access and encourages community interaction

Skylight



Skylight at the second-floor library brings natural light into deeper spaces. Polycarbonate roofing at the open deck and gardening cafe lets in daylight while reducing heat and UV, enhancing comfort in activity zones.

Water Feature



The water feature creates a calming ambiance through visual and sound effects, enhancing comfort in the open deck area. It supports evaporative cooling and complements wellness activities like tai chi and zumba

Surrounding Landscape



Vegetation helps direct cooling breezes across the area, while the process of evapotranspiration from the plants effectively reduces surrounding air temperature, contributing to a more comfortable and cooler microclimate.

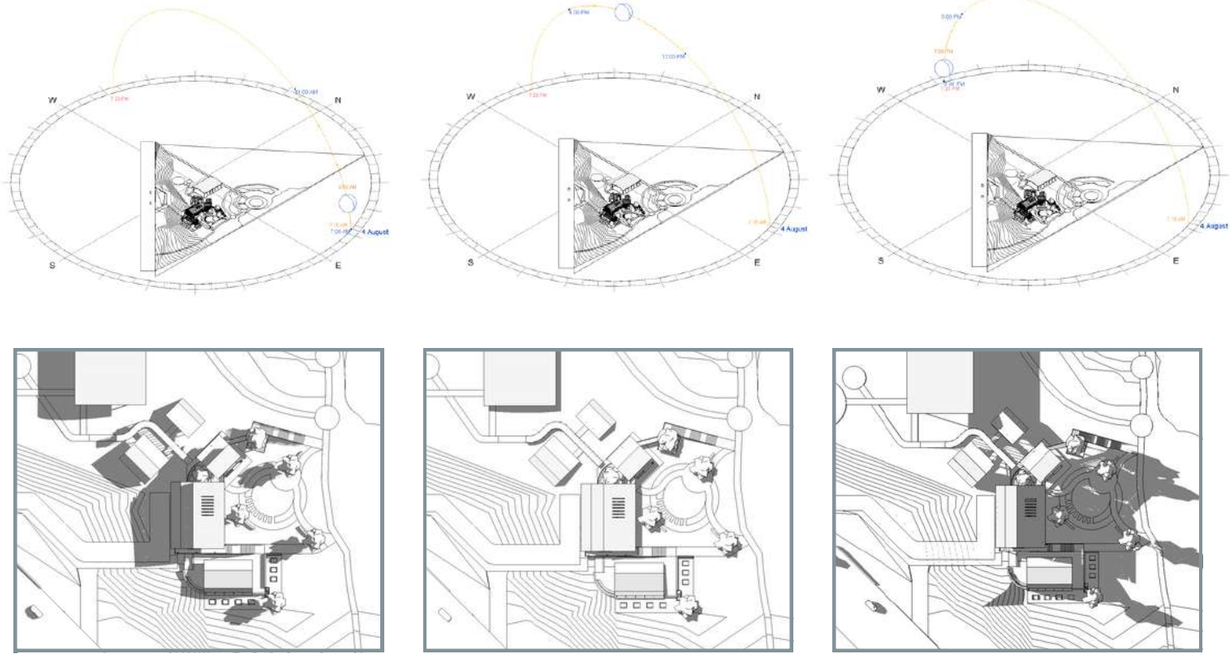
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DAYLIGHTING

4.0 DAYLIGHTING

SUNPATH AND SHADOW ANALYSIS

Morning [8 AM]	AFTERNOON [2 PM]	EVENING [7 PM]



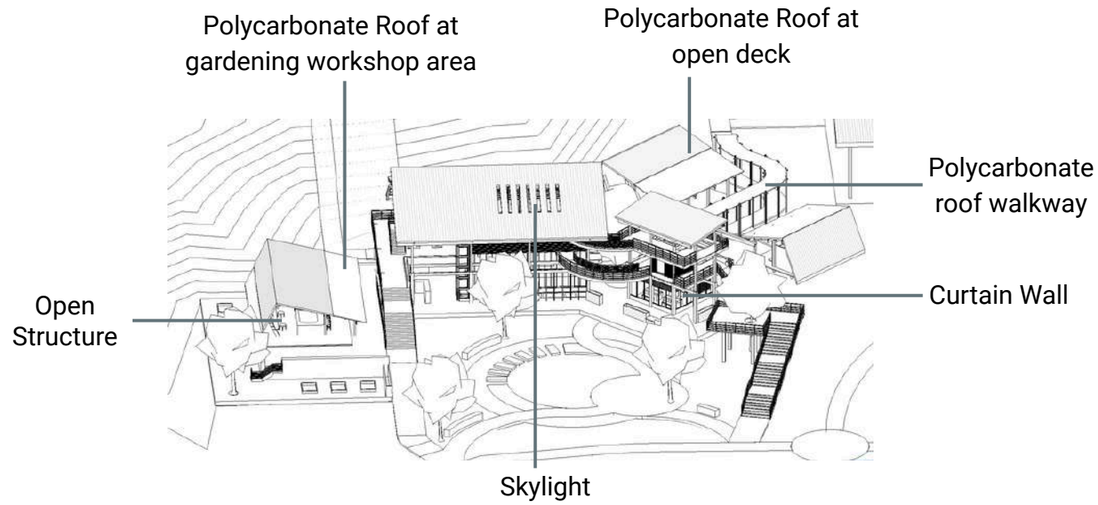
Morning (East Sunlight – 8AM)
- Sunlight enters from the east, casting shadows towards the west.
- Front facade, decks, and entry areas receive gentle morning light, making it ideal for passive activities and arrival experience.
- Strategic overhangs and existing trees help diffuse direct light while welcoming natural brightness.

Afternoon (Overhead Sun – 2PM)
- The sun is directly overhead, creating shorter shadows.
- High solar exposure is minimized with roof overhangs, vertical shading devices, and vegetation coverage.
- Activity zones are placed under shaded roofs or tree canopies to reduce heat exposure.

Evening (West Sunlight – 7PM)
- Sunlight enters from the west, casting long shadows toward the east.
- The rear and side façades are more exposed to heat; hence, solid walls, trees, and trellises are used as buffers.
- Design aims to shield interior spaces from direct west sun, reducing glare and overheating.

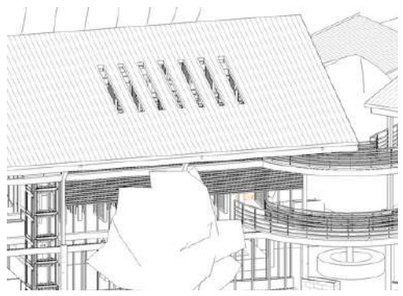
Design Response Summary
- Building orientation and placement respond directly to sun movement.
- Passive design elements such as vegetation, roof design, and shading respond effectively to different times of day.
- Enhances thermal comfort, daylighting, and energy efficiency throughout the day.

DAYLIGHTING STRATEGIES



SKYLIGHT

Location: Above mini library & study area (2nd floor)

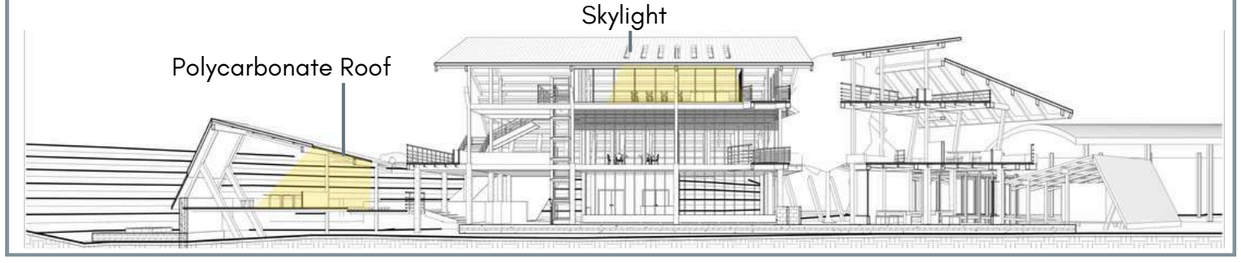




Purpose & Functionality:
- Allows natural light to penetrate into the deeper parts of the interior, especially in enclosed reading areas
- Minimizes reliance on artificial lighting during daytime
- Supports a healthier, more focused environment ideal for studying and quiet activities

Material Used:
- Polycarbonate panels for skylight structure
- Offers high light transmission while blocking excess heat and UV rays
- Keeps space naturally lit without overheating

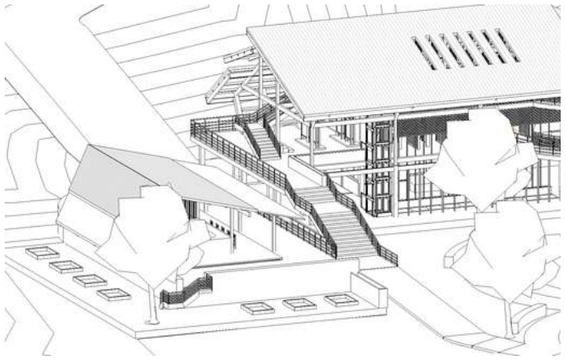
Benefits to Users & Design:
- Promotes visual comfort and improves circadian rhythm
- Enhances spatial experience by connecting users to the sky
- Contributes to energy efficiency and green design goals

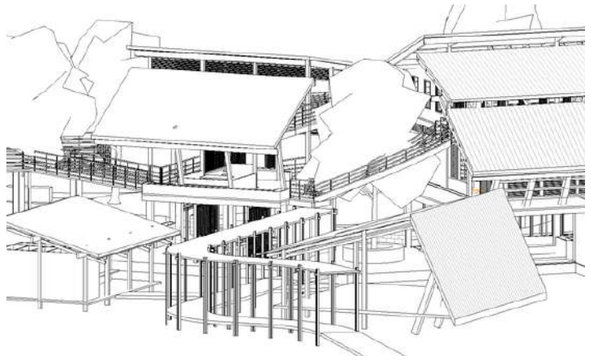


4.0 DAYLIGHTING

DAYLIGHTING STRATEGIES

SIDE- LIGHTING STRATEGIES





Open Structural System

- The building adopts a highly open structural system, supported mainly by beams and columns without solid enclosure walls. This openness encourages natural daylight to flow freely into the spaces. To reduce heat gain, deciduous climbing plants are integrated into the structure, providing seasonal shading and helping to cool the environment naturally.







Double Glazed Curtain Wall & Curtain Glass Wall

- Transparent glass panels maximize daylight entry into the space. To manage glare and reduce heat gain, the design uses double-glazed low-emissivity (low-e) glass and channel glass, which effectively block infrared and UV radiation while still allowing visible light to illuminate the interior. This helps maintain a bright yet thermally comfortable environment.

DAYLIGHTING STRATEGY SUMMARY

Natural Light Optimization

- Skylight above mini library brings daylight deep inside.
- Roof gap between levels enhances vertical light flow.
- Open structure with columns & beams allows full daylight penetration.

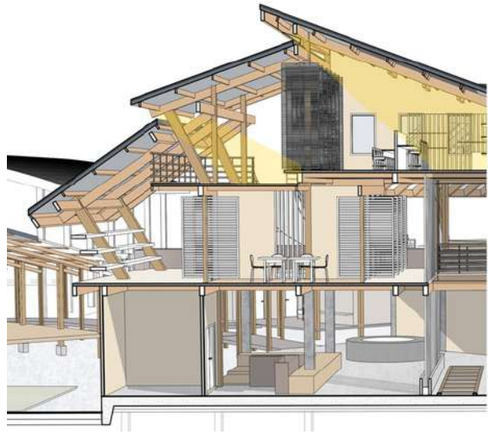
Material Use for Light & Comfort

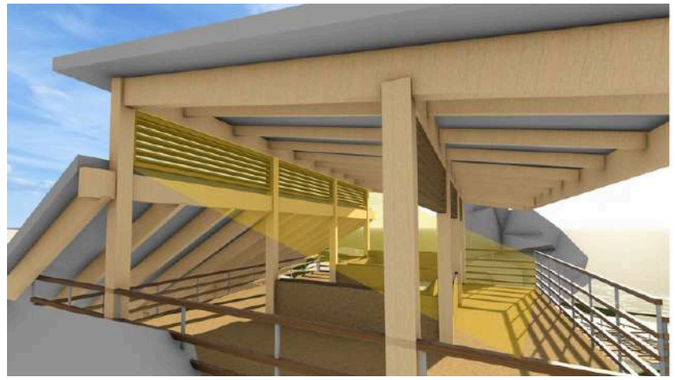
- Polycarbonate roof at decks filters harsh sunlight.
- Double-glazed low-e glass reduces glare & heat.
- Channel glass softens incoming light.

User-Centered Experience

- Brighter, calmer interior spaces
- Visual connection to greenery
- Reduces energy use during the day

ROOF LIGHT GAP





The building features a multi-level roof design, where one portion of the roof is elevated higher than the adjacent lower roof, creating a clerestory gap between them. This architectural feature serves both functional and environmental purposes.

Daylight Penetration :

- This vertical gap acts as a natural light channel, allowing sunlight to enter from a higher angle, especially during the morning and late afternoon. The clerestory helps bring in soft, diffused daylight into the central or deeper areas of the building that might otherwise remain dim. This reduces the dependency on artificial lighting during daytime hours, supporting passive daylighting strategies.

USER EXPERIENCE & SPATIAL QUALITY

Comfortable & Calming Atmosphere

- Natural daylight creates a warm, soothing environment – ideal for relaxation and social interaction.

Enhanced Productivity

- Skylight in mini library brings in soft daylight, reducing eye strain and improving focus for reading or studying.

Connection with Nature

- Daylight highlights views of surrounding greenery, making interior spaces feel more open, fresh, and biophilic.

Bright & Airy Ambience

- Polycarbonate and translucent roofing let in diffused light on open decks and workshop areas without glare or heat.

Energy Efficient

- Reduces the need for artificial lighting during the day, promoting sustainable and low-energy operation.

Positive Mental Impact

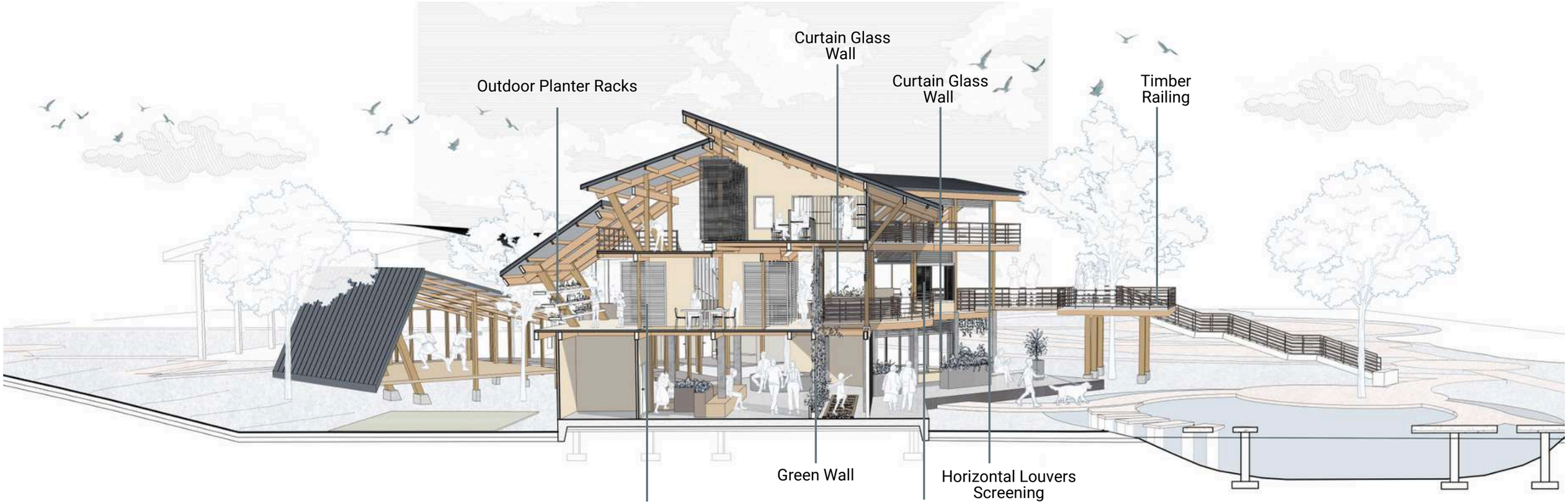
- Natural light boosts user mood, reduces stress, and invites people to stay longer in the space.

5.0

FACADE DESIGN

5.0 FACADE DESIGN

FACADE STRATEGIES OVERVIEW



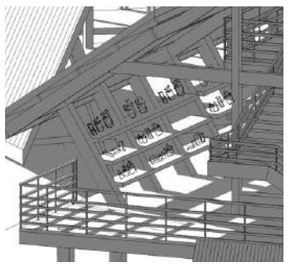
STRATEGIES IMPLEMENTED

PLANTER RACKS

The planter rack serves as both a functional architectural element and an aesthetic green feature. Integrated along balconies, decks, and facades, it merges nature with built form, creating a more breathable, comfortable, and engaging environment for users. This strategy supports passive design, enhances spatial experience, and promotes sustainability through living architecture.

West Elevation [N.T.S]





Architectural Integration

- The zoomed-in detail shows how the rack is integrated into the railing and facade language, maintaining a consistent aesthetic while performing a functional role. This dual use of the element enhances space efficiency and contributes to the building's green design narrative.

Enhanced User Experience

- From the user's perspective, this green screen offers a more visually comfortable view, reducing the feeling of being exposed to strong sunlight. It also frames glimpses of the outside landscape with a soft, natural foreground.

West Elevation Placement

- The west-facing facade is most exposed to intense afternoon sunlight, especially between 2 PM to 5 PM, when heat gain and glare are at their peak in Malaysia's tropical climate. Placing the planter rack system here serves multiple passive design purposes.

Sunlight Filtering

- The dense greenery acts as a natural buffer, filtering harsh western sun rays to reduce glare and heat gain, creating a cooler indoor environment.

Thermal Comfort

- The plants' evapotranspiration effect helps cool the air around the façade, minimizing heat absorption by the walls and improving indoor thermal comfort.

Sustainable & Low-Maintenance

- Using local, drought-tolerant species makes the green facade easier to maintain while encouraging biodiversity.
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Visual Softness & Rhythm

- The layered greenery softens the solid wall behind and creates a dynamic, ever-changing facade that responds to growth and seasons.

5.0 FACADE DESIGN

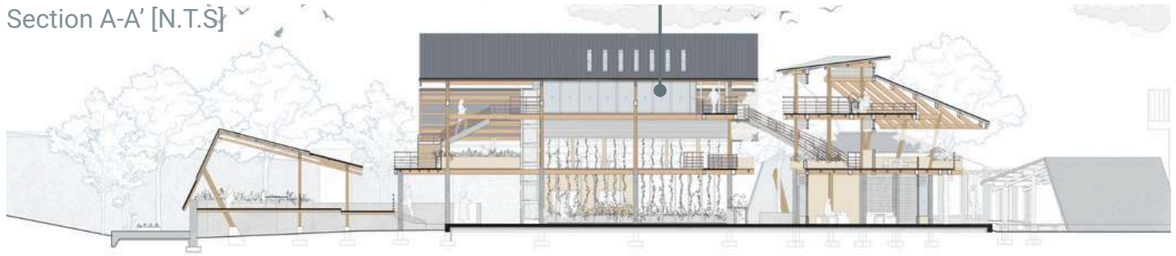
STRATEGIES IMPLEMENTED

CURTAIN GLASS WALL

North Elevation [N.T.S]



Section A-A' [N.T.S]

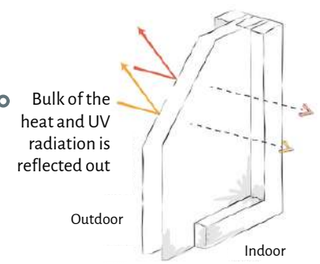


Daylight Optimization

- The east-facing curtain wall allows soft morning light to enter spaces, reducing the need for artificial lighting during the first half of the day.
- Enhances productivity and concentration — especially important in the library and workshop areas where focus and clarity are essential.

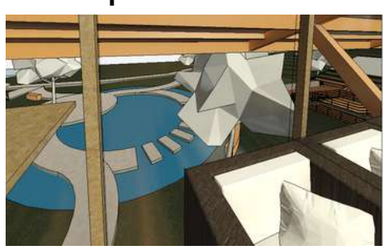
Low-E Glass Performance





- Low-Emissivity (Low-E) double glazing reduces unwanted heat transmission and UV radiation while allowing visible daylight in.
- Blocks 95% of UV rays, protecting interior finishes and maintaining visual comfort.
- Maintains indoor thermal comfort by reflecting infrared heat outward and minimizing glare.
- Enhances energy efficiency, especially in air-conditioned zones.

Connection to Exterior Landscape



- Provides transparency and visual porosity, strengthening the indoor-outdoor connection.
- Users can enjoy framed green views, increasing psychological comfort and biophilic experience.

User Comfort & Spatial Quality

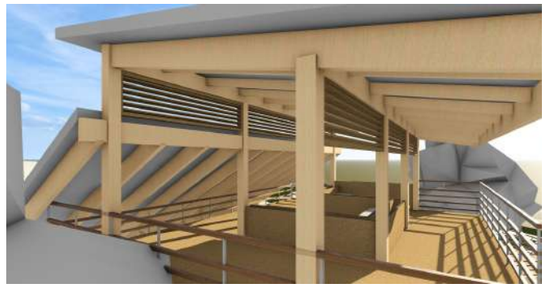
- In the morning, natural light filters through softly, creating a warm and inviting environment.
- Low-E glass ensures cool interior conditions, preventing glare or overheating — essential for long-duration usage in reading or crafting areas.

LOUVERS SCREENING



Location:

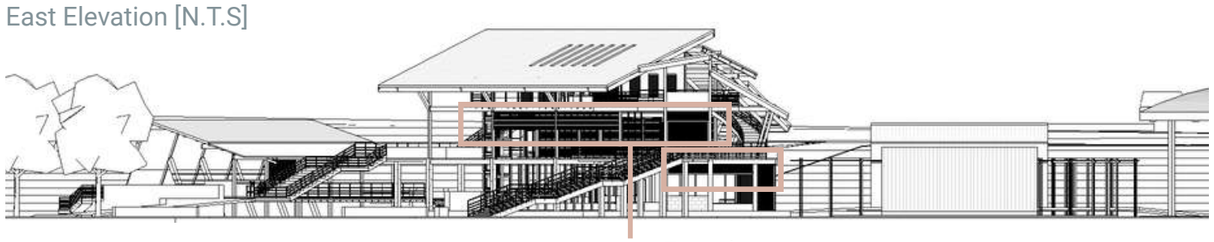
- East Elevation (main sun-filtering facade)



Location:

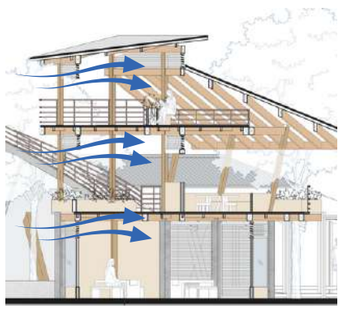
- Southeast & Northwest (climatic and privacy modulation)

East Elevation [N.T.S]



Sunlight Filtering & Glare Control (East Elevation)

- East-facing louvers reduce morning glare, which is low-angled and intense, especially in tropical climates.
- By adjusting the tilt and spacing of louvers, diffused daylight is allowed while direct sun rays are blocked.
- Enhances visual comfort in spaces like workshop room for avoiding screen glare and overheating.



Thermal Regulation & Passive Cooling

- Acts as a solar shading device, reducing solar heat gain and cooling loads, especially during the early hours.
- Combined with natural ventilation, it contributes to passive thermal comfort strategies.



Orientation-Based Performance

- Southeast-facing louvers reduce oblique solar exposure during late morning hours, when the sun begins to rise higher.
- Northwest-facing louvers shield against reflected glare and offer wind and rain protection, especially during seasonal storms.

User Experience & Spatial Quality

Visual Privacy with Openness

- Louvers act as see-through partitions, creating a sense of enclosure without isolation.
- Ideal for focused activities like studying or crafting.



Dynamic Spatial Atmosphere

- As sunlight shifts, louvers cast changing shadows that animate the space.
- This creates rhythmic light patterns, making the interior feel alive and connected to nature.

5.0 FACADE DESIGN

STRATEGIES IMPLEMENTED

ROOF

Overhang Roof



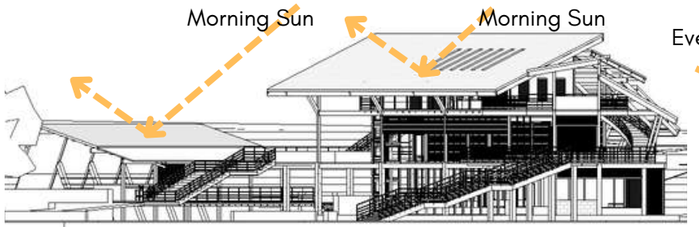
Environmental Response Design

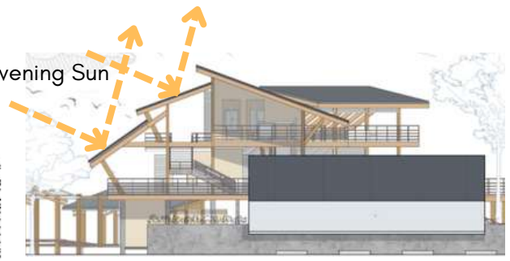
Solar Protection:

- The roof overhangs are calculated based on solar angles to effectively block high-angle sun rays during midday (especially from the east and west directions), reducing unwanted heat gain.

Passive Cooling Contribution:

- By shading glazing and wall surfaces, the overhangs reduce surface temperatures and help keep interior spaces cooler, supporting energy-efficient cooling.





Daylighting and Comfort

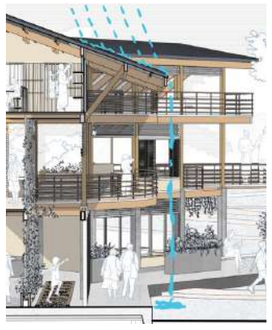
Controlled Natural Light:

- While blocking harsh direct sunlight, overhangs allow indirect, diffused daylight to enter the space, improving indoor lighting quality without glare.

Enhancing Indoor Ambience:

- Spaces beneath overhangs feel sheltered yet visually connected to the outside, enhancing spatial quality for rest or reflection.





Aesthetic and Functional Integration

Architectural Language:

- The deep roof projection adds a strong horizontal emphasis to the facade, creating a visually grounded profile.

Weather Resilience:

- Protects walls and openings from rain splashes and material degradation, increasing longevity of the building skin.

User Comfort at Thresholds:

- Overhangs provide transitional zones between indoor and outdoor, such as shaded porches and walkways, where users can pause and interact with nature.

Polycarbonate Roof

Lightweight Transparency:

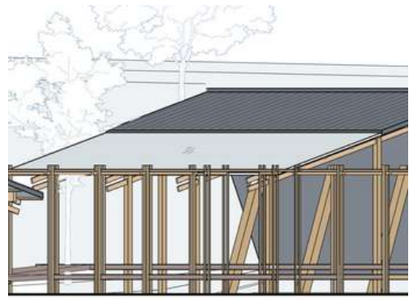
- Used in semi-open zones like the open deck and gardening cafe, polycarbonate allows high light transmission while remaining lightweight and durable.

UV & Infrared Filtering:

- Blocks up to 99% of UV and a large portion of infrared rays—protecting users, plants, and interior materials from sun damage and overheating.

Thermal Comfort Management:

- Unlike standard glass, it admits daylight without trapping heat, ensuring cooler, more comfortable shaded spaces.



GREEN FACADE





Climate Responsive Design

Morning Sun Filtering:

- East-facing facade receives gentler morning sunlight, and the vegetation acts as a natural shading device, cooling the surface before heat builds up.

Passive Cooling Buffer:

- Dense foliage traps less heat than opaque surfaces and creates a microclimate layer between the outer wall and the environment.

Evapotranspiration Cooling:

- The plants release moisture into the air, helping to reduce surrounding air temperature and improve comfort.

Sustainable Facade Function

Low-Energy Design:

- Reduces need for artificial cooling or shading systems, contributing to energy savings and green building performance.

Air Quality Enhancement:

- Leaves trap dust particles and pollutants, improving air quality in semi-open decks or corridors behind the facade.



Spatial Quality & User Experience

Soft, Green Transition Zones:

- Users encounter a visually soothing entry sequence, walking through dappled light and filtered views behind the vines.

Privacy Without Full Enclosure:

- The leafy layer screens views from outside without fully cutting off daylight or ventilation—perfect for quiet sitting areas or semi-public walkways.
- Natural Ambience:
- Shifting light, wind movement, and rustling leaves bring a calming sensory experience, enhancing the biophilic quality of the façade.

Conclusion

- The facade strategies—including green walls, louvers, planter racks, curtain glass, and roof treatments—are thoughtfully designed to respond to climate, enhance daylighting, and regulate thermal comfort. These elements not only improve energy efficiency and user well-being but also reflect the building's identity as an inclusive, nature-integrated recreational hub. Through passive design and material articulation, the facade becomes more than a surface—it becomes an experience.

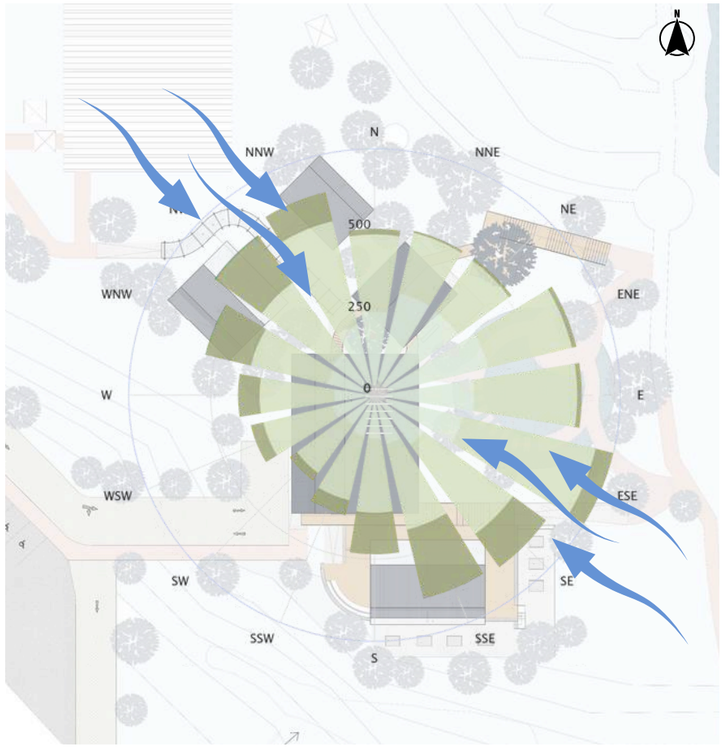
6.0

NATURAL VENTILATION

6.0 NATURAL VENTILATION

6.1 WIND PATH ANALYSIS

To design effective natural ventilation, a wind analysis was conducted to study the prevailing wind directions, wind speed, and seasonal airflow throughout the year. This helps determine how to orient openings, place shading devices, and design building forms that work with the climate—not against it.



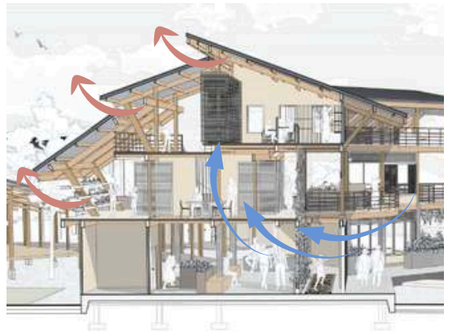
Key Insights from Wind Analysis:

- Prevailing Winds: Mainly from the Northwest, Northeast and Southeast.
- High Wind Exposure Zones: The southern and eastern sides receive stronger, more consistent breezes.
- Calm Zones: Some shaded areas or corners receive less wind and may require additional openings or stack effect support.

Design Implications:

- Maximized Openings at southern and eastern facades to capture prevailing breezes.
- Cross Ventilation is applied by aligning windows and voids opposite each other.
- Elevated Building and void decks allow wind to flow underneath and through, reducing heat build-up.
- Vegetation Placement considered to guide and cool incoming breezes.

STACK VENTILATION



Clerestory Roof Gap

An intentional vertical opening between the upper wall and the roofline, often combined with operable windows or vents. It serves as a passive exhaust point for rising warm air.

- As indoor air heats up during the day, it becomes lighter and rises.
- The clerestory gap allows this hot air to escape naturally.
- This creates a pressure difference, pulling cooler air from lower openings to replace it—thus maintaining a vertical air flow cycle.

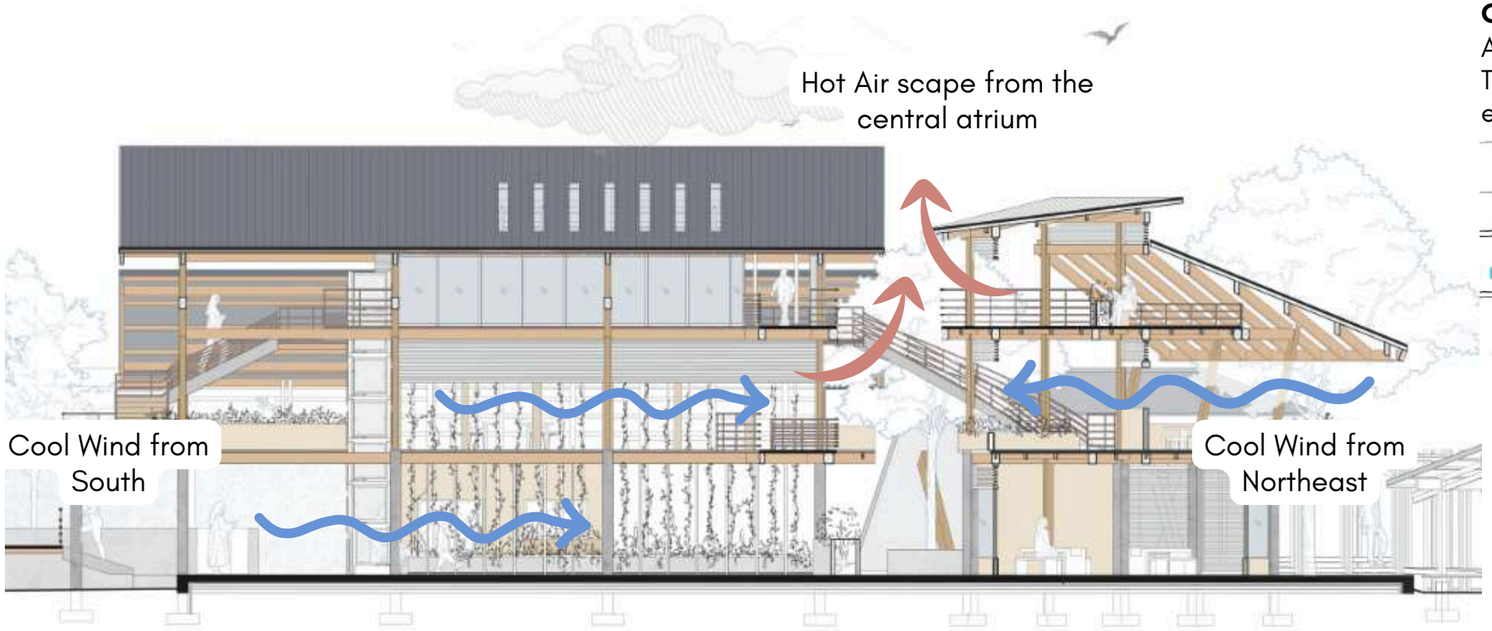
Benefits:

- Reduces heat build-up in upper interior zones.
- Maintains thermal comfort without active cooling systems.
- Adds daylighting benefit—bringing soft light deeper into the space while supporting ventilation.
- Contributes to a visually light, breathable atmosphere in taller volumes.

User Experience:

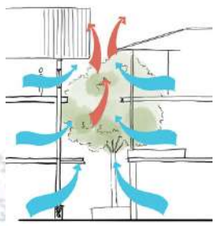
- Interiors feel less stuffy and more breathable, even on hot days.
- Enhances air freshness and supports long-duration indoor use like crafting or reading.

STACK VENTILATION



Central Atrium

A vertical ventilation shaft that channels hot air upward and out of the building. The tree at the heart of the atrium contributes to cooling and air purification, enhancing both thermal performance and user well-being.



- The atrium allows warm indoor air to rise naturally and escape through upper openings.
- This stack effect creates suction, pulling in cooler air from lower parts of the building.
- The tree adds shade and humidity regulation, reducing the air temperature and promoting comfort.

Benefits:

- Promotes air movement throughout the interior zones without mechanical fans.
- Supports cross-flow between rooms as air is naturally pulled toward the atrium.
- Improves thermal comfort, especially in common areas like the mini library and cafe.
- Introduces a visually calming green core that also serves an environmental function.

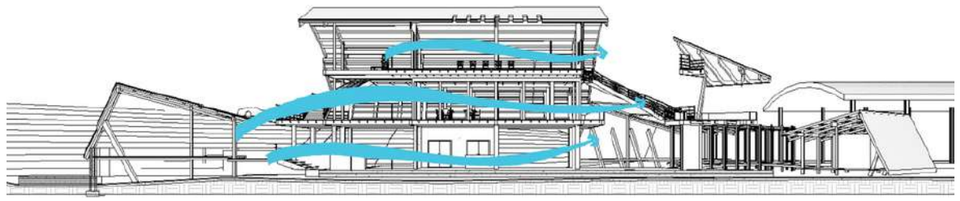
User Experience:

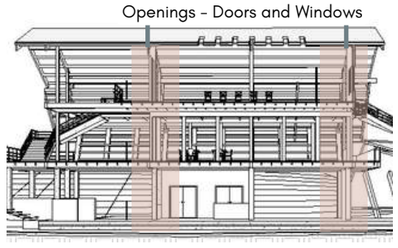
- Users feel a cool breeze and natural circulation even without active cooling.
- Being close to the tree and open atrium offers a relaxing, nature-integrated atmosphere.

6.0 NATURAL VENTILATION

NATURAL VENTILATION STRATEGIES

CROSS VENTILATION





Open Layout

The building adopts an open-plan layout to encourage uninterrupted airflow across interior spaces. By minimizing full-height partitions and aligning openings, the design maximizes natural wind movement.

- Open layouts reduce airflow resistance, allowing wind to flow smoothly from one end to another.
- Strategic placement of doors, windows, and voids on opposing facades allows air to enter and exit effectively, enabling cross ventilation.

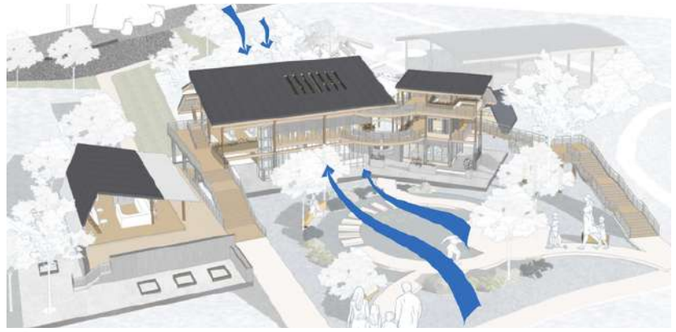
User Experience:

- Users experience fresh air movement and natural breeze across rooms.
- Indoor spaces feel more spacious, breathable, and well-connected to the outdoor environment.

Benefits:

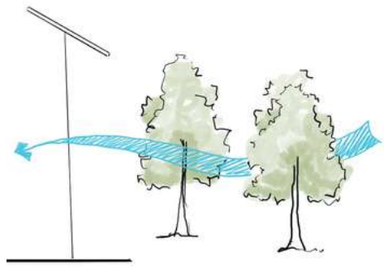
- Enhances indoor air quality by constantly replacing stale air.
- Reduces reliance on mechanical cooling, supporting passive sustainability goals.
- Improves thermal comfort, especially in high-activity zones.
- Encourages connection between spaces while retaining functional zoning.

CROSS VENTILATION



Evapotranspiration

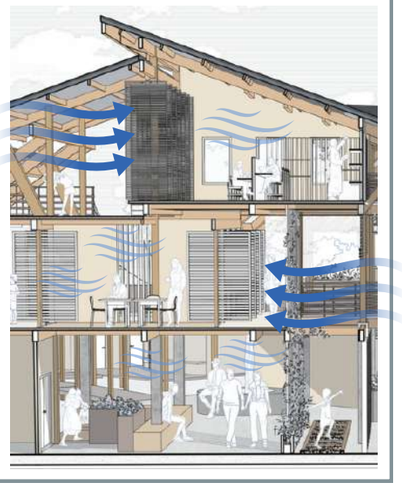
Evapotranspiration is the natural process where water evaporates from soil and transpires from plant leaves, which lowers the surrounding air temperature. This phenomenon contributes to passive cooling, especially when integrated with cross ventilation.



- The central atrium and gardening zones are planted with lush vegetation and a central tree, creating high-moisture microclimates.
- As wind flows through the building, it passes over these planted areas, picking up cooled air through the evapotranspiration effect.
- Open layout and permeable boundaries allow this cooled air to travel further into interior spaces.

How It Enhances Cross Ventilation:

- Moisture from plants cools the air before it enters indoor spaces, making incoming wind more refreshing.
- The combination of airflow + moisture cooling results in lower indoor temperatures without mechanical systems.
- Enhances thermal comfort in semi-enclosed areas like the open deck café, outdoor seating, and workshops.



Spatial Quality & User Benefits:

- Creates a naturally cooler zone under the atrium and nearby spaces.
- Promotes a healthier, breathable atmosphere that feels connected to nature.
- Users experience cool breeze mixed with the scent and freshness of plants, increasing sensory engagement and comfort.

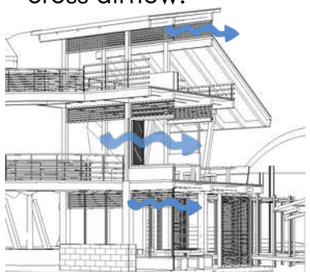
CROSS VENTILATION

Louvers Doors and Windows



Louvers are integrated throughout the building envelope in various forms:

- Louvers panels
- Folding louvered windows
- Pivot doors with louver blades
- These elements are strategically positioned on opposite walls or facades to facilitate natural cross airflow.



- Louvers panels allow to control airflow direction and intensity based on wind conditions.
- Air enters through lower-level louvers and exits from opposite openings, creating constant air movement across interior spaces.
- When winds are mild, angled louvers still guide airflow efficiently through narrow openings, keeping interiors ventilated.

User & Spatial Experience:

- Enhances comfort in spaces like reading corner, workshops, and resting zones with a gentle, filtered breeze.
- Creates transitional atmospheres between indoor and outdoor, where users feel both protected and connected to nature.
- The movement of louvers can be tactile and interactive, giving occupants agency over their environment.

Sustainable Performance:

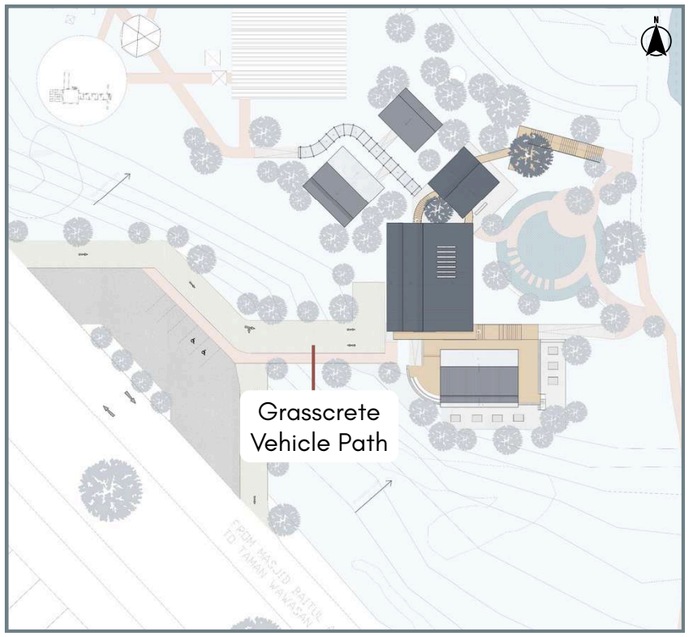
- Reduces reliance on fans or AC by optimizing passive wind-driven cooling.
- Combined with evapotranspiration and open layout design, louvers maximize cross ventilation potential across the building.

7.0

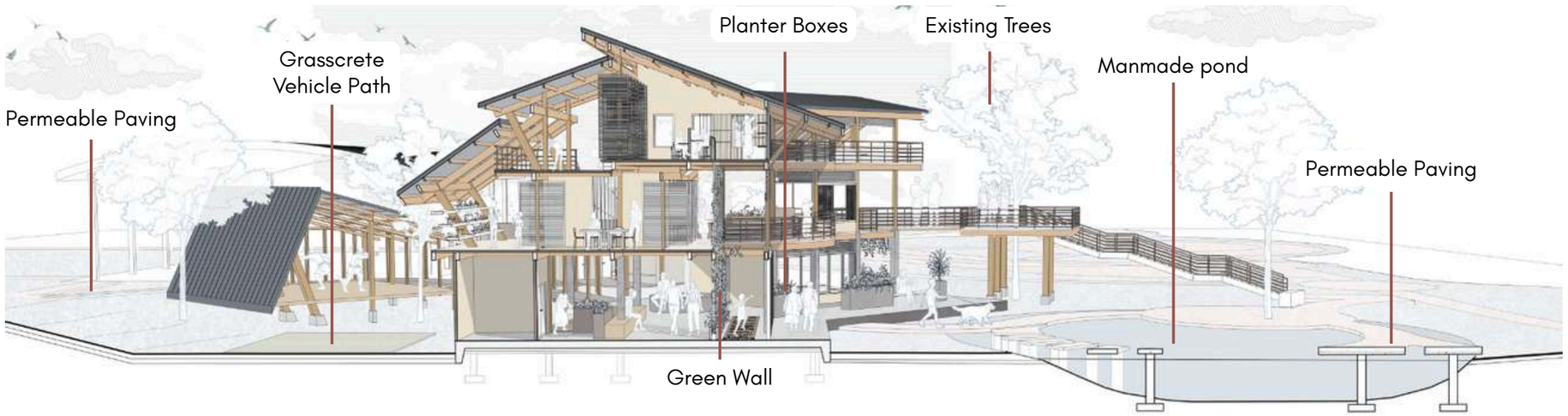
STRATEGIC LANDSCAPING

7.0 STRATEGIES LANDSCAPING

STRATEGIC LANDSCAPING OVERVIEW



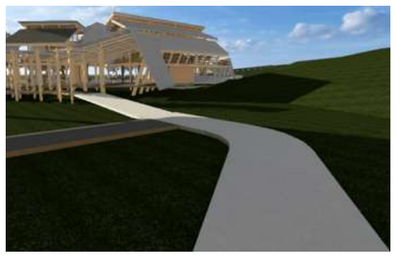
Landscaping plays a vital role in creating a cooler, greener environment by offering natural sun shading and enhancing air movement to support thermal comfort. As the site sits atop a park and is highly exposed to direct sunlight, integrating strategic greenery becomes essential in the overall design. Effective landscape planning not only improves user experience but also contributes to the building's environmental sustainability and its impact on the local microclimate.

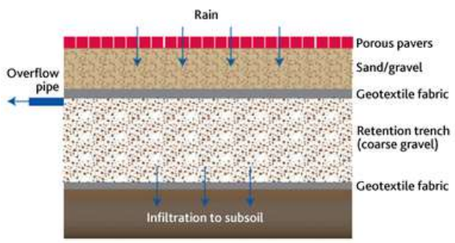


Permeable Paving

Solves Site-Specific Drainage Issue

- Site is slightly lower in elevation, causing frequent water puddles after rain
- Permeable paving helps rainwater infiltrate into the soil
- Reduces surface water accumulation and improves safety and comfort





Manages Stormwater Naturally

- Minimizes surface runoff
- Recharges groundwater
- Prevents soil erosion in landscaped zones

User-Friendly & Practical

- Comfortable to walk on even when wet
- Reduces slippery surfaces and water splashing
- Enhances visual and tactile experience of pathways

Supports Healthy Greenery

- Allows air and water to reach roots
- Prevents root suffocation from compact soil
- Ideal near trees and planting beds

Grasscrete Vehicle Path



Dual Functionality

- Supports vehicular traffic (loading/unloading, service access)
- Also maintains a green and permeable surface
- Ideal for low-frequency use paths that shouldn't look like harsh roads

Protects the Landscape

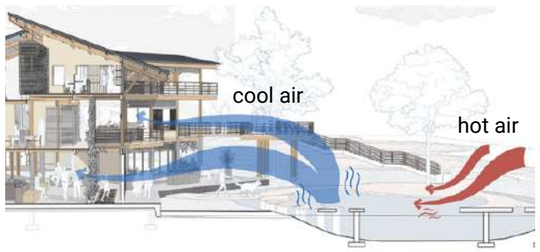
- Prevents soil compaction and plant damage from heavy wheels
- Enables occasional access without harming surrounding green areas
- Supports site sustainability by balancing use and conservation

Manmade Pond



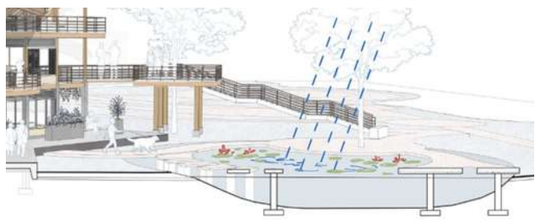
Biodiversity & Sustainability

- Can support aquatic plants and small animals, encouraging biodiversity.
- Water plants (like lotus or water hyacinths) contribute to oxygenation and natural filtration.
- Enhances the ecological value of the recreational hub.



Evaporative Cooling System

- During hot days, water from the pond evaporates, absorbing heat from the surrounding air.
- This lowers the ambient temperature, especially when placed near open-air seating or semi-enclosed zones.
- Acts as a natural air conditioner when combined with wind movement through cross ventilation.



Enhancing User Experience

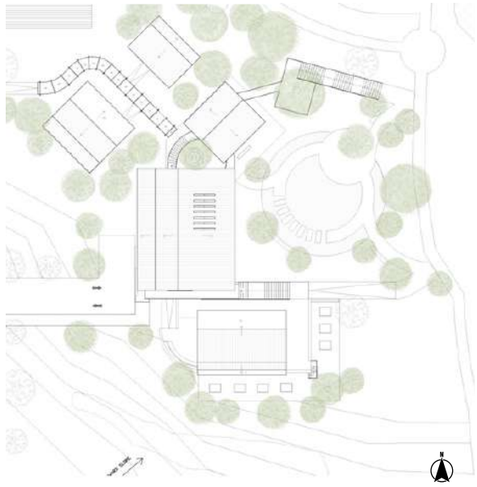
- Adds visual calmness and acoustic quality (soothing water sound).
- Encourages longer stay and relaxation, promoting well-being.
- Reflects light softly and adds dynamic textures to the landscape.

Strategic Integration

- Placed in lower ground zones or areas with natural catchment.
- Helps manage surface runoff and reduces stormwater buildup.
- Can be paired with rain garden or bioswale for improved water management.

7.0 STRATEGIES LANDSCAPING

Softscape Placement



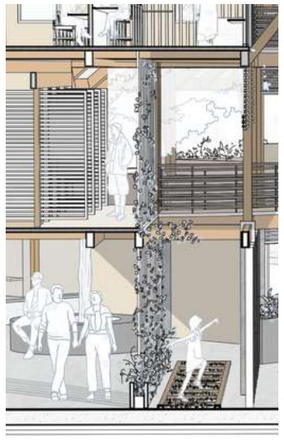
Preservation of Existing Trees

- The design respects the original site ecology by maintaining mature trees found on-site.
- These trees offer instant shade, creating microclimates that reduce surrounding temperature by up to 2-4°C.
- Acts as natural windbreakers, improving the wind flow experience in semi-open areas.

Benefits:

- Habitat for birds/insects
- Air purification
- Carbon sequestration

- Promotes mental well-being by maintaining visual and tactile contact with nature.
- Symbol of identity and memory — trees as emotional landmarks for long-term users.



Vertical Green Wall

- A layered vegetation system that reduces wall heat absorption and improves insulation.
- Positioned on sun-exposed facades (East Facing) to combat overheating.
- Features a built-in irrigation system with recycled greywater where possible.
- Filters airborne particles, improving outdoor air quality, especially in activity areas.
- Aesthetically enhances hardscape areas with soft, tactile green textures.
- Encourages passive biophilic design — a core aspect of green strategies.



- Benefits: Fast-growing and provides seasonal blooms.
- Maintenance: Medium. Requires sunlight and some guidance to climb.
- Effect: Playful and colorful green wall sections.



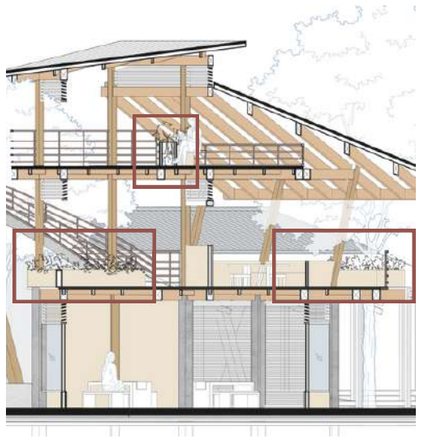
- Benefits: Fast-growing, self-clinging, great coverage.
- Maintenance: Low. Just trim occasionally to prevent overgrowth.
- Effect: Dense, lush green wall with natural texture.

User Experiences

- *Visual comfort:* Users feel more at ease with green surfaces around them, reducing visual fatigue and stress.
- *Enhanced air quality:* Visitors feel refreshed from natural oxygen released by plants, especially in shaded zones.
- *Sensory richness*: Sounds of rustling leaves, light filtering through foliage, and the occasional scent from green walls create a multi-sensory experience.
- *Connection to nature*: Users feel a sense of calm, serenity, and grounding when walking under or near preserved trees.

Green Pocket Spaces

- Integration of small-scale planted areas within and around the building to promote visual greenery, user interaction, and passive cooling.
- Why it matters: Enhances environmental quality, encourages user engagement with nature, and contributes to mental well-being and microclimate regulation.













Planter Boxes as Railings

- Green railings integrated into balconies, walkways, and ramps.
- How: Boxes are mounted at parapet or railing height (around 900mm), planted with trailing or dense foliage.

Design Considerations:

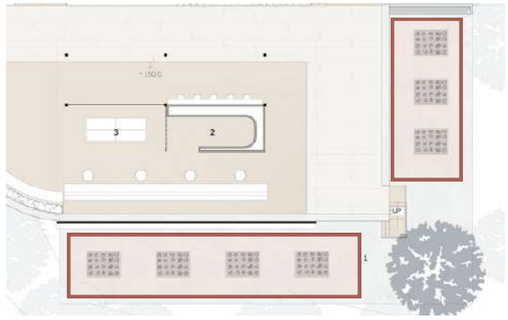
- Raised edge with proper drainage.
- Light planting media to reduce structural load.
- Waterproofing and protection for timber/metal railing.

Benefits:

- Dual-purpose (safety + greenery).
- Softens harsh materials (like concrete or steel).
- Improves thermal insulation around building skin.
- Provides privacy while allowing airflow.

Edible Garden

- A small garden space growing edible plants for community use.



Design Considerations:

- Raised planter beds with compost soil.
- Rainwater irrigation system or water-efficient pots.
- Accessible by public

Benefits:

- Promotes local food production and sustainability.
- Encourages users to engage in light farming or gardening.
- Educational value (gardening workshops).

Conclusion

- Strategic landscaping plays a vital role in improving thermal comfort, managing stormwater, and enhancing the overall spatial experience. By integrating features like permeable paving, manmade ponds, softscape placements, and green pocket spaces, the design promotes sustainability, strengthens the connection to nature, and supports the microclimate of the site—especially important for a hilltop park location exposed to direct sunlight.

8.0

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