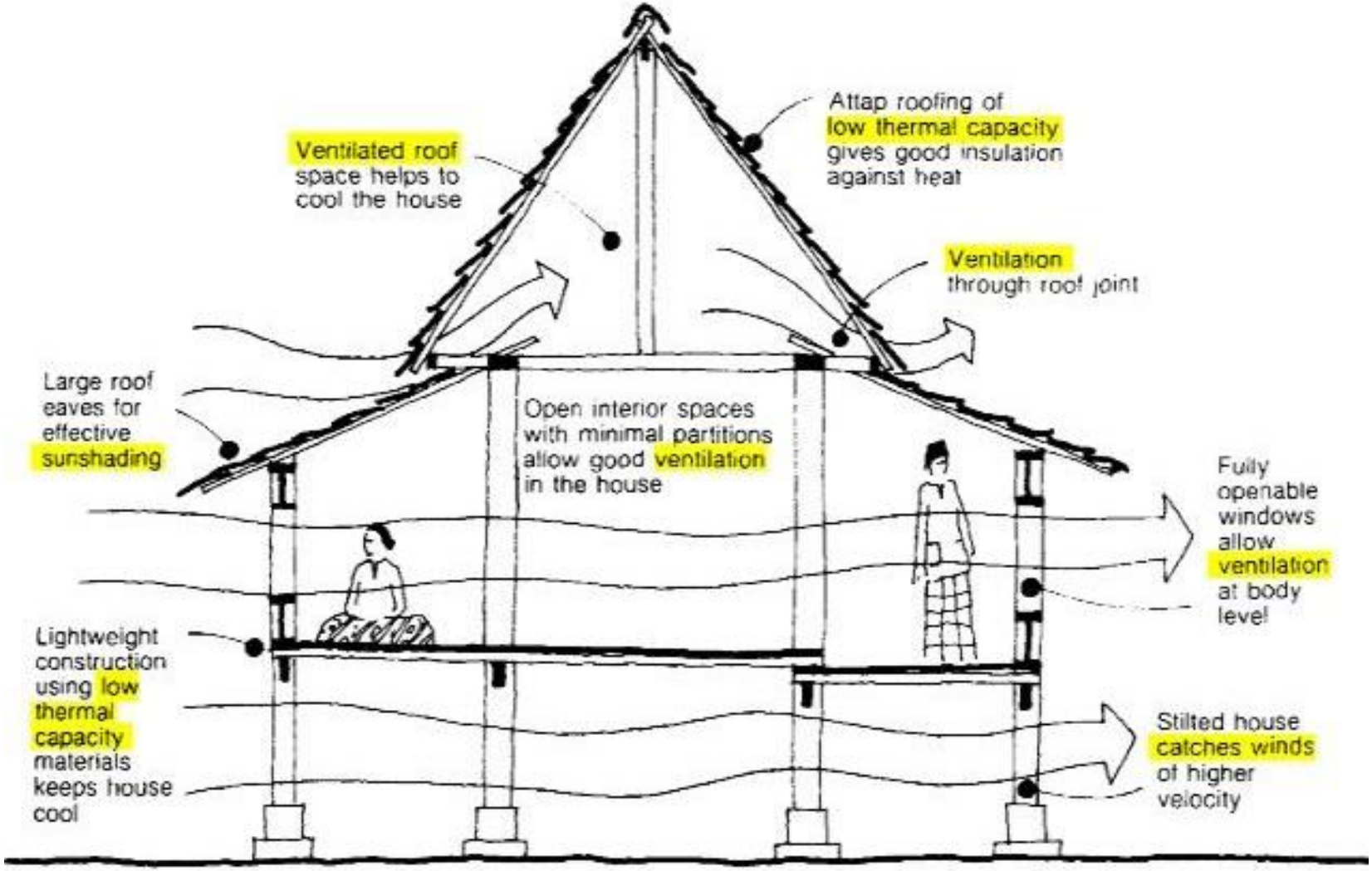
Design exploration in Green Building projects

AZRIL AMIR JAAFAR

The **climatic challenges** in Malaysia are caused by :

- High **temperatures**
- High **humidity**
- Excessive **Radiation**
- **Glare**



- Large overhang for sun shading
- wind flow for ventilation
- low thermal capacity material to promote air flow thru the wall

-shaded transition corridor
- air-well for ventilation n lighting
- heavy thermal capacity material to prevent heat penetration

sustainable design strategy

Passive Design

+ Context

+ Building usage + typology

+ Building Orientation

+ Space Planning

+ Building Envelope

+ Natural Light Strategy

+ Efficient Use of resources
  - water
  - Material selection (embodied energy)

+ Other contextual elements

Efficient M&E System

+ ACMV Strategy

+ Artificial lighting

+ Small power / plug load

Renewable energy

+ Solar PV

+ Solar heat collector
  - AC
  - Hot water

+ Wind

+ Water

+ Etc

Enhanced Energy Management System

+ BMS

+ Lighting Controls

+ Sensors

+ Intelligent features

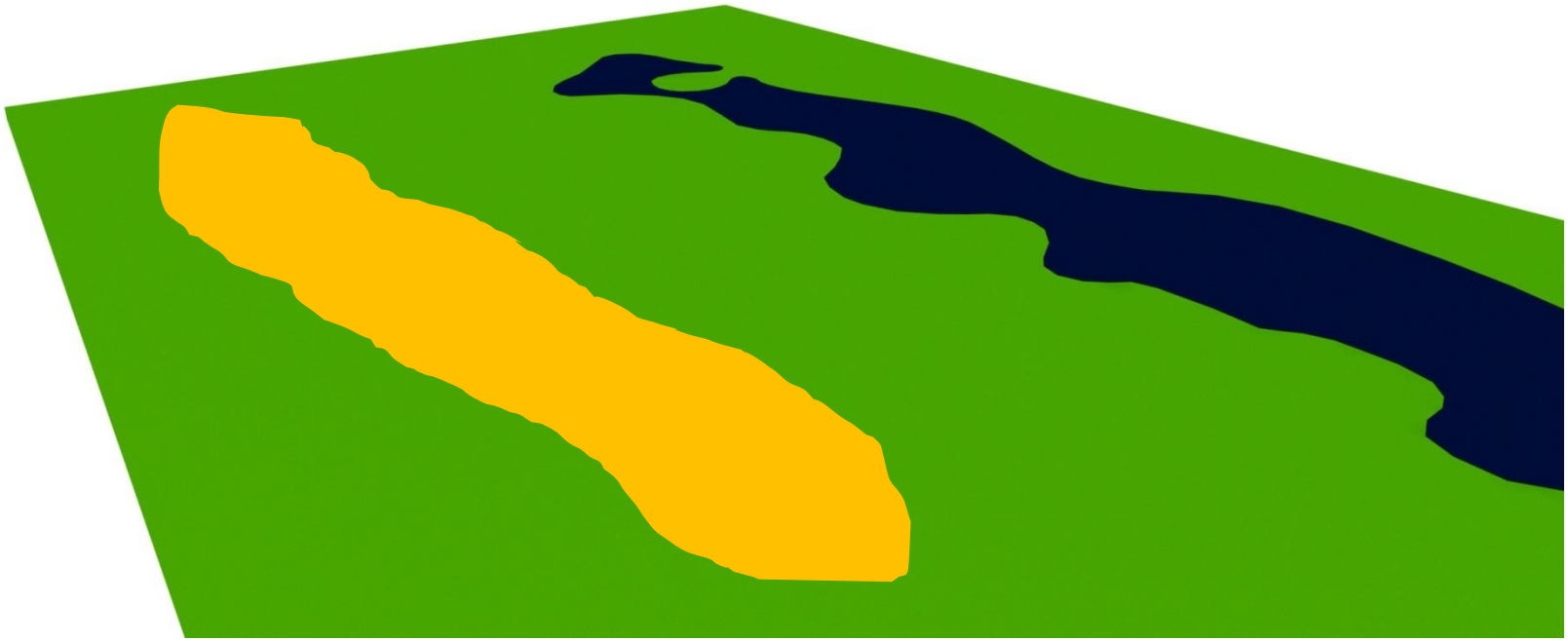
01

Office

- Private HQ
- Low rise
- Single Building
- Shah Alam
  > urban setting

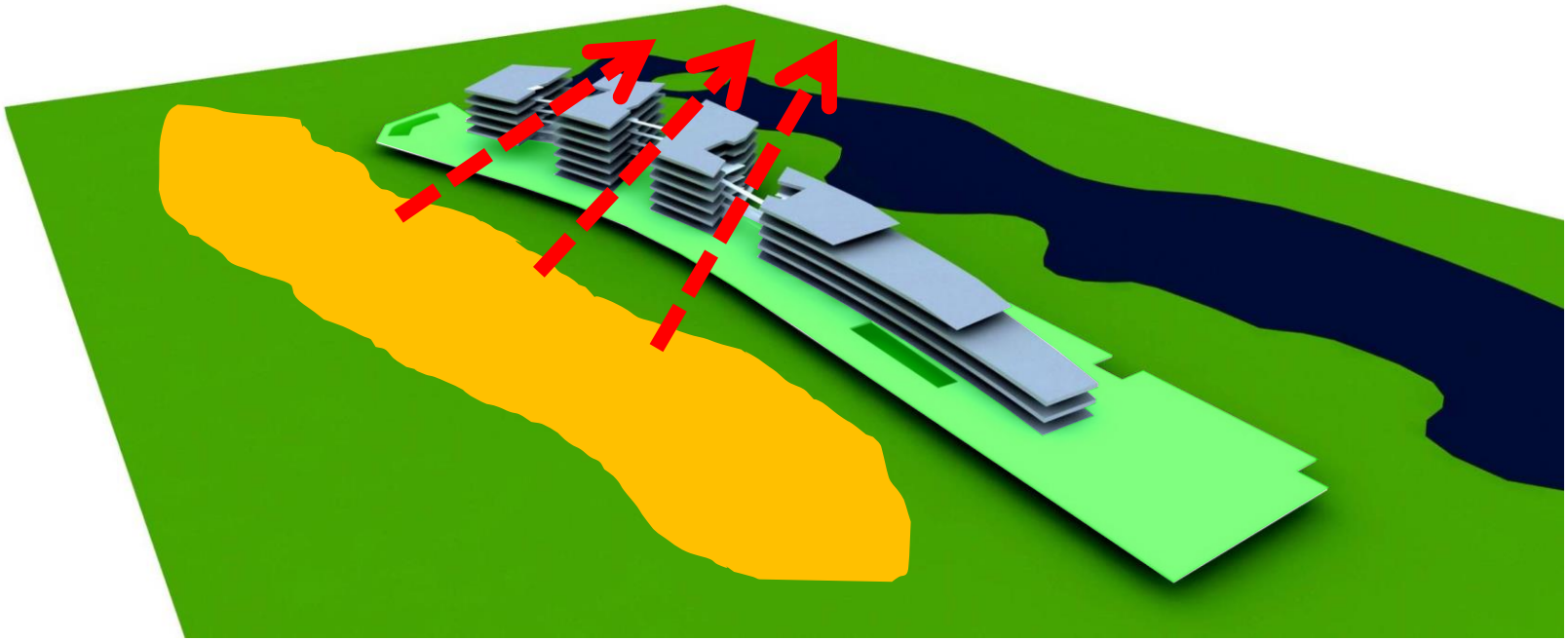
city of **Shah alam**

the **context**

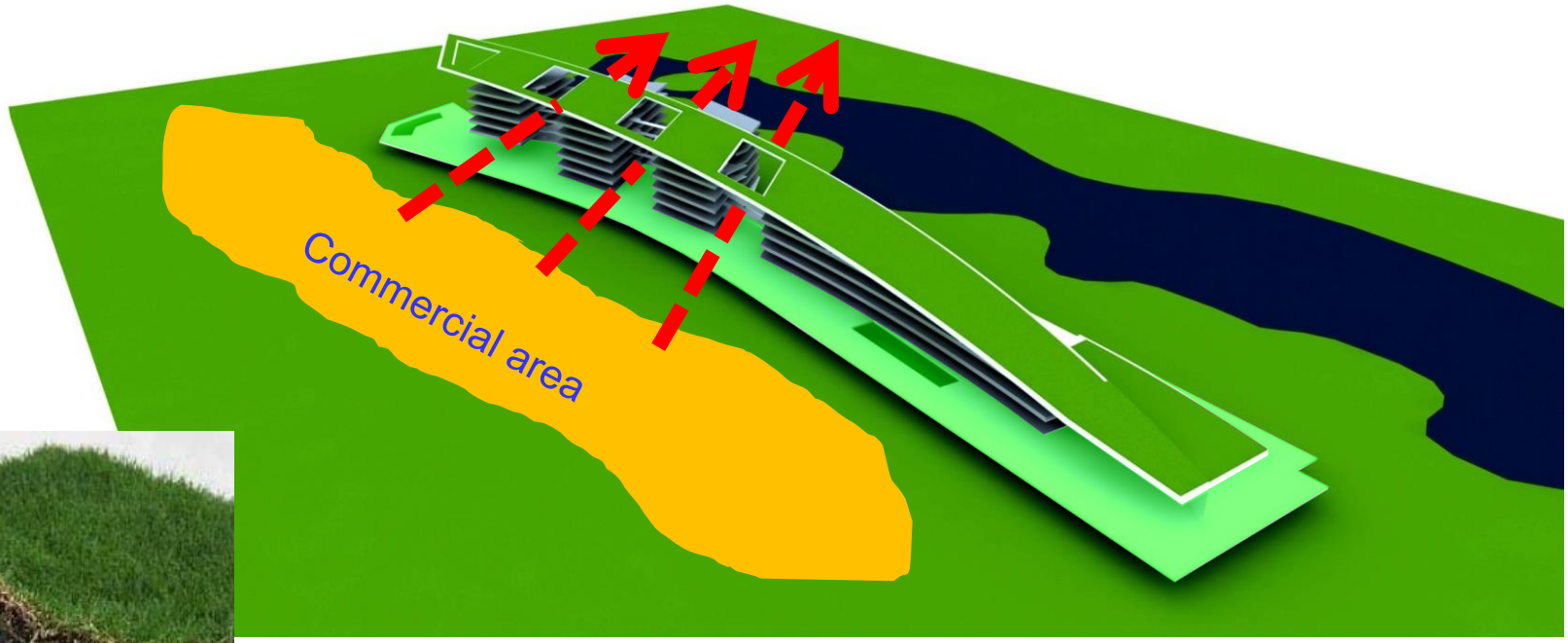


connecting the city

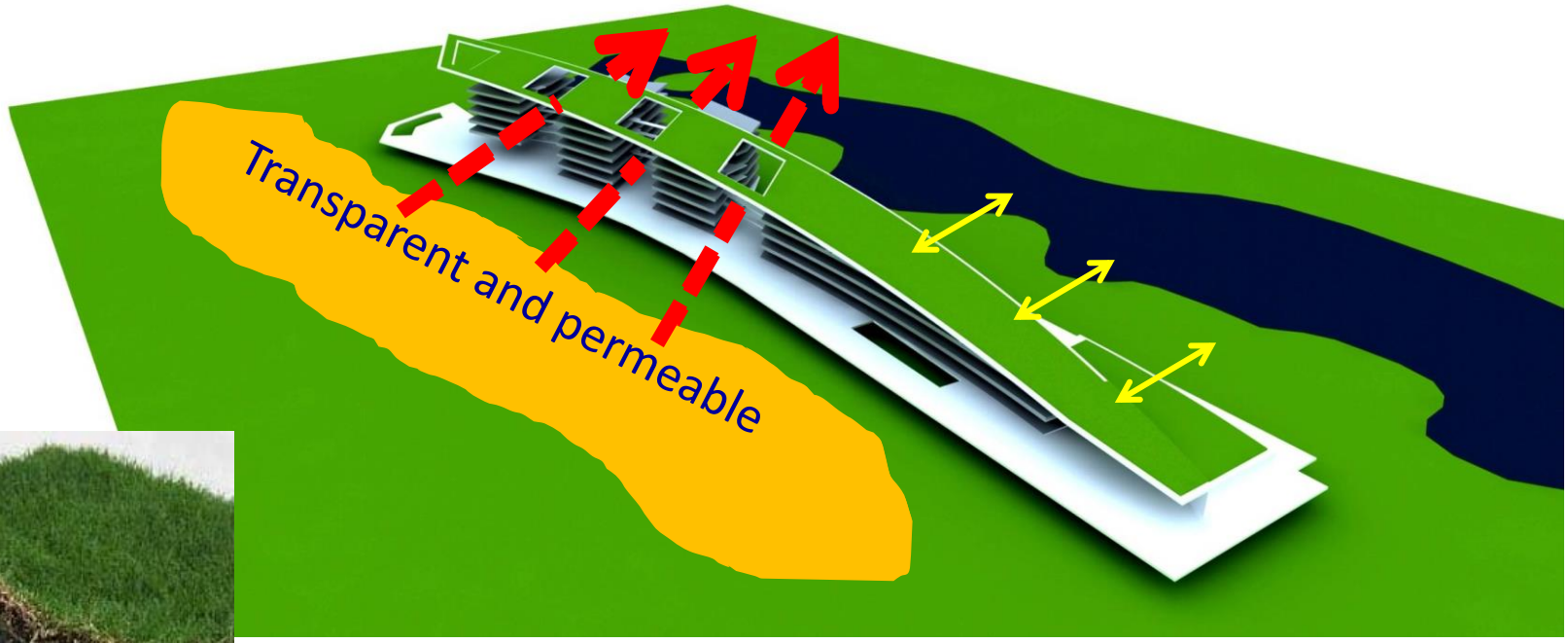
Office program built around the public spaces



connecting with nature



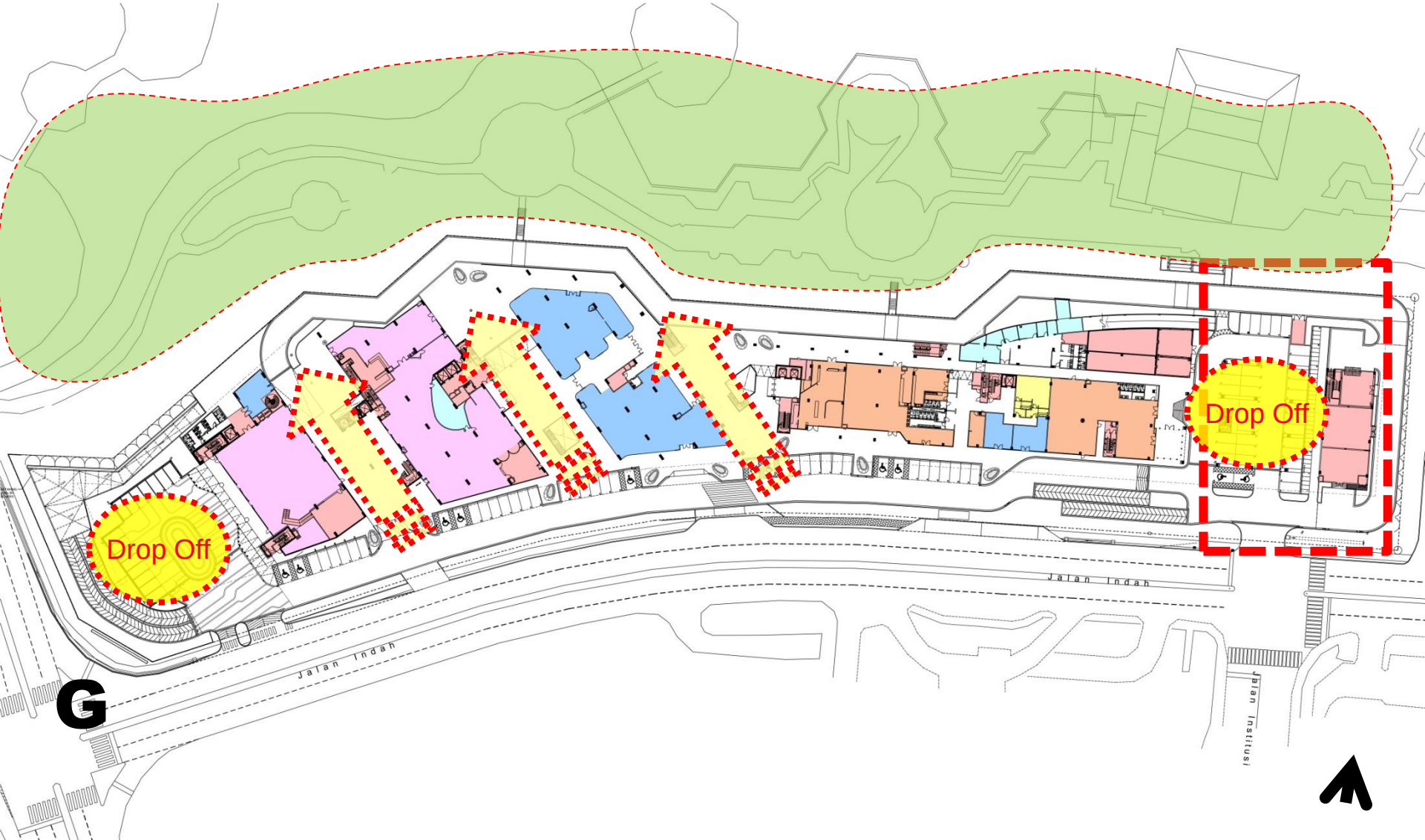
connecting the city
connecting people
connecting with nature



passive strategy - **orientation**

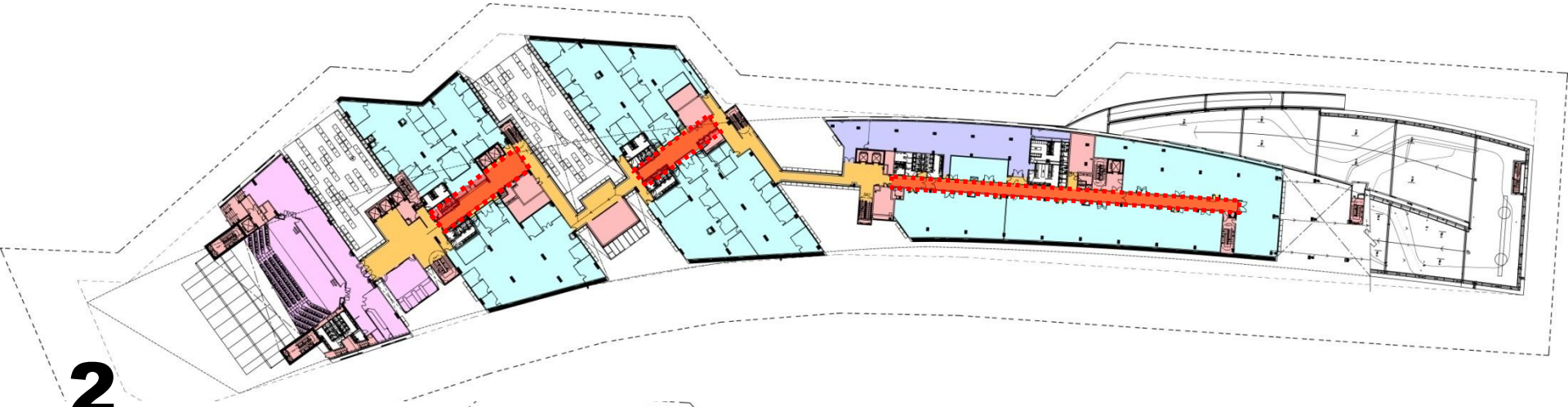
passive strategy - **planning**

services vs usable spaces



passive strategy - **planning**

+ space planning
+ AC vs Non AC spaces



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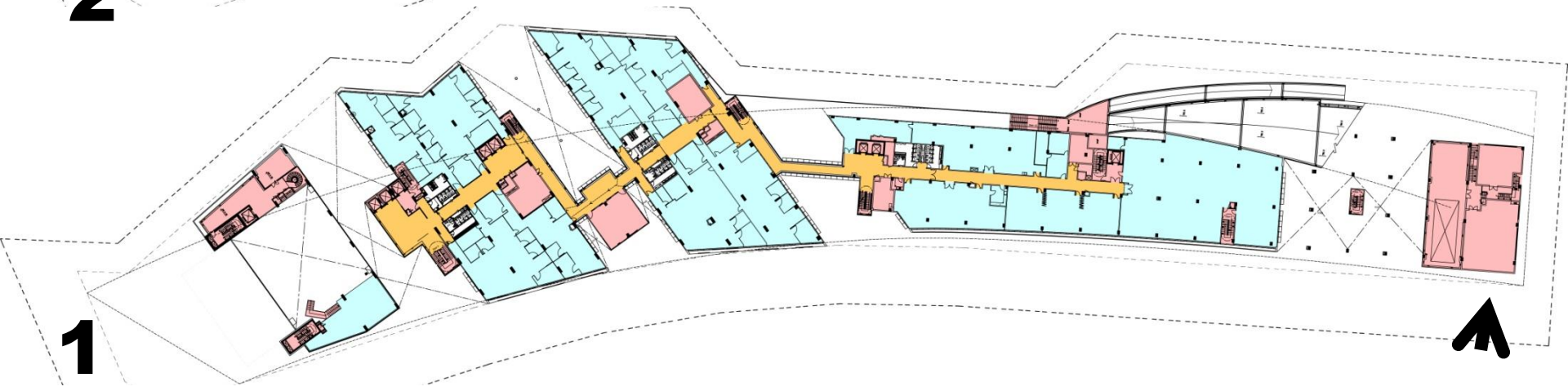


1

passive strategy - **planning**

+ vertical arrangement
+ roof buffer

promote **air flow**
that cool the plaza and the surrounding spaces.

promote **air flow**

promote **air flow** below roof

reduce **heat island** effect

Grass as **insulation**

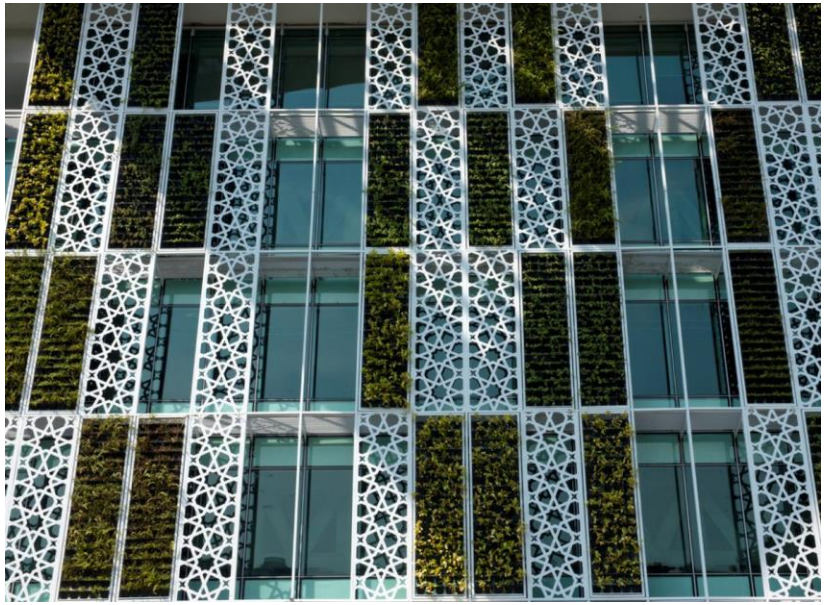
high performance **building envelope**

-Less glazing on the eastern and western walls to reduce exposure to solar radiation
-walls and windows (U-Values:
0.50 W/m²K for walls,
0.25 W/m²K green roof and
1.2 W/m²K for the low-e double glazing).

cultural **identity**

Glare Control

Partial facade views of office blocks and floating meeting rooms with DGU curtain walls and islamic motive sunscreen



Close-up facade views of office blocks with DGU curtain walls and islamic motive sunscreen

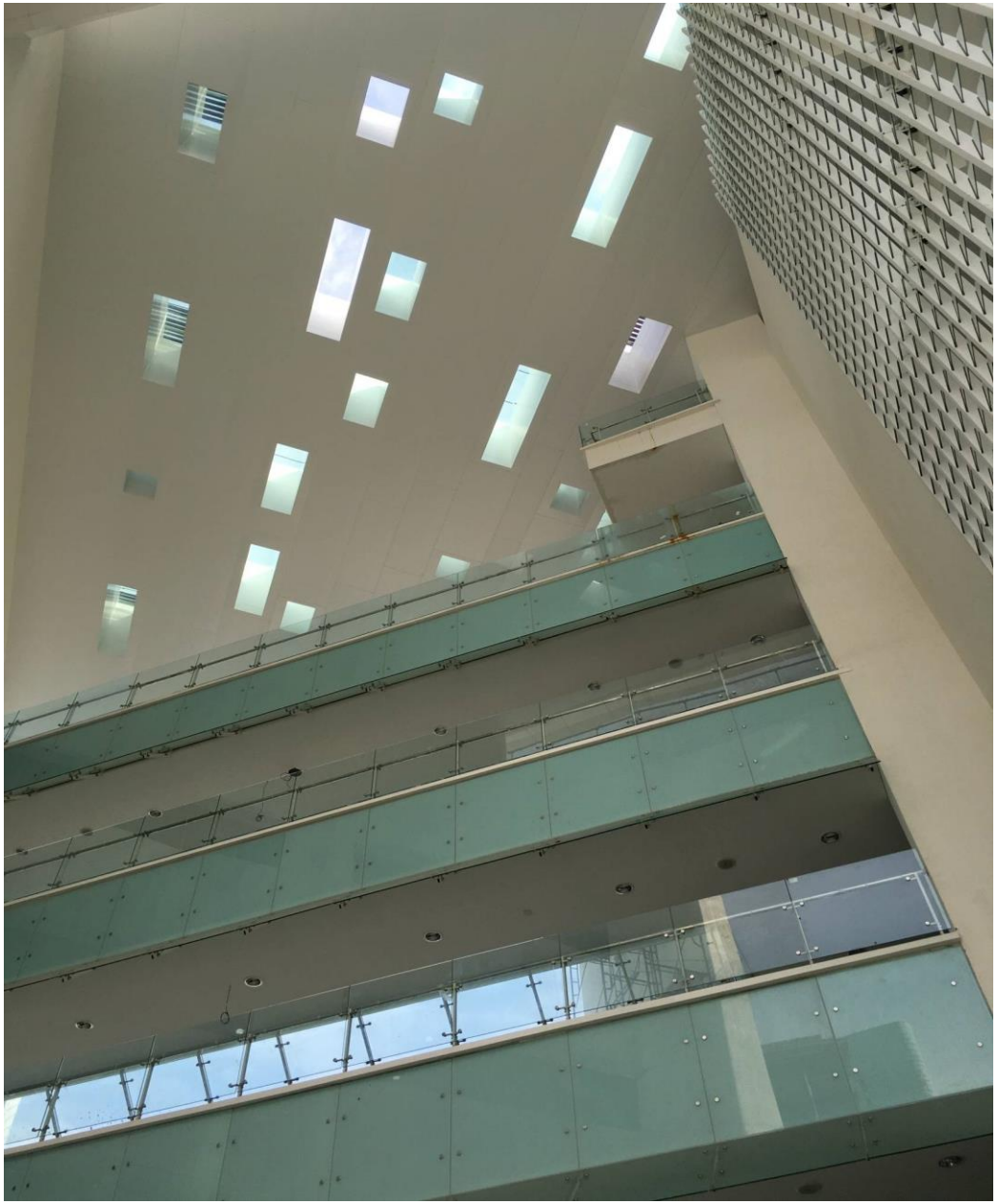
Partial facade views of office blocks and floating meeting rooms with DGU curtain walls and islamic motive sunscreen

Western facade

Shaded by **large Overhang**
Buffered by Outer **screen and vertical planting**

maximise **daylighting**
Sloped ceiling
Lighting Zones
Glare Control
Open Plan

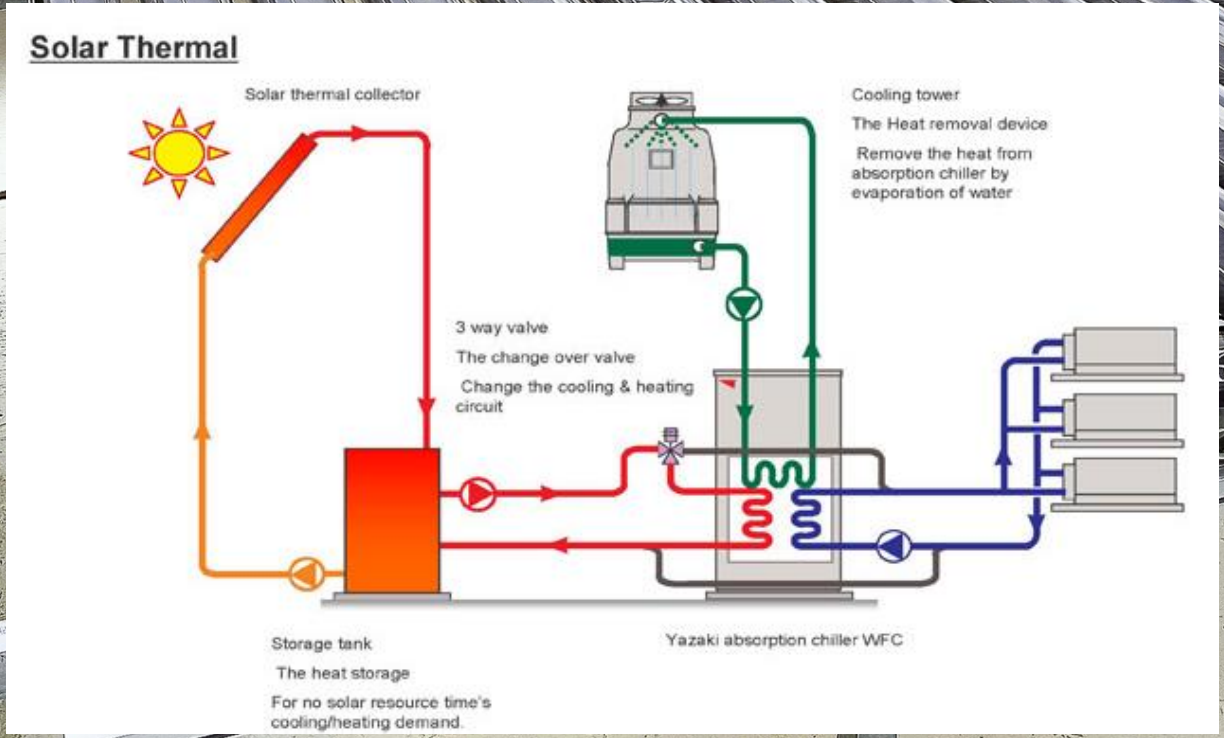
naturally ventilated corridors & staircase



renewable energy

Solar tube heat collectors

Solar thermal collectors power the AC systems, using thermal energy from the sun to drive an absorption chiller



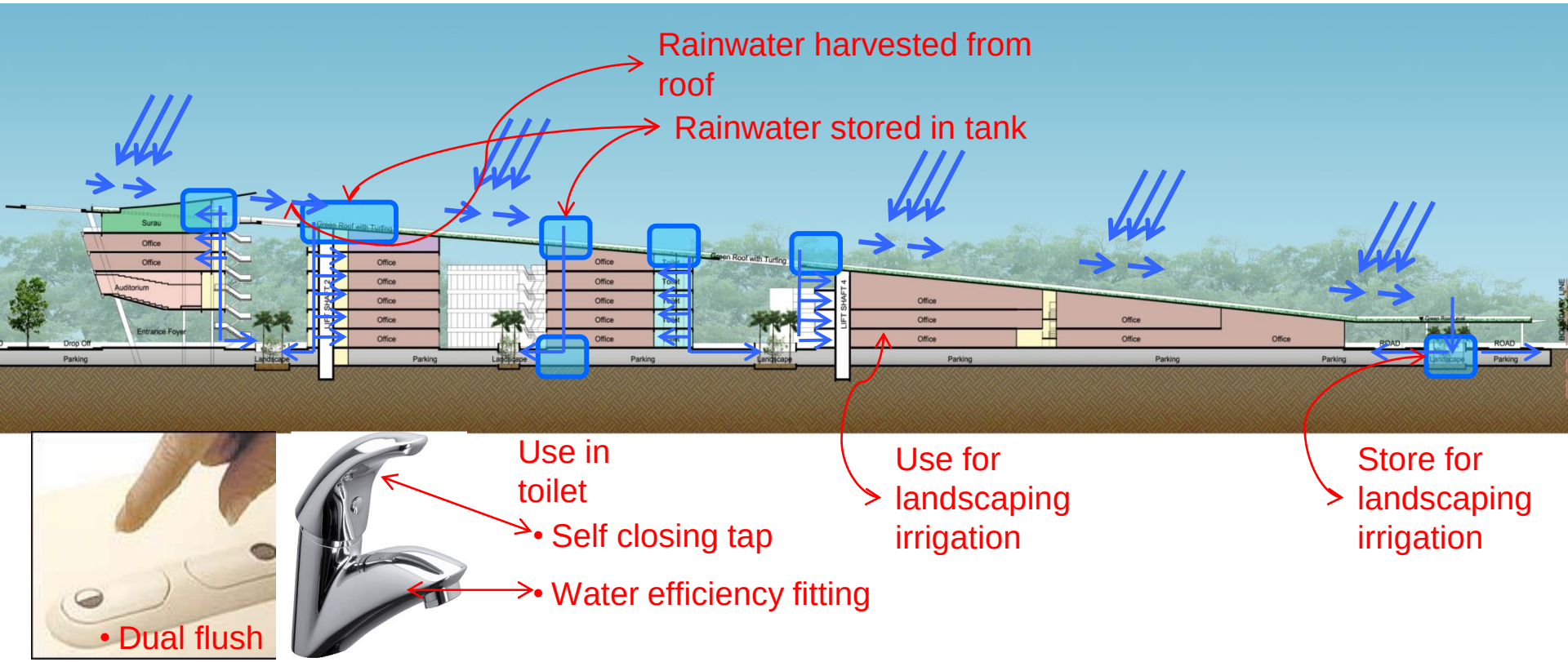
rainwater **harvesting**

Overall water consumption is **reduced by over 60%**

- Water efficient fittings

- A Greywater Harvesting System >**harvest** water from ACMV condensate
  >used water from the basin taps, surau ablution

- Rainwater harvesting system



Use in toilet

• Self closing tap

• Water efficiency fitting

Use for landscaping irrigation

Store for landscaping irrigation

indoor quality

Material procurement that focuses on **regional, recycled** and **low VOC** non-toxic building materials

CO2 reduction

Green roof from the top

Green roof with water bed stream at upper roof level

PKNS HQ **offsets** over **5,000 tones of CO2** emissions per year reducing energy usage by **70 %** compared to typical Malaysian office buildings

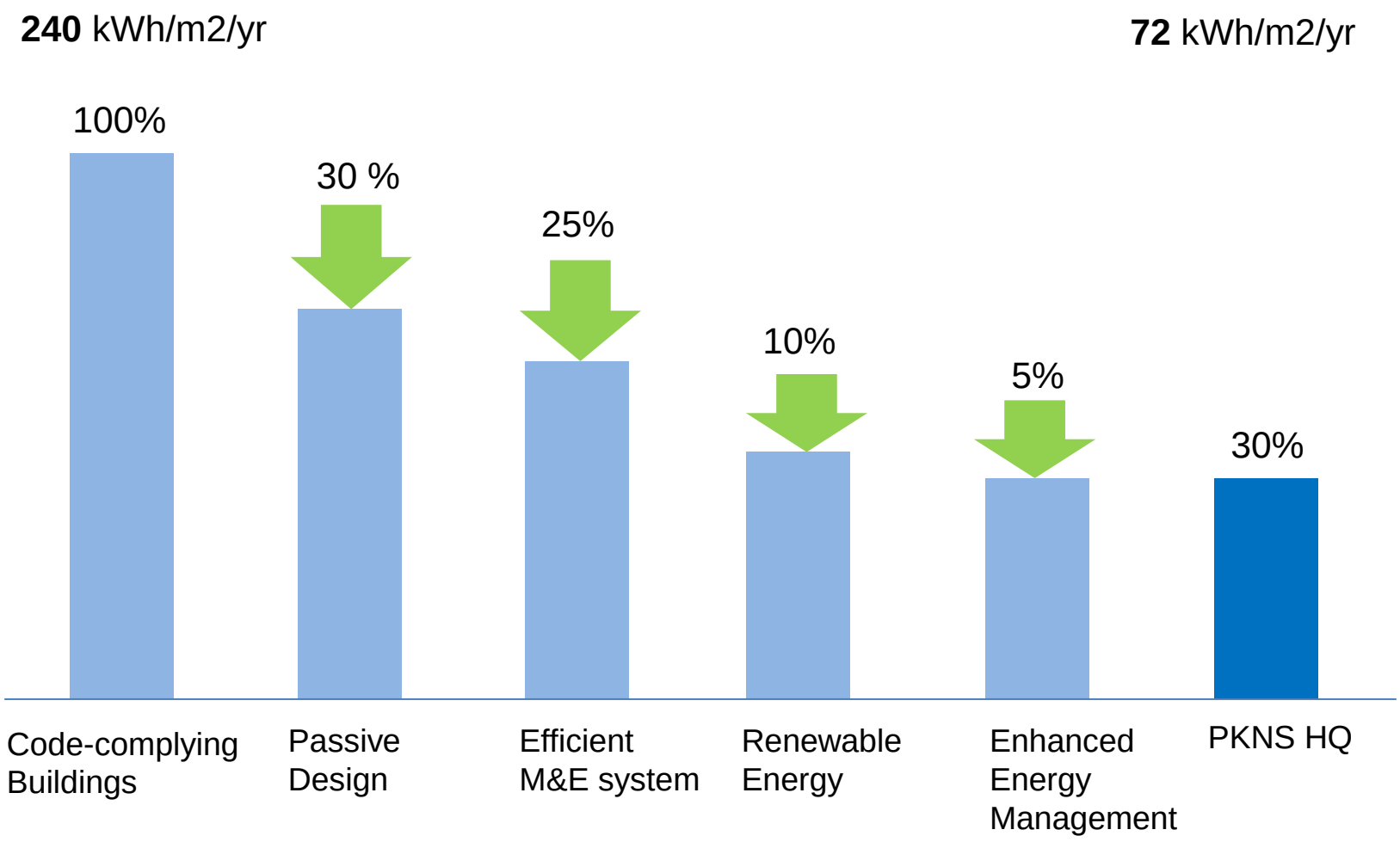
sustainable **transportation**

downsizing carpark

giving **parking priority to Green vehicles** and carpools.

Provision of **electric vehicle chargers** for 5% of the car park lots.

sustainable design strategy



WAO SHELTER HOME
PETALING JAYA, KUALA LUMPUR

03

Shelter
- Hostel
- Teaching facilities
- Offices
- Residential rooms
- Kitchen + Laundry
- Residential
  > sub-urban

previous WAO shelter

1 NO POVERTY

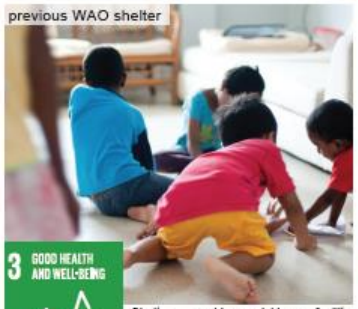
The shelter home provides free childcare for low-income poor working single moms.

previous WAO shelter

2 ZERO HUNGER

Provides food for the children at the shelter saved from domestic abuse homes

previous WAO shelter



3 GOOD HEALTH AND WELL-BEING

Shelter provides sickbay facility, medical care and healthcare support.

previous WAO shelter

4 QUALITY EDUCATION

Provide facilities eg. library, computer room and classroom & WI-fi.

previous WAO shelter

5 GENDER EQUALITY

Serve as safe home for women and children suffering domestic violence

6 CLEAN WATER AND SANITATION

Rainwater harvesting tank for grey water for toilets and garden.

7 AFFORDABLE AND CLEAN ENERGY

Equipped with solar PV cells and solar water heating system.

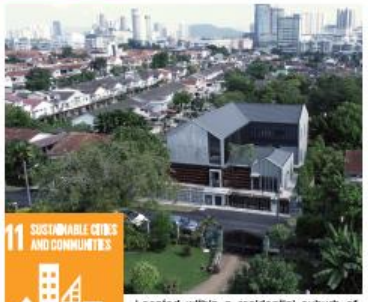
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

Extensive reuse and repurpose of rejected & discarded bricks, roof tiles floor tiles etc.

previous WAO shelter

10 REDUCED INEQUALITIES

Children from poor, troubled homes have chance to learn in safe environment.



11 SUSTAINABLE CITIES AND COMMUNITIES

Located within a residential suburb of Petaling Jaya.

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

The shelter children learn responsible consumption habits with recycling practice.

13 CLIMATE ACTION

WAO shelter home is one of the highest green scoring platinum award building

15 LIFE ON LAND

Courtyard and garden with trees and plants to maintain biodiversity

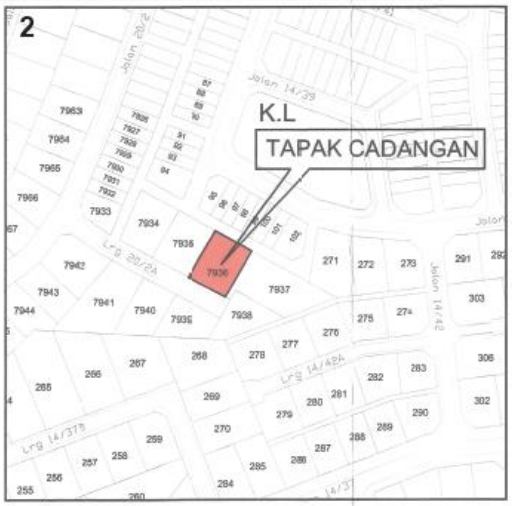
16 PEACE, JUSTICE AND STRONG INSTITUTIONS

A shelter to help instill good values

17 PARTNERSHIPS FOR THE GOALS

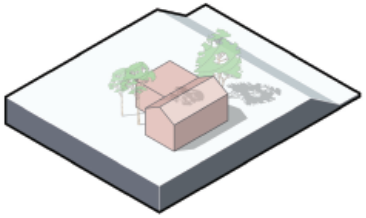
Corporate social responsibility project collaborated between the developers, Architect, Consultant, suppliers and contractor.

sustainable development goals



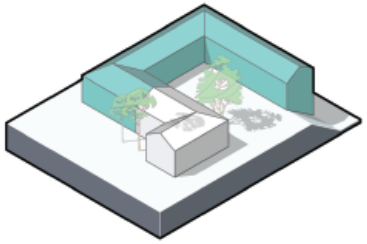
the neighbourhood

1. key plan
2. location plan
3. The WAO shelter home sits within a middle class residential neighbourhood but it does not feel out of place and that is probably important in giving its users status in society.



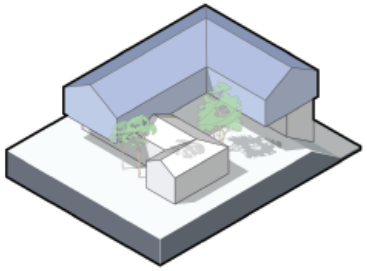
1

Remaining burnt skeleton of original house as part of the new expanded shelter home



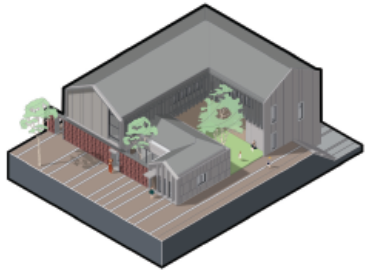
2

A new garden courtyard allows the dining and classrooms spaces extend to the outdoors



3

Secured dormitory bedrooms are housed in upper level of new structure



4

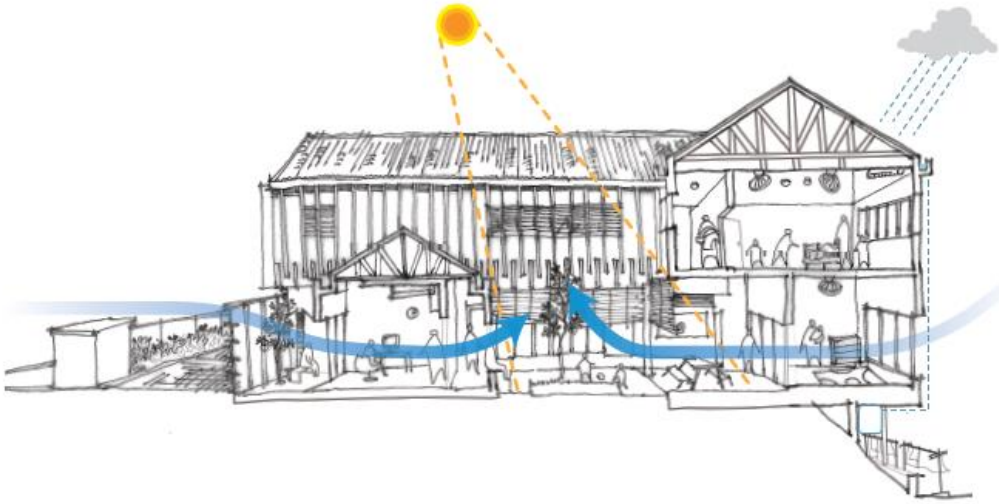
Adding permeable facade envelope to modulate outdoor conditions for maximum thermal comfort

design strategy

extend + rebuilding from the old

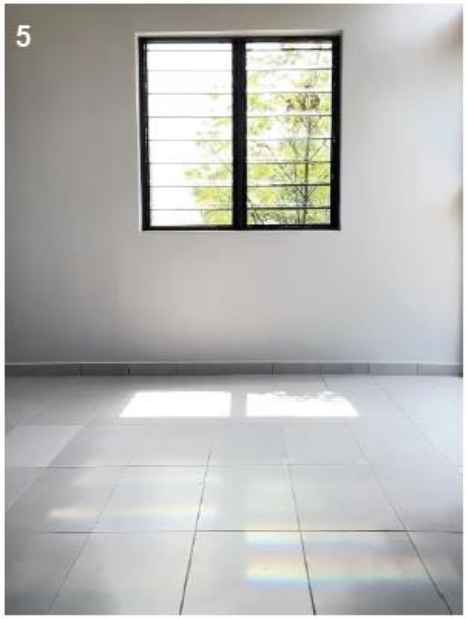
courtyard

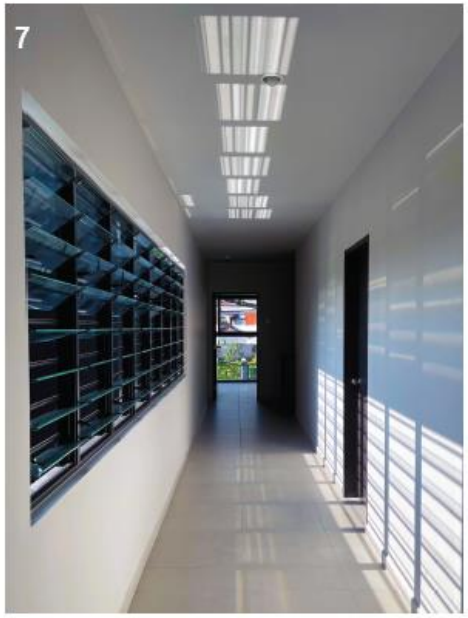
To further limit the entrapment of heat through the window, the high-performance glasses were installed with RETV 15.24 W/m2k achieved. the selection of louvers window allows up to 95% open to breeze and window to wall ratio of 0.17 with concrete wall U-Value at 2.6W/m2k.



building envelope

To limit the Sunlight penetration, vertical shading devices were incorporated with the window frame design to allow unobstructed view while maintaining the thermal comfort in the rooms.





openings

1. permeable wall as a screen for large openings at ground floor
2. window bar incorporated to the window design for extra security
3. large bay window allow direct interaction between outside and inside
4. blurring boundaries, bringing in the green
5. window to wall ratio of 0.17 at upper floor bedroom to limit direct sunlight penetration
6. large windows acting as watch tower has the direct view towards the street front
7. balcony as a buffer to bring in daylight
8. shading devices were incorporated within the window frame design to allow unobstruccted views

reused, recycled, rebuilt

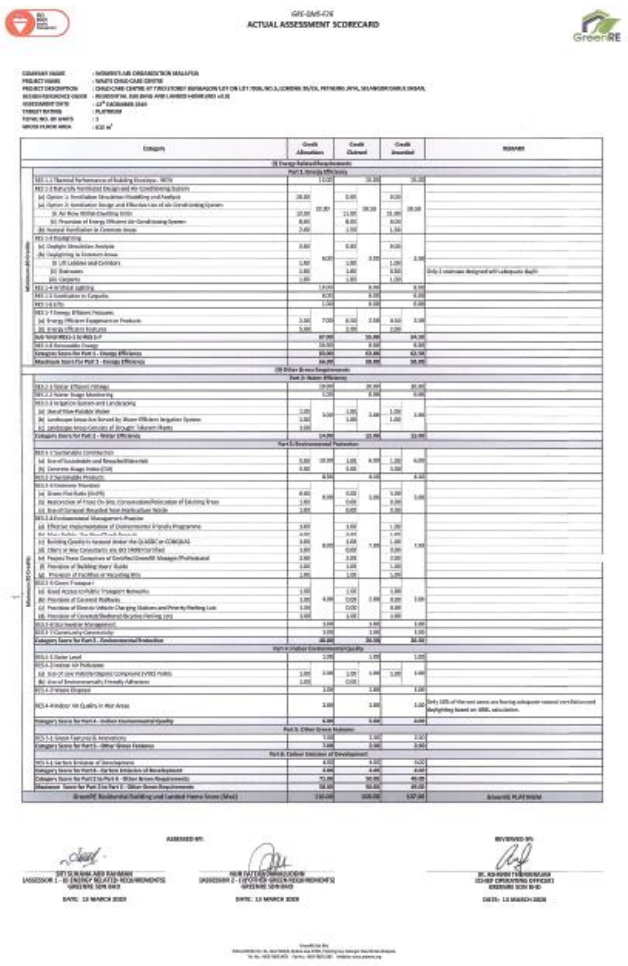
1. existing house condition after fire
2. salvaging of existing burnt tiles
3. salvaged roof tiles
4. steel bracing mock-up study
5. built steel bracing
6. arranging the tiles
7. arrangement of tile rows
8. view from entry way
9. view from office space

other green features

1. solar panels
2. pv cells
3. rainwater taps
4. rainwater harvesting tank
5. hybrid cooling system
6. recycle bins
7. bicycle rack
8. nearby public transport station

platinum greenre certification

The WAO Shelter home is one of the first childcare centre with GreenRE certification achieving the highest GreenRE Platinum score to date.



GRE-SMS-07K

ACTUAL ASSESSMENT SCORECARD

GreenRE

COMPANY NAME : WOMEN'S AID ORGANISATION MALAYSIA
PROJECT NAME : WAO'S CHILD CARE CENTRE
PROJECT DESCRIPTION : CHILD CARE CENTRE BY TERUS KORBIT INFRASTRUCTURE SDN BHD, NO.3, LORONG 3B/3A, PETALING JAYA, SELANGOR DARUL EHSAN,
ASSESSMENT REFERENCE USED : RESIDENTIAL BUILDING AND LANDED HOUSE (RES) v5.2E
ASSESSMENT DATE : 12th DECEMBER 2019
TYPE(S) OF BUILDING : PLATINUM
TOTAL NO. OF UNITS : 1
GROSS FLOOR AREA : 632 m²

Category	Credit Allocations	Credit Claimed	Credit Awarded	Remark
(A) Energy-Related Requirements				
Part 1: Energy Efficiency				
RES 1.1 Thermal Performance of Building Envelope - WETH	15.00	15.00	15.00	
RES 1.2 Naturally Ventilated Design and Air-Conditioning System				
(a) Option 1: Ventilation Simulation Modelling and Analysis	20.00	0.00	0.00	
(a) Option 2: Ventilation Design and Effective Use of Air-Conditioning System	20.00	20.00	20.00	20.00
(i) Air Flow Within Dwelling Units	10.00	10.00	10.00	10.00
(c) Provision of Energy Efficient Air-Conditioning System	8.00	8.00	0.00	
(b) Natural Ventilation in Common Areas	2.00	1.50	1.50	
RES 1.3 Daylighting				
(a) Daylight Simulation Analysis	3.00	0.00	0.00	
(b) Daylighting in Common Areas		3.00	3.00	3.00
(i) Lift Lobbies and Corridors	1.00	1.00	1.00	
(ii) Staircases	1.00	1.00	0.50	Only 1 staircase designed with adequate depth
(iii) Carparks	1.00	1.00	1.00	
RES 1.4 Artificial Lighting		8.00	8.00	8.00
RES 1.5 Ventilation in Carparks		6.00	6.00	6.00
RES 1.6 Lifts		1.00	0.00	0.00
RES 1.7 Energy Efficient Features				
(a) Energy Efficient Equipment on Products	3.00	7.00	6.50	3.00
(b) Energy Efficient Features	5.00	3.00	2.00	2.00
Sub-total RES1.1 to RES 1.7		67.00	55.00	34.00
RES 1.8 Renewable Energy		10.00	8.00	8.00
Category Score for Part 1 - Energy Efficiency		83.00	63.00	42.00
Maximum Score For Part 1 - Energy Efficiency		83.00	63.00	42.00
(B) Other Green Requirements				
Part 2: Water Efficiency				
RES 2.1 Water Efficient Fittings		19.00	19.00	19.00
RES 2.2 Water Usage Monitoring		1.00	0.00	0.00
RES 2.3 Irrigation System and Landscaping				
(a) Use of Non-Potable Water	1.00	1.00	1.00	1.00
(b) Landscape Areas Are Served by Water Efficient Irrigation System	1.00	1.00	1.00	1.00
(c) Landscape Areas Consists of Drought Tolerant Plants	1.00			
Category Score for Part 2 - Water Efficiency		14.00	21.00	21.00
Part 3: Environmental Protection				
RES 3.1 Sustainable Construction				
(a) Use of Sustainable and Recycled Materials	5.00	10.00	1.00	0.00
(b) Concrete Usage Index (CUI)	5.00		0.00	0.00
RES 3.2 Sustainable Products		8.00	0.00	0.00
RES 3.3 Greenery Provision				
(a) Green Plot Ratio (GnPR)	0.40	0.00	0.00	0.00
(b) Preservation of Trees On Site, Compensation/Relocation of Existing Trees	1.00	0.00	0.00	0.00
(c) Use of Compost/ Recycled Non-Horticulture Waste	1.00	0.00	0.00	
RES 3.4 Environmental Management Practice				
(a) Effective Implementation of Environmental Friendly Programme	1.00		0.00	1.00
(b) Main Builder Has Obtained Green Mark Assessment	4.00		0.00	0.00
(c) Building Capable to Achieved Similar Met Q-MBC or CONQUAS	1.00	0.00	0.00	1.00
(d) Others or New Consultants are ISO 14000 Certified	1.00		0.00	0.00
(e) Prepare Green Conscious of Condition/Green/RE Manager/Professional	2.00		0.00	0.00
(f) Provision of Building Users' Guide	1.00		0.00	1.00
(g) Provision of Facilities or Recycling Bins	1.00		0.00	1.00
RES 3.5 Green Transport				
(a) Good Access to Public Transport Networks	1.00		0.00	0.00
(b) Provision of Covered Walkways	1.00	4.00	0.00	0.00
(c) Provision of Electric Vehicle Charging Stations and Priority Parking Lots	1.00		0.00	0.00
(d) Provision of Covered/Sheltered Bicycles Parking Lots	1.00		0.00	0.00
RES 3.6 Eco Friendly Management		1.00	1.00	1.00
RES 3.7 Community Connectivity		3.00	3.00	3.00
Category Score for Part 3 - Environmental Protection		32.00	24.00	16.00
Part 4: Indoor Environment Quality				
RES 4.1 Noise Level		1.00	1.00	1.00
RES 4.2 Indoor Air Pollutants				
(a) Use of Low Volatile Organic Compound (VOC) Paints	1.00	2.00	1.00	1.00
(b) Use of Environmentally Friendly Adhesives	1.00		0.00	
RES 4.3 Mold Proposal		1.00		1.00
RES 4.4 Indoor Air Quality in Wet Areas		2.00	2.00	2.00
Category Score for Part 4 - Indoor Environmental Quality		6.00	4.00	4.00
Part 5: Other Green Features				
RES 5.1 Green Features & Innovations		1.00	1.00	2.00
Category Score for Part 5 - Other Green Features		1.00	1.00	2.00
Part 6: Carbon Emission of Development				
RES 6.1 Carbon Emission of Development		4.00	4.00	4.00
Category Score for Part 6 - Carbon Emission of Development		4.00	4.00	4.00
Category Score for Part 2 to Part 6 - Other Green Requirements		57.00	54.00	49.00
Maximum Score for Part 2 to Part 6 - Other Green Requirements		58.00	58.00	49.00
GreenRE Residential/Building and Landed Home Score (Max)		210.00	205.00	157.00

GreenRE PLATINUM

ASSESSED BY:

DATE: 13 MARCH 2020

DATE: 13 MARCH 2020

REVIEWED BY:

DATE: 13 MARCH 2020

GreenRE Sdn Bhd

GreenRE

WAO'S Child Care Centre

HAS BEEN AWARDED

Platinum

Provisional GreenRE Certification
Residential Category

A project by

Woman's Aid Organization Sdn. Bhd.

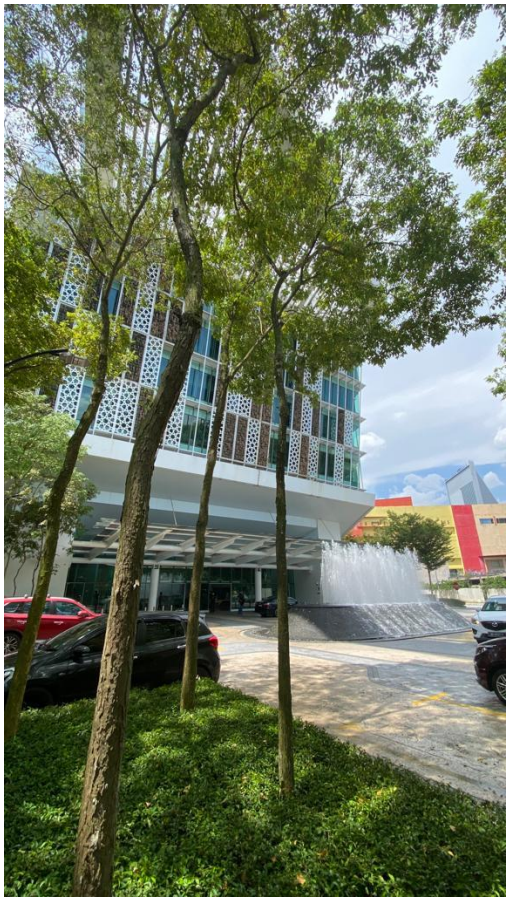
on

13th March 2020

Datuk Seri Michael Yam Kong Choy *SMW, DSAS*
Director
GreenRE Sdn Bhd (1040485-V)
Wisma REHDA, No. 2C, Jalan 51/216, 47301 Petaling Jaya
tel: 603-7803 2978 Fax: 603-7803 3283

Certificate No.: **RES/051/20C**

Trees absorb and sink carbon that would otherwise contribute to global heating. Through photosynthesis, trees use sunlight, carbon dioxide and water to create energy (glucose) for their cells.



Trees end up feeding themselves with the carbon we desperately need to avoid getting into the atmosphere. Trees also help the soil capture and store carbon.

Trees are extremely important to help mitigate climate change - more trees out there, the better.

Plant more trees in your projects !