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SMART CITIES: INTEGRATING BLUE AND GREEN CORRIDOR TO CREATE HEALTHY LIFESTYLE

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ABSTRACT

This comprehensive project is about enhancing the well being of the community around Klang. Klang town might have faced urban environmental issues, social and economic aspects of the problems. This project intends to create comprehensive smart living cities focusing on biodiversity, historical values and economy with a concentration on accessibility for Klang town. The project, located at the centre of Klang town, has 243 hectares in acreage. The study area involved skyscrapers clustered within the city centre encompassing banks, commercial sectors, regional offices, institutions, religious and large corporations, especially those along Jalan Tengku Kelana, Jalan Tengku Diaudin and Jalan Dato Hamzah. The low scale development of the site dominated by traditional shop-houses and retail outlets of high pedestrian activity is in the southern part of Klang town.

Keywords: Smart cities, blue and green corridor, riverfront, landscape design
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INTRODUCTION

This project aims to strengthen Klang Town (Figure 1) as a smart living competitive city globally by emphasising sustainable development holistically and bearing the image of heritage and digital city. The issues of this project highlight three factors: natural resources, social, and development.

NATURAL RESOURCES

1) Degradation of natural resources and river/seawater quality that affects aquaculture, 2) Unrecycled solid waste dumping, 3) Flash flood -poor drainage maintenance.

SOCIAL

1) Lack of job opportunity for human resources, 2) Less emphasis on local economic development, 3) Non-strategic location of development of housing and public infrastructure.

DEVELOPMENT

1) Incomprehensive development of land use planning of small lots, 2) Increasing number of brownfield sites and abandoned projects, 3) Insufficient provision of community facilities, support facilities and infrastructure, 4) Developments that do not comply with standards of planning permission, such as buffer zones, 5) Dangerous and inefficient road transport system, 6) Less emphasis on the provision of appropriate pedestrian paths, 7) No specific development control guidelines in the heritage area.

The objectives of this project are:

1. To improve the high-quality landscape and urban design environment.
2. To optimise land use and natural resources.
3. To create an efficient infrastructure and transportation system.

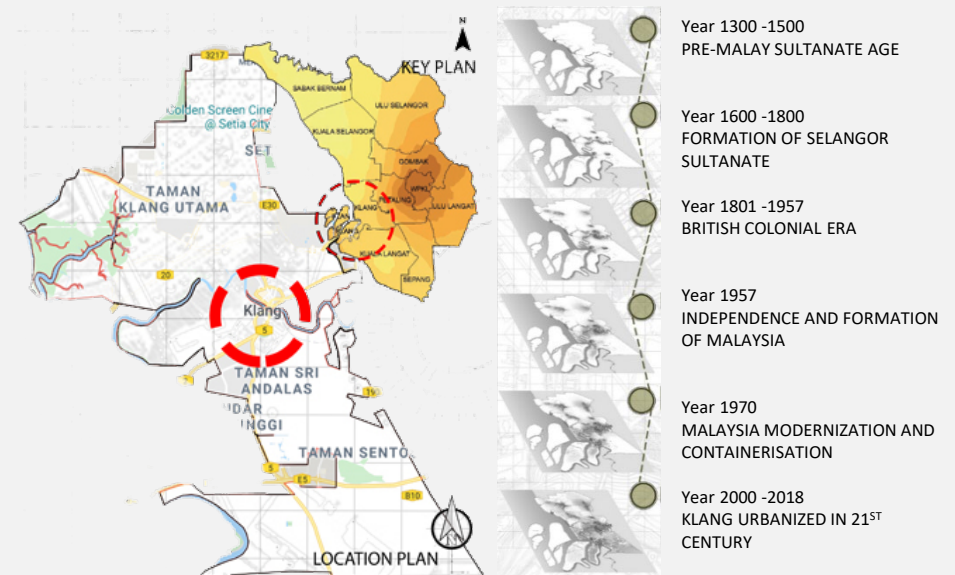


Figure 1: Key and location plan of selected site of Klang Town as well as its chronology .

LITERATURE REVIEW

BLUE CORRIDOR

The blue corridor manages areas of low, moderate or high flood risk and takes action where necessary to keep pace with climate change. Explore opportunity or restore sustainable natural storage of floodwater on undeveloped floodplains. Make more space for rivers through urban areas, such as restoring access for floodwater onto the key strips of the floodplain by limiting redevelopment to flood-compatible and land use like parkland.

GREEN CORRIDOR

A thin strip of land provides sufficient habitat to support wildlife, often within an urban environment, thus allowing wildlife movement within its domain. Common green corridors include railway embankments, riverbanks, and roadside grass verges.

HEALTHY LIFESTYLE

Urban growth occurs in developing cities. Therefore, urban expansion needs to be planned from the “ground up” to make cities- the health and well-being centres. The development includes effective planning such as durable housing, accessible neighbourhoods, efficient energy; transit networks; robust freshwater supply, waste and sanitation systems, ample green spaces, preventing diseases and protecting the climate (Smart Selangor Action Plan 2025).

URBAN RIVER

Rivers have many functions. Rivers provide connections between landscapes and communities, and they also gather people around the same idea for a creative and sustainable environment. Humans use the river waters for various purposes such as drinking water, irrigation, industry, power production, transportation, flood control, fishing, boating, swimming and aesthetic enjoyment.

URBAN ECOSYSTEM IMPROVEMENT

An urban ecosystem is any ecological system located within a city or other densely settled area or the greater ecological system that makes up an entire metropolitan area. The physical complex includes buildings, transportation networks, modified surfaces (e.g., parking lots, roofs, landscaping), and the environmental alterations resulting from human decision making. The physical components of any urban ecosystem also include energy use and the import, transformation, and export of materials.

METHODS

Checklist and Observation

In conducting the research, the data collection used a checklist for site inventory and observation methods - taking pictures of the site condition to map the existing site condition.

SITE INVENTORY AND ANALYSIS

1. SOCIAL AND CULTURAL ELEMENT

Figure 2 shows that the male population dominates the population distribution with 474,200 male population compared to 471,000 female population.

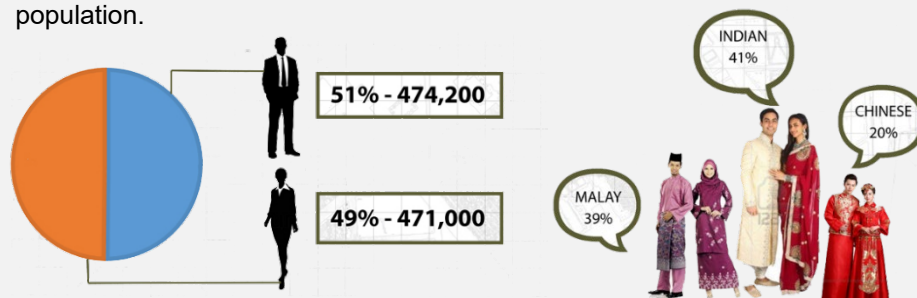


Figure 2: Domination of people by ages and cultures.

Historical values, social and cultural tradition.

- Shows the uniqueness of a place and community.
- Strong historical background, particularly the history of Klang Town and royalties.
- Marketable and gradually gaining popularity in traditional customs such as little Indian art.
- The many distinctively food culture popularised for commercial or tourism purposes.

2. SITE CONTEXT

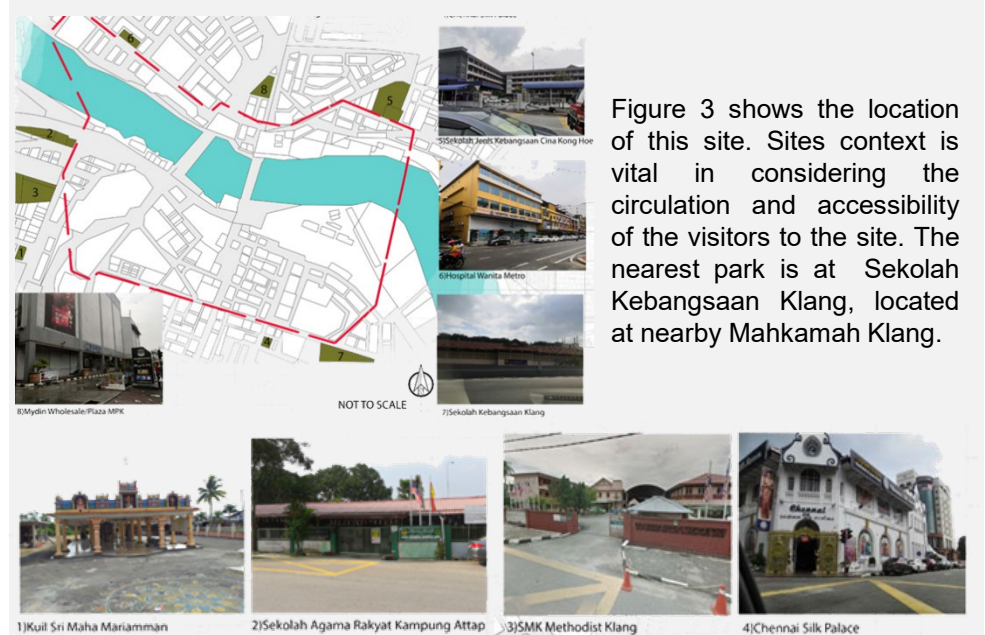


Figure 3: Site context.

3. LANDUSE

Figure 4 shows that the strategic location of urban cities near water bodies and commercial areas can increase the economics of local people. Weak management of water surface runoff contributes to the emergence of flood plains and can cause pollution. Nature and cultural resources of this area can be turned into something more functional and benefit tourists.

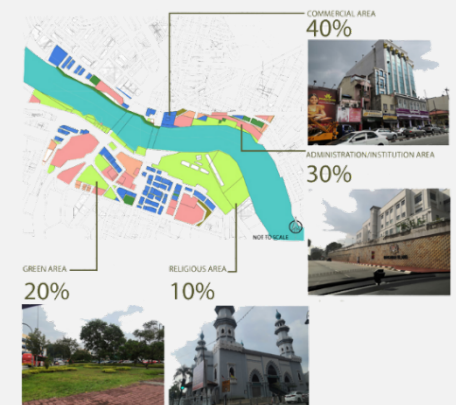


Figure 4: Strategic location.

4. FIGURE GROUND STUDY

The figure-ground theory, founded on the study of the relative land coverage of solid masses, consists of figures, i.e. buildings to open voids- such as parks, streets, and squares (Figure 5) . A predominant “field” of solid and void creates the urban fabric (R.Trancik, 1988)

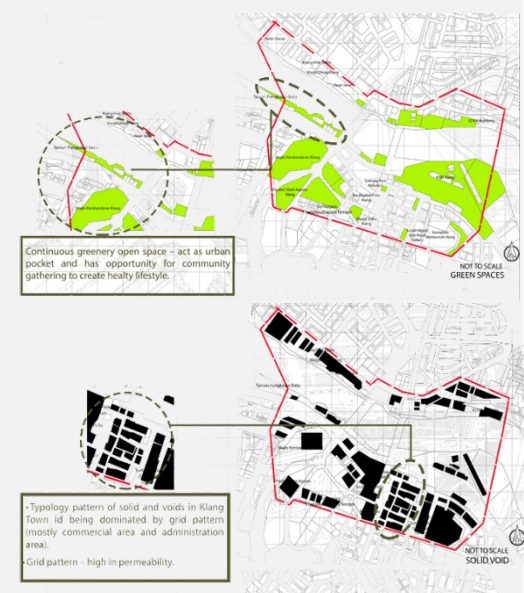


Figure 5: Figure ground and solid void study

5. USER ACTIVITIES

Figure 6 shows pedestrian activities: walking from bus stop to the workplace and shopping mall, enjoying meals at street hawkers and performing prayers at religious centres.

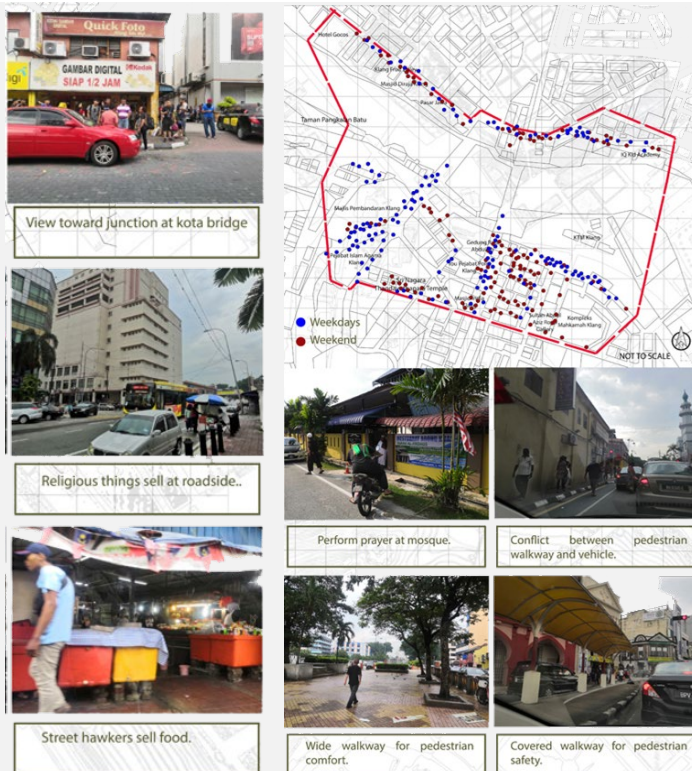


Figure 6: Pedestrian pattern and activities.

6. CIRCULATION

Figure 7 shows three primary roads in Klang Town: the Federal Highway, Jalan Kota and Jalan Tengku Kelana. Traffic congestion often occurs on these roads during the day and especially on weekdays. This occurrence is due to the administration and public services around Klang city. In addition, congestion happens when some of these areas are routinely occupied by traders as their territory.

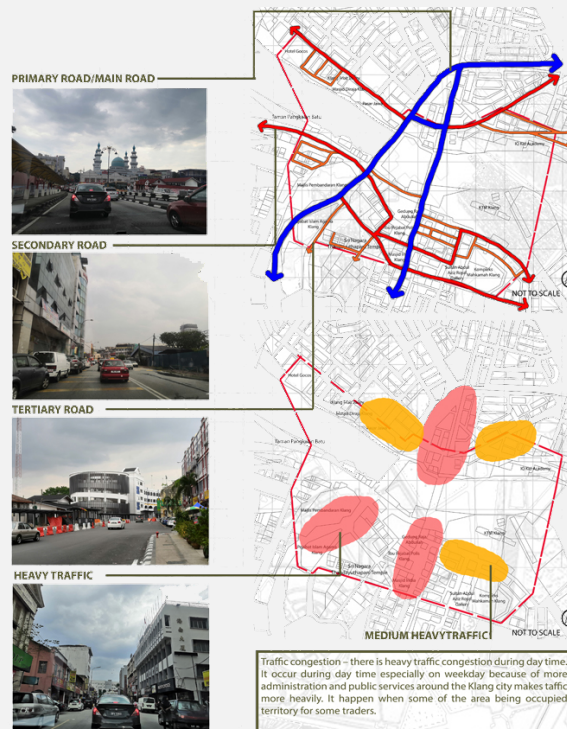


Figure 7: circulation pattern at the site area.

7. IMAGEABILITY STUDY

The quality of a physical object gives an observer a vivid and robust image. When placed in good form, the elements of legibility, paths, edges, districts, landmarks, and nodes increase human ability to see and remember patterns and are easier to learn. (Lynch, 1960)

7.1 Landmark and Nodes

Figure 8 shows that a landmark is a point of reference, which people see externally, and nodes are the centre of attraction and located at strategic locations that people can enter (Lynch, 1960)

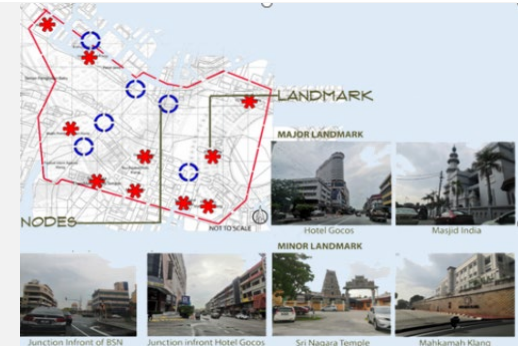


Figure 8: Landmark and nodes study.

7.2 Path

Figure 9 shows that familiar routes followed which pedestrians customarily, occasionally, or potentially move (Lynch, 1960).

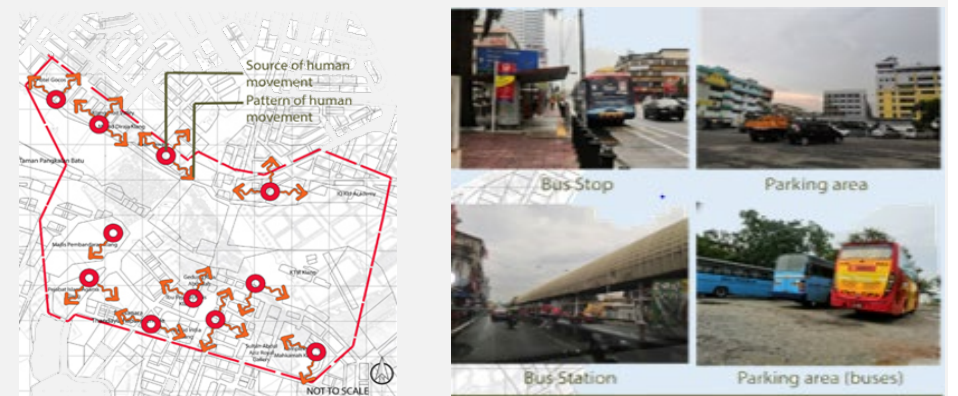


Figure 9: Routed study

7.3 Edges

Figure 10 shows edges are the dividing lines between districts (Lynch, 1960)



Figure 10: Edges study

7.4 District

Figure 11 shows that districts are areas with perceived internal homogeneity and recognised as having some common identifying character (Lynch, 1960).



Figure 11: District study

8. MICROCLIMATE

There are 3 major determinants that shaped the microclimate of Klang town. These determinants are temperature, wind pattern and shadow casting of the high-rise buildings. These determinants are related to each other.

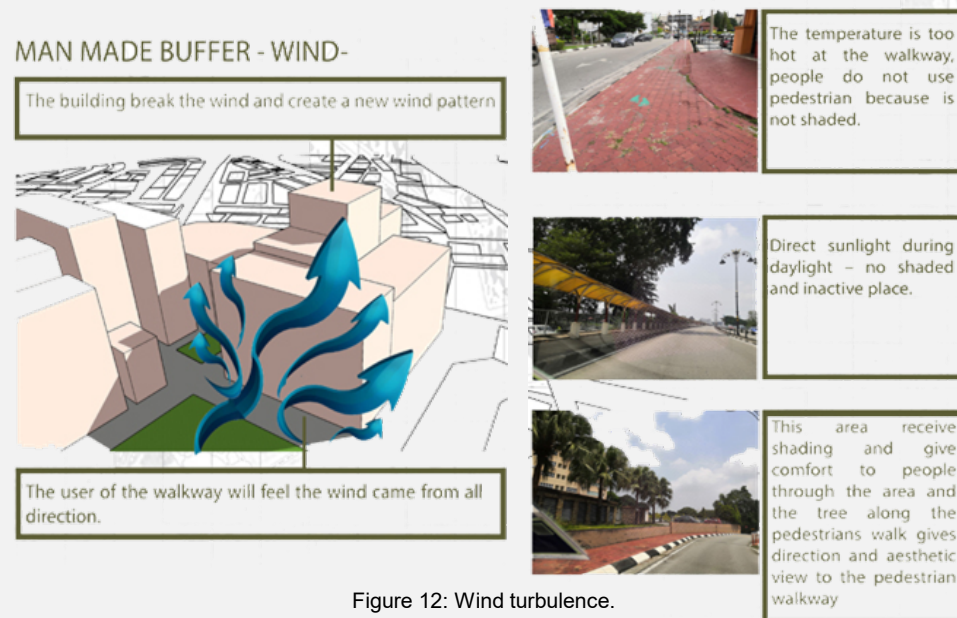


Figure 12: Wind turbulence.

9. HYDROLOGY

In Klang, Sungai Klang or the Klang River is significant. The river starts from Gombak and ends at Klang town..

- Poor maintenance degraded the view of the city.
- Water easily overflow if the capacity reach its limit as it's cannot allocate the low land runoff also the highland runoff.
- Water from commercial area degraded the water quality, bring bad smell to the city.



10. VEGETATION

The landscape style at Klang town is a combination between formal and cultural vegetation. Both landscape characters were divided further into three parts.

- More cultural and unformal arrangement
- Combination of both unformal and formal arrangement and choices of vegetation.
- Formal arrangement and the choice of vegetation.



Figure 13: Hydrology and vegetation study

SITE SYNTHESIS

a) POTENTIAL FOR GOOD STREET LIFE

Good street life brings economy and social power to walkable cities (Martinez Gaete). There is a need to have different means of transportation, walkable areas, and greater access to new jobs. It can be an excellent example to make the Kota Bridge street life.



b) INTEGRATING NATURE AND CITIES

Integrating nature and cities means convening community, catalysing development, and remediating environmental conditions for a newly conceived public realm (facilityexecutive.com). For example, propose a rooftop garden on the low rise building to make an excellent visual of the high rise building to the rooftop garden as attractions.



c) IMPROVE THE AMENITIES OF RECREATIONAL AREA

Provide activities and a sense of calmness to the sound of water in making the environment attractive to users.

d) PROPOSE SEMI - NODAL SPACE

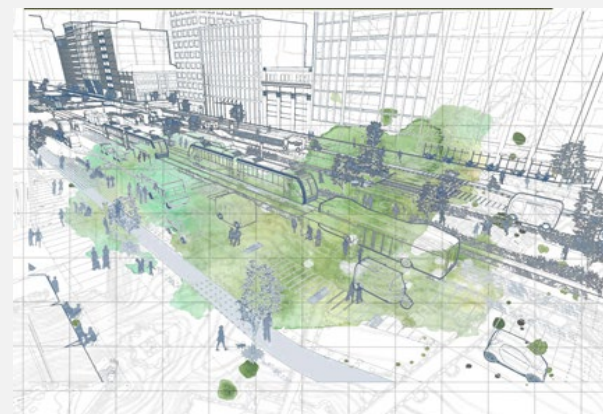


Figure 14: Site synthesis

Provide the resting area such as pocket parks and more green spaces to make it walkable to the Little Indian area. Change from parking space to the nodal space to create the major nodes as focal area. Before that Hotel Gocos had the good frontage of the parking area it could be the potential area.

e) PROVIDE GOOD ENTRANCE TO ACCESS LITTLE INDIAN AND COMMERCIAL AREA.

Create a sense of welcoming from transit stations to commercial areas and Little Indian, to make good permeability to low rise buildings.



f) IMPROVE WATER QUALITY OF SUNGAI KLANG

Water filtration through wetlands as natural filtration system and to improve water quality as well as enhance biodiversity

Example:

- The use of freshwater mangrove.
- Using floating wetlands species
- Using marginal planting along the river



g) PROVIDE ACCESSIBILITY TO THE SUNGAI KLANG

Propose the entrance such as bridge and stages to access the recreational area near to the riverside.



h) IMPLEMENTATION OF GREEN TECHNOLOGY

Propose smart waste management that collect, manage and reduce waste from commercial areas. Installation of high technology systems that used natural energy.

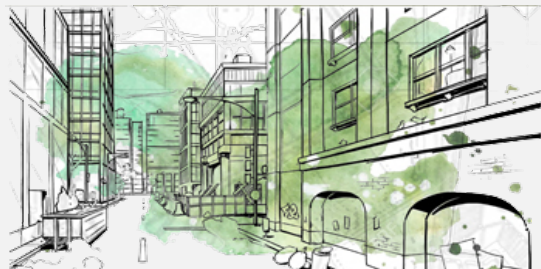


Figure 15: Potentiality of the site

DESIGN DEVELOPMENT

Design Strategies

The strategy is developed using Sustainable Development Goals (SDG) as the guideline. These strategies are categorised by three aspects - environment, social and economy. Figure 11, highlighted the SDG goals related to the proposed design.



Figure 16: Design strategies as a guideline.

Design Concept

“PINTASAN KLONG”

‘Pintasan’ is interception or bypass. ‘Klong’ is an old name of klang. Thus, ‘Pintasan Klong’ is an inception from one space to another space through a variety of choices of network.



Figure 17: Design concept development

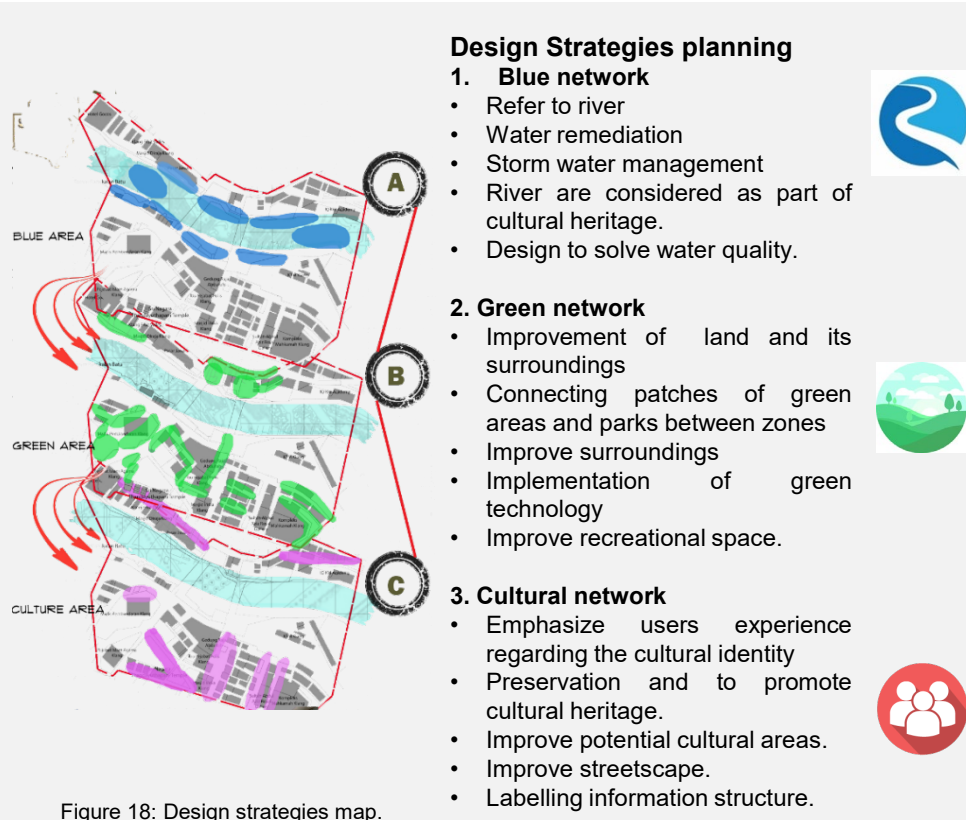


Figure 18: Design strategies map.

Figure 18 & 19 shows the development of the design strategies that derived from the synthesis map. At this stage, the area is located according to the most potential area for either environment, social and economic development. Most potential area for the environment is focused on the northern part followed by social focus and economic focus of the site.



Figure 19: Design strategies development.

Space Programming

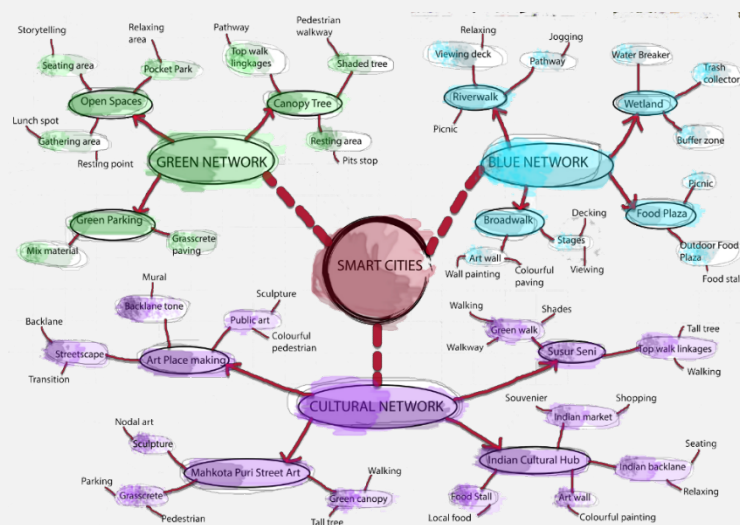


Figure 20: Space programming diagram

Functional diagram

The functional diagram is divided into four categories, solid void, green spaces, the circulation, the nodes and landmarks, and district.

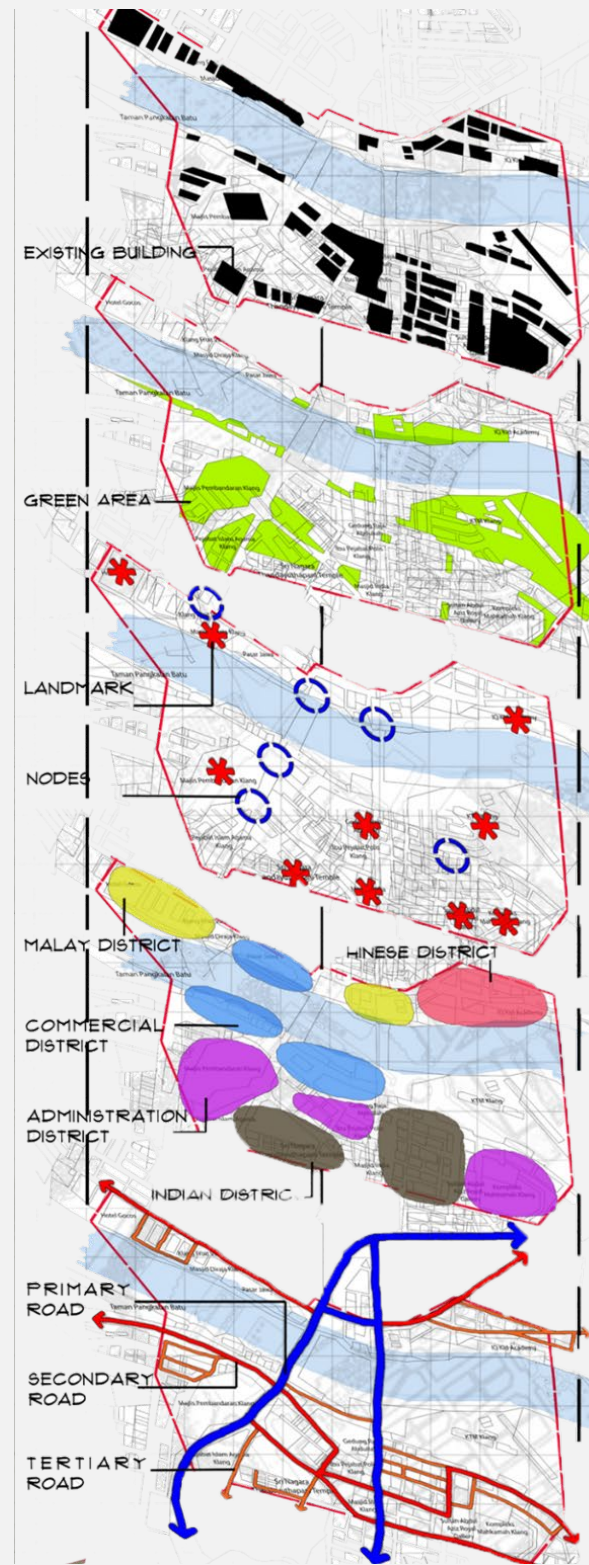


Figure 21: Functional diagram .

Solid void

- Determination of existing buildings.
- To show the space that exists around buildings.
- Create space for pocket park between buildings.

Green space

- To indicate green space.
- Create a linkage between green spaces in the city.
- Determine forest area and open space.

Landmark and nodes

- Indicate a main and minor landmark and nodes
- Create a hierarchy of spaces.
- Determines townscape elements.

District

- To indicate a different culture in a certain spot.
- Create a unique user experience around the city.
- Highlight the culture through public art and streetscape.

Circulation

- Determines between vehicle and pedestrian road
- To indicate main and minor entrance
- Connecting between all spaces.

Conceptual diagram

Figure 22 and 23 shows the conceptual plan, results of the merging layers of functional diagram and detail explanations on the element proposed to the site

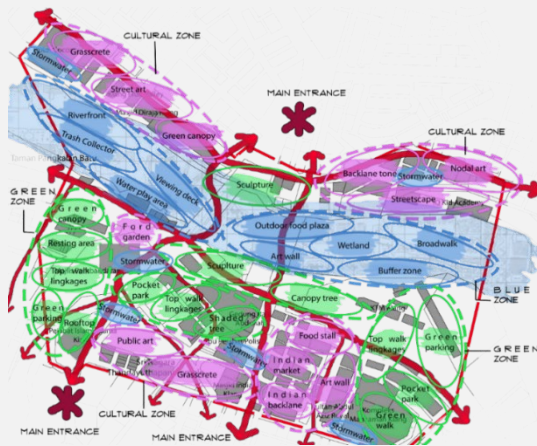


Figure 22: Conceptual map

Design Idea



Figure 23: Design idea development.

MAJOR SPACES

1. Riverfront

Ensure the preservation and conservation of the existing ecosystem while improving water quality that is kind to the environment at the same time create a space for user interaction with the urban river itself.

2. Pocket park

Provide resting point facilities under natural and manmade structures with seating areas that give tranquil and relaxing experience to users after a long walk.

3. Street art

Public street art that consists of Malay elements around the site and provide user experience of the old Malay culture with mixture of colours and type of trees, plus Malay carvings on the facilities.

4. Back lane tone

Interactive spaces that play with pastel colors pasted on the wall, it allows visitors to experience a different excitement and feel safe with the variety of facilities that are provided along the back lane.

5. Outdoor food plaza

Promote sustainable economic value along the riverside, with open dining style to give users' experience of the natural environment with the family and friends.

MASTER PLAN

Figure 24 shows the finalised master plan for proposed design of Klang town.



Figure 24: Master Plan.

PLANTING CONCEPT

Planting diagram

Figure 25 shows several concept that has been developed to highlight planting design around Klang town.



Figure 25: Planting diagrams.

Concept on Planting Design

1. Cultural character planting

To highlight the character of traditional landscapes such as the Malay garden as a symbol of old landscape around the town.



Figure 26: Shows the plants arrangement due to cultural concept.



Figure 27: *Mimosup elengi* or Bunga tanjung.

2. Flower / vibrant planting

To plant a certain species together to create a pleasing visual effect on the selected area. It will attract more users to the place due to its great sense of smell and sense of visuals.



Figure 28: Shows the plants arrangement due to vibrant concept.



Figure 29: *Fabaceae Delonix Regia* a.k.a Semarak api.

DETAIL DEVELOPMENT PLAN

KLONG PARK

Klong can be identified as a warehouse that states that Klang became an important Port that has lots of warehouses. "Klang" means "canal" or waterway. This opinion was agreed upon because Klang has many waterways such as the Sg. Klang.

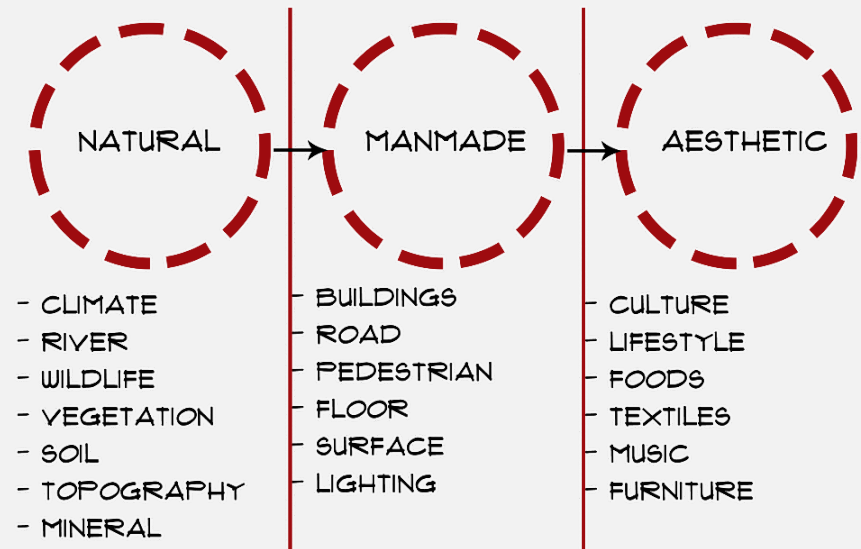


Figure 30: Shows the relationship between natural and human to produce a better lifestyle.

DETAIL DEVELOPMENT AREA PLAN

Figure 31 shows the finalised detailed development plan of the proposed master plan design of the Klang town.



Figure 31: Detail development plan of Klong Park.

Main space ideas

The idea of the main space is divided into amphitheatre zone, hibiscus garden, pebble beach and fish sanctuary.

1. Amphitheatre Zone



Figure 32: Amphitheater zone.



Figure 33: Space for user to interact with other users.

Figure 32 & 33 shows an amphitheatre zone where a combination of natural and manmade elements create comfort for users.

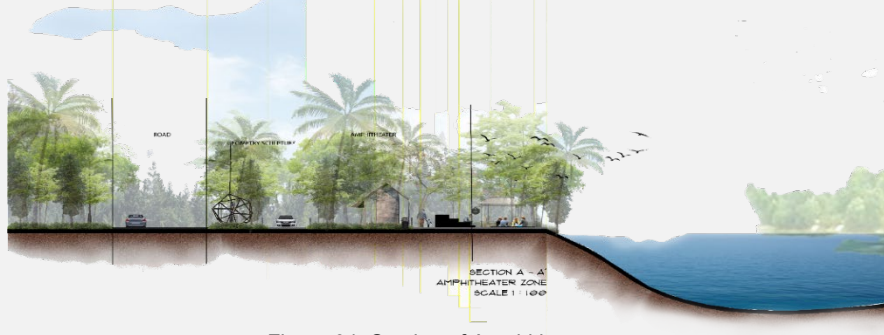


Figure 34: Section of Amphitheatre zone.

Figure 34 shows the area for leisure activities where users can enjoy the riverfront for views and social interaction.

2. Hibiscus Garden.

Figure 35 & 36 shows the hibiscus scrub is the main planting for Klang Park.



Figure 35: Hibiscus Garden.



Figure 36: Vibrant colours attracts more users.



Figure 37: Section of hibiscus garden.

Figure 37 shows the area as a viewing area where people can interact with nature at the fish jetty and the flower planting area-hibiscus garden. Malay traditional plants inspire the hibiscus garden, where various Malay planting with various colours attracts users.

3. Pebble Beach.



Figure 38: Pebble beach.



Figure 39: Hipped roof structure for shaded purpose.

Figure 38 & 39 shows the connection between users and river at the decking area.

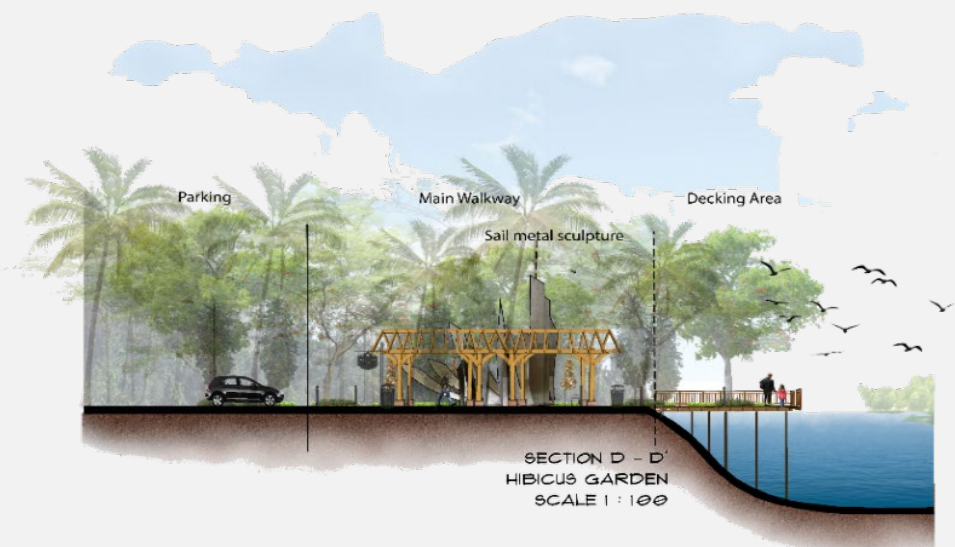


Figure 40: Section of pebble beach.

Figure 40 shows the gathering areas where people can gather and walk through the jetty while enjoying the view. In addition, this place offers more activities for users, such as picnics, educational purposes, and jogging. Taman Warisan, located at Putrajaya, inspired the design of the Pebble Beach to offer a splendid view of the river itself.

INNOVATIVE DESIGN ELEMENT

SHIPBENCH

This bench is from the structure of a ship. It was modified to a sitting position with a fountain for aesthetic value.

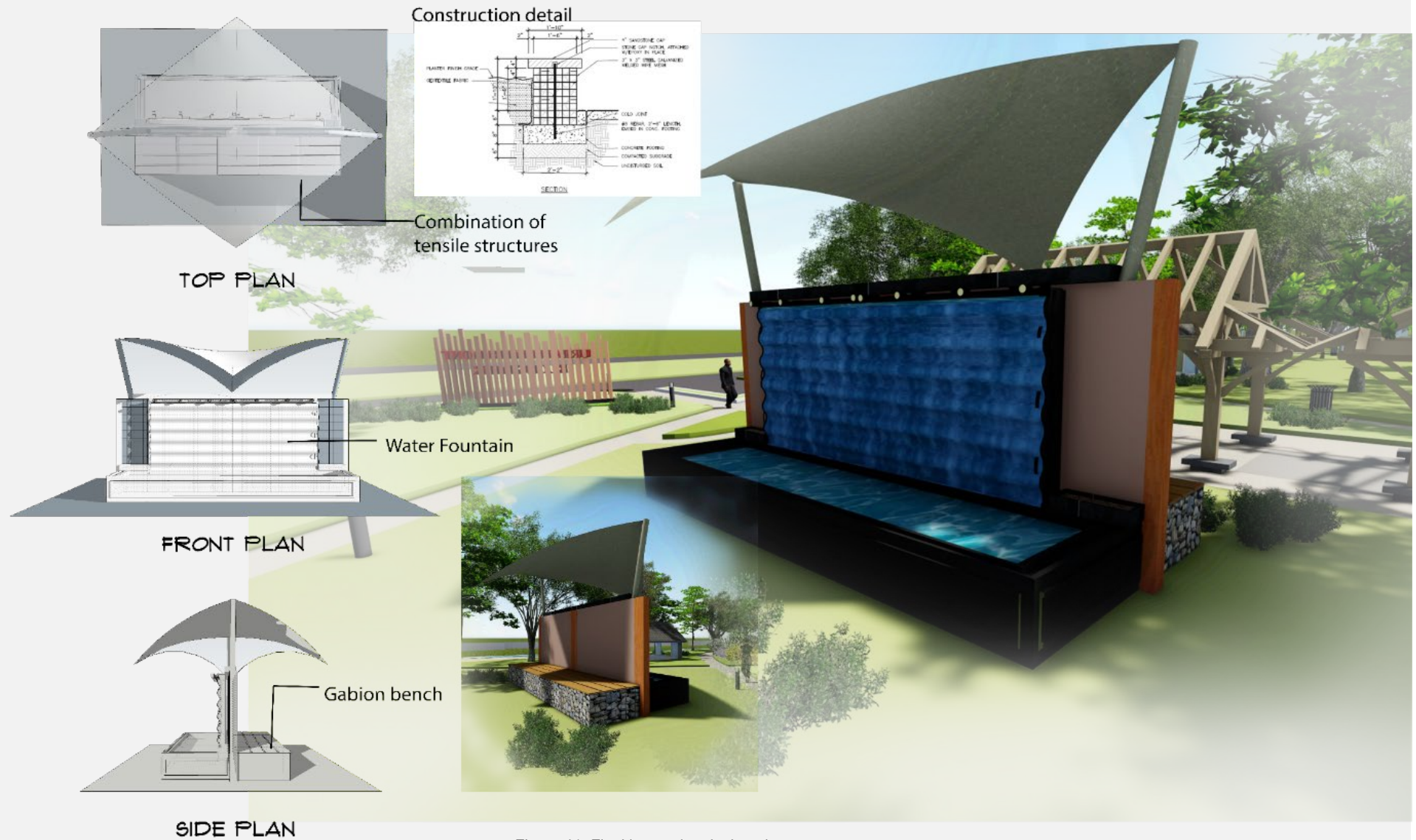


Figure 41: Final innovative design element.

CONCLUSION

The opportunity to design and integrate blue and green corridors has many positive impacts on the environment, society, and economy. The main important approaches proposed are nodal spaces and riverfront that act as the main attraction, which had tackled the urban elements seamlessly. In addition, the intervention helps to remind the users of the importance of keeping a balance between nature and structure in our daily life.

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