

INNOVATIVE MIXED-RESIDENTIAL WATERFRONT DEVELOPMENT PROPOSALS FOR SUSTAINABLE LIVELIHOOD IN URBAN KUANTAN, MALAYSIA

Aida Kesuma Azmin and Tahirah Zahirah Azman

International Islamic University Malaysia (IIUM), Malaysia

This paper primarily highlights an appraisal of an undergraduate architectural student's work for a third year design studio project on a mixed-residential waterfront development, which aims to achieve sustainable livelihood for Kuantan's urban community. Dwelling architecture demands good architects to respond holistically towards the local contexts, and people's socio-cultural-economics activities. Kuantan's waterfront principal issue is the deteriorating wetland eco-system. The environmental degradation of the existing tropical wetlands is caused by forest clearing and land reclamation activities. Since 1980s, Malaysia's city centres have experienced exponential growth in the urban population - caused by rural-urban migration - due to the shift of national economic development from agricultural and mineral resources output, to industrial production. Hence, the demand for affordable housing has also increased exponentially. Housing needs are more demanding for the low-income groups. The rapid urbanization in Malaysia is currently estimated at 65%. The decline in the farming population phenomenon is synonymous with development. Whilst government's strategy is to encourage the evolution of large farms and rural migration to higher value-added jobs, other economic sectors offer better prospects of reducing rural poverty. The decrease in younger population's interest in agriculture is also a concern. The aged and less educated in the sector may not be ready to uphold the required initiative to develop value-added sustainable practices. In this light, the mixed-residential waterfront development scheme proposals offers to respond to these issues with the objectives: to provide "sustainable livelihood" so as to sustain the eco-system; initiate a well-balanced housing community, and stimulate innovative solutions for the community's self-sustenance. The proposed mixed residential waterfront development scheme is envisioned to be the national reference for sustainable livelihood in Malaysia, and a medium for interaction to disseminate community awareness about individual and social responsibility towards sustaining the urban eco-system and its community.

Keywords: Mix-use waterfront development, Sustainable livelihood, Urban housing design, Cultural meanings.

Introduction

This paper primarily highlights an illustrative process of an academic design studio project for the urban migrants community residential development at Kuantan city's waterfront, with the main aim to achieve sustainable livelihood. The scope of this project is configured to suit the requirements of an urban infill for the third year undergraduate students in architectural studies, in Semester 1, 2011/2012, at the *Kulliyyah* (faculty) of Architecture & Environmental Design, IIUM, Malaysia.

In order to achieve sustainability in contemporary dwelling architecture requires architects to be deeply sensitive towards the local **Social-Cultural-Context** as well as **Economic activities** of a particular place and setting. For instance, in the attempt to portray the local identity and a sense of belonging for the residents, every architect must respond holistically to the “*Genius Loci*” of the place.

In the case of Kuantan City, the site chosen for the residential development is an urban infill next to the city’s riverfront. The challenge is to respond to the end-users’ needs and demands, as well as the city’s identity, tourism economy and sustainability of the wetland – the waterfront development. The up and coming city of Kuantan, is gearing towards total urbanisation in the year 2015. This vision is evident in Kuantan Municipality’s Local Plan 2010 -2015. The city plan aims to achieve the followings:

- Improving Kuantan as a dynamic and attractive urban centre;
- Strengthen the town’s economy to be more economically competitive;
- Alleviating its citizen’s quality of life to be more harmonious; and
- Establishing a more efficient linkage system.

However, Kuantan faces the following issues:

Issue no.1: Deteriorating Eco-system

Rapid population growth in urban areas has been experienced in Malaysia since the 1980s. This is due to the shift of national economic development from agricultural and mineral resources to industrial production. Its major consequent is environmental degradation of the existing tropical wetlands, which include the chosen site, Kuantan, Pahang. Forest clearing and land reclamation activities are two major resources for the wetland degradation.

Issue no.2: Rural-urban migration

With the increase in population, the demand in affordable housing due to rural-urban migration has also increased rapidly. Malaysia is experiencing rapid urbanization currently estimated at 65%. In fulfilling the housing needs in Malaysia, it involves private developers, Government at Federal and State level; and Federal and State agencies. Housing needs are more demanding for the low-income groups, particularly in the large urban centres due to influx of migrants.

Issue No.3: A decline in the farming population

This phenomenon is synonymous with development. While the strategy to encourage the evolution of large farms and rural migration to higher value added jobs in other economic sectors offered better prospects of reducing rural poverty, the decline in the younger population’s interest in agriculture is a concern. The aged and less educated who are left behind in the agricultural sector may not be well disposed to take up the required initiative or challenges to develop value added sustainable practices. As a group, they would tend to be risk averse, unaware and probably innovation shy.

In this light, the Housing Design Proposals has been formulated to respond to the three major issues through the following objectives:

- To provide an alternative and sustainable* housing design solutions which may sustain the eco-system of the Wetland;
- To create a well-balanced community housing development with holistic design approach which caters for humans from all stage of life, physical and economic abilities.
- To stimulate Innovative Urban farming for Self-sustenance with “sustainable design” approach

The Design Process

This section the site planning, zoning and programming used to strategize the design process. Various factors from the site analysis are considered in the project as it provides a great impact in shaping the building, design development as well as the final product.

Zoning

From the site synthesis, the public zones have been identified with the north and south areas of the site, each influenced by the urban and waterfront factors. The in-between spaces are provided with horizontal sequences of outdoor pedestrian experience as shall be explained further in the next section.

Site Inventory Analysis and Synthesis

The chosen site is located in the heart of the city of Kuantan, sandwiched between shop lots fronting the busy one-way main road on the north, along the Kuantan River waterfront down the south.

Designing in urban site, the designer take into consideration of the urban studies as it has to response to the overall context. The urban elements of the site such as paths, edges, district, nodes, and landmarks of the city are taken into consideration. Special considerations are given to the urban skyline of Kuantan, continuity and connectivity through the site as well as rhythm and scale.

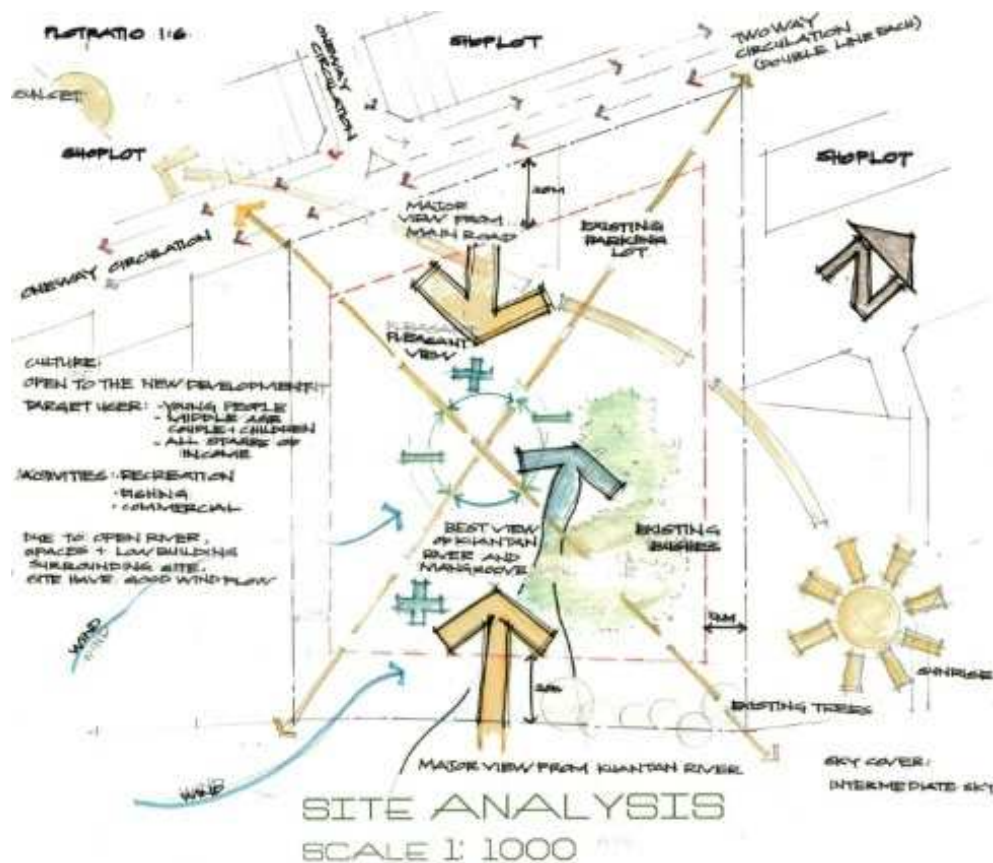


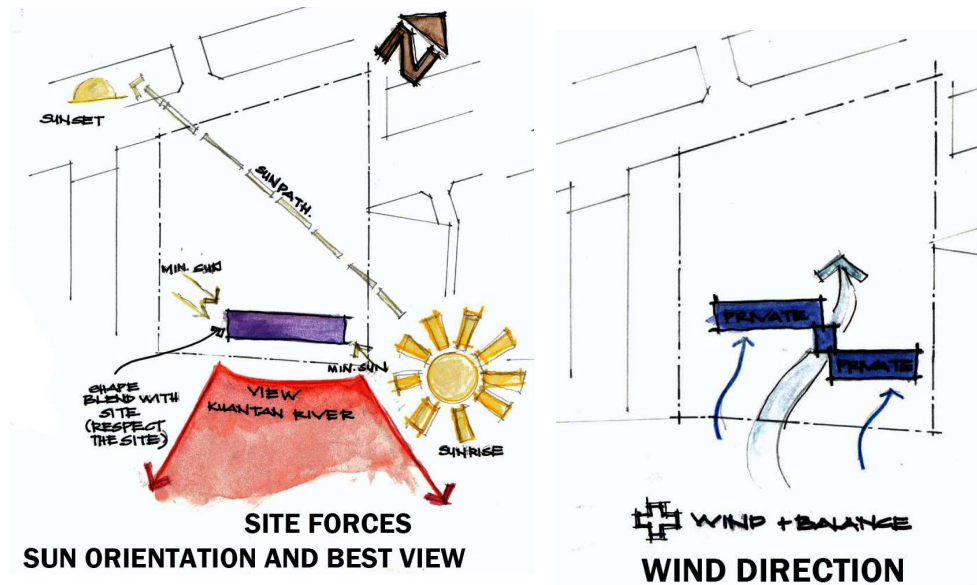
Figure 1. Site Analysis Diagram of the sit
Site location:

In urban design concept, the project aim to encourage public participation, create neighbourhood identity, build vibrant public space, protect environmental resources, vary transportation option by providing alternative transportation such as bicycle and water taxi and respect the setting by addressing the main road and Kuantan River.

The project will enhance the quality of life by integrating cultural, recreational and education into the development to ensure civic dimension. It also will accommodate a full range of human activities

Site Analysis

Various factor from the site analysis is considered in designing the project as it give a great impact in shaping the building, design development as well as the final product. Site forces such sun orientation and vista give the biggest impact on the form making and block positioning. Long block are separated into two small blocks to allow for more ventilation.



The Site Synthesis

The limitations

The site is an urban infill at the heart of the busy Kuantan's city centre, which means a lot of constraints for a residential development. What add to the limitations are the wetlands characteristics, which the site possesses. With heavy rainfall seasons, chances of flooding, and land deteriorations are quite high.

Designing in urban site, the designer also takes into consideration of the urban studies as it has to respond to the overall site context. Hence, the urban elements of the site such as paths, edges, district, nodes, and landmarks of the city are taken into consideration.

The Opportunities

From the cultural aspect, the residential development offers opportunities for the future dwellers due to its central location. The target users would vary from young professionals and couples with children; the middle aged to the elderly, and ultimately for people of all stages of income.

Hence, the activities proposed for the residential development in response to the cultural activities and its context, shall include recreations, urban farming, fishing as well as domestic scale commercial activities such as selling the products from the residents' own activities, in order to encourage self-sufficient and independent lifestyles for the resident community itself.

The most pleasant view is the Kuantan River and its mangroves. But the site is also fronting the busy two-way main road. So, the design scheme would have to have double frontage for the housing scheme in order to address both the urban context, and the scenic waterfront view.

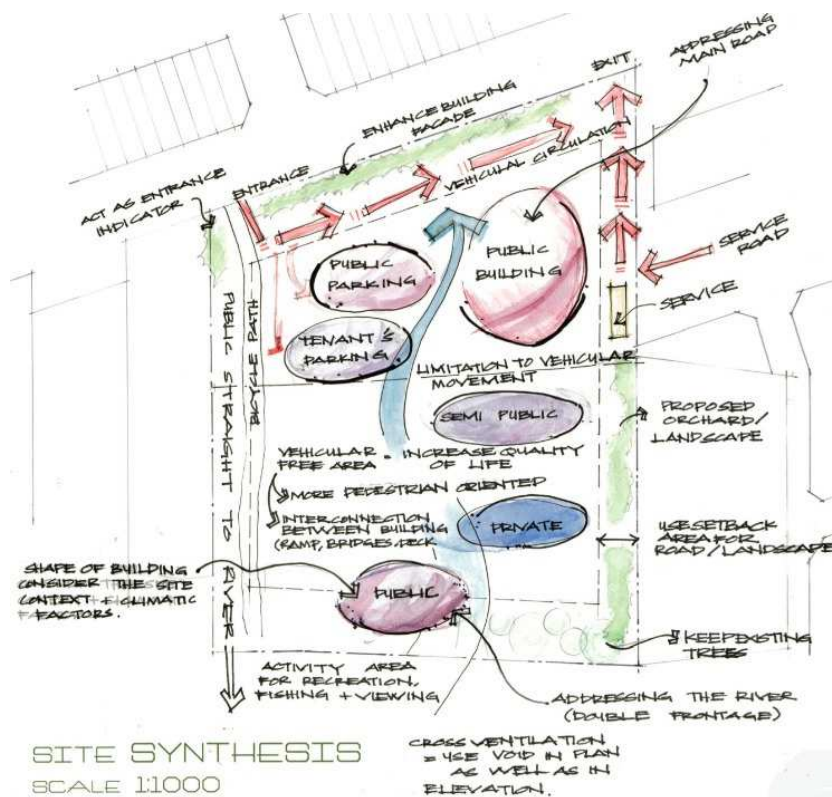


Figure 2. Site Synthesis diagram of the site.

Due to the open river, the low-rise building surrounding the open site, it also receives good wind flow through out which gives the site the opportunity to utilise the natural forces in the composition of the building blocks. The building heights shall be kept to the maximum 5 storeys-high and the building arrangements shall be compartmentalised so as the utilised the full use of the wind flow.

Solution 1: Housing Design TO Sustain the Eco-system of the Wetland

The Proposed Low-Rise-Low Density(LR-LD) Sustainable Livelihood Urban Residential Complex



Establishing the Concept

The designer coins the concept of “Balance, in emerging with nature” as it compromises and achieves the aim that the designer aspires to achieve in her design. In her attempt to interpret the concept, the designer

takes into consideration of the issues of the site so as to provide solutions through her design approach. The solutions to the issues are based on four major components, which are: (1) Sustainable, (2) livelihood, (3) [Islamic] Values and (4) Urban Context. These aspects are greatly influenced by the concept.

Conceptual Studies

The designer establishes the concept of '**BALANCE** in emerging with nature' as it can compromise and achieve the aim that the designer need to achieve in the design. Balance will be applied in private and public, solid and void, privacy and interaction, Nature and built environment, and form and function.

The Concept of Balance

The design proposals comes up with the concept of **BALANCE in the emerging environment** aimed for the future built environment of the site, as the outcome of the project. In establishing the concept, the designer **take into consideration of the issue of the site** from the design brief, as well as **in providing solutions towards the issues raised**. The design approach based on this concept to provide design solutions on the three raised issues with response to the following: the urban context and sustainable design for the physical aspects; communal livelihood and Islamic values for the spiritual. Hence the outcome was based on the concept configuration.

There are various ayahs in the Al- Quran that speaks about balance. Thus the concept of balance is being further studied. It obviously evident in the form making of the project, designers tries in keeping balance between all aspects mentioned above and based on the definition of balance in keeping satisfying proportion or harmony as well as even distribution of weigh on each side of vertical axis. This is the aspect that is limited in the boundary of creating balance in the project.

The concept of "Balance" in the design approach is explained as follows:

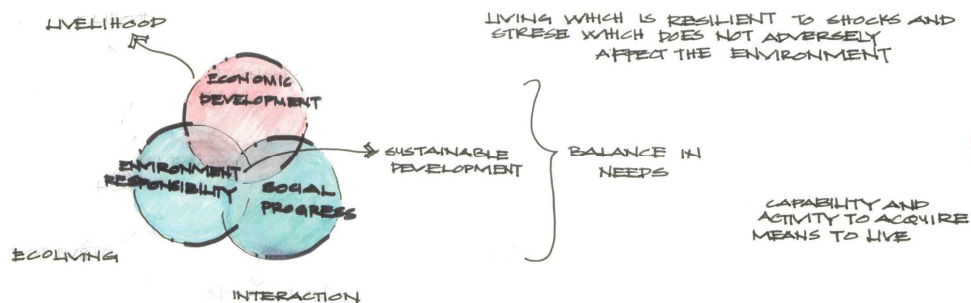


Figure 3. The bubble diagram shows the interdependency of the aspects of balance in three categories.

First, the concept balance here emphasises that for a sustainable livelihood residential development at a sensitive site like the waterfront, in order to achieve balance, the design approach towards a sustainable developments, focuses on three aspects, i.e.: (1) economic development –to attain livelihood; (2) environment responsibility- to obtain eco-living lifestyle; and (3) social progress – for continuous community interaction.

The designer also highlights the idea of balance in light of housing in Islam. In the attempt to achieve balance in the emerging environment of the residential water front project, the design also responses to the urban context and Islamic values to achieve sustainable livelihood development. This is done through consideration of communal participation, environmental conscious design as demonstrated in the author's sustainable design strategies. Secondly, in order to maintain the environmental sustainability, the design emphasises on:

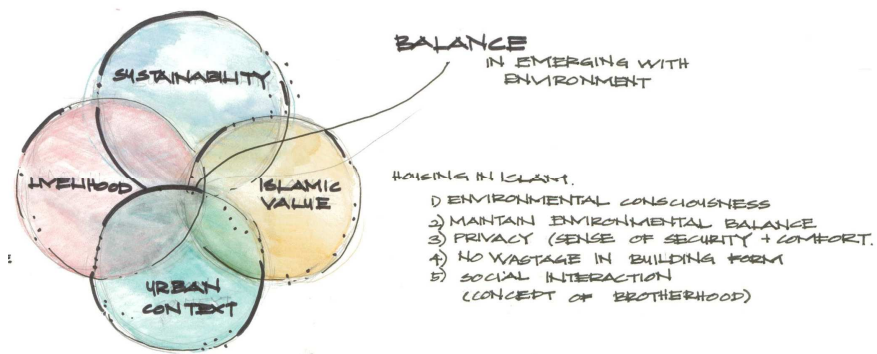


Figure 4. The concept of Balance in light of Housing in Islam, divided into four interdependent aspects as shown in the interlocking bubble diagram above.

Insertion of Concept

The block are being arranged by its zoning while considering the balance of solid-void, privacy-interaction, and nature-built environment along the center axis to create an even and harmony distribution of weight on both site to create balance in horizontal form.

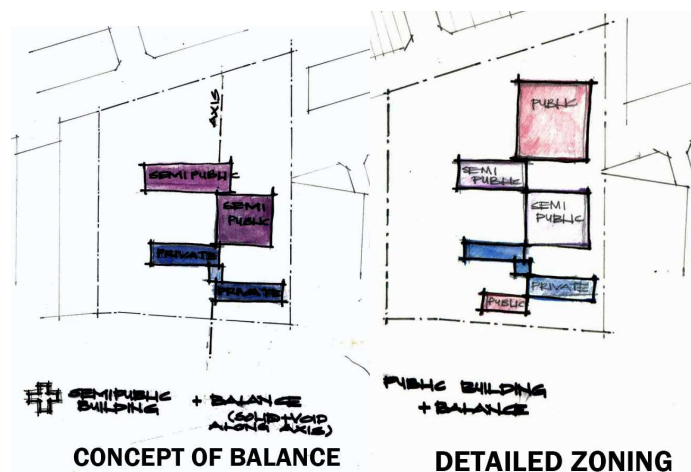


Figure 5. Conceptual ideas developments.

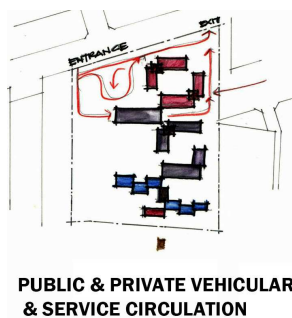
DESIGN: Viewing Tower and Water functions

Detail of development being work out to tie the blocks together with common element with is the viewing tower, which also act as a water feature to increase evaporation of water.



Circulation

In order to create balance in between public and private users of the building complex, the parking and road for residents and public user are gathered at main vehicular entry from Jalan Besar, the busy main street, and the public vehicular access is controlled by the introduction of commercial blocks (in red) and Communal building block (marked in grey next to the commercial block), centrally placed horizontally in the middle to denote the physical separation of the space zoning and the limit of public accessibility (with vehicles), and the beginning of pedestrianized public to pass through the central axis of the residential building blocks above the ground levels towards the waterfront promenade.

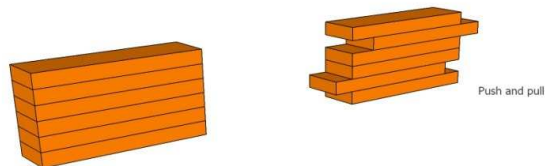


Integrated Greeneries (8th Diagram)

Greenery is being integrated at horizontal and vertical level using various ways.

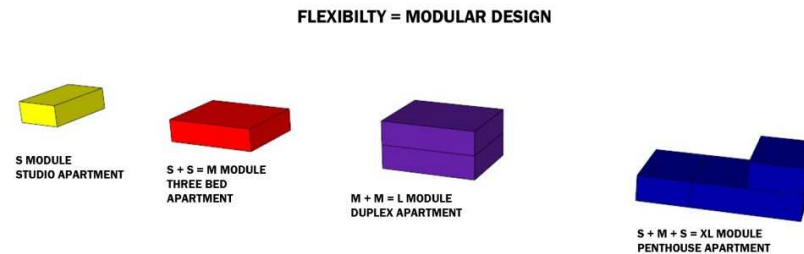


Design Ideas



The figure above demonstrate shows the idea of “**push-and-pulls**” of the building blocks to provide community space, green, and wind flow. In order to give more flexibility and fast construction to the building module system is used. There are four (4) different types of residential units provided so as to

provide more options people, as part of its holistic design approach. It is also one of the project aim create a variety of housing sizes, characters and types in support of different age, lifestyle and status. Studio type is set as the smallest module; apartment is two times of studio, duplex is two times the apartment and penthouse is addition of the module of studio and apartment.



View Enhancements

The paths and circulation areas within the site are designed for people to experience with local green environments, enhancing the views throughout. In realising this idea, the designer has attempted to apply the notion of “*Enclosed Architecture*” along the external paths and circulation routes throughout the building complex.

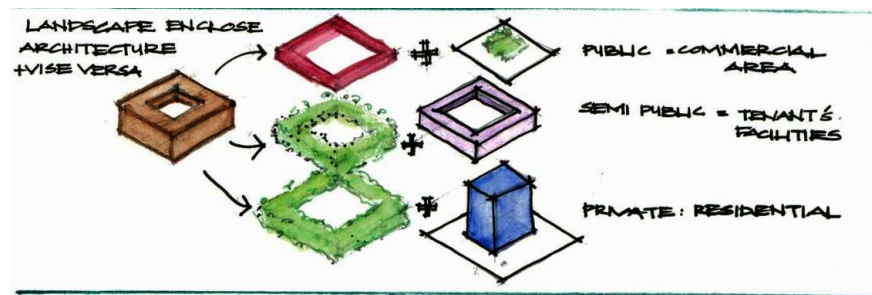


Figure 6. The idea of enclose architecture with landscape and vice versa.

Design Developments

In further stage of design development, the designer took the idea of balance as a concept further in terms of:

How the Building Forms Are Arranged

To begin with, the site is like an open canvas for the designer to venture her skills. Considering all the site opportunities and constraints, the designer applies the concept of balance in order to guide her decision making in her design approach. In achieving the concept balance, the designer has produced several schematic sketch models pertaining the ideas and orders of achieving balance, as in the figure below. From this, she arrived at summarising the aspects that are focused within the constraints of creating balance in the project.

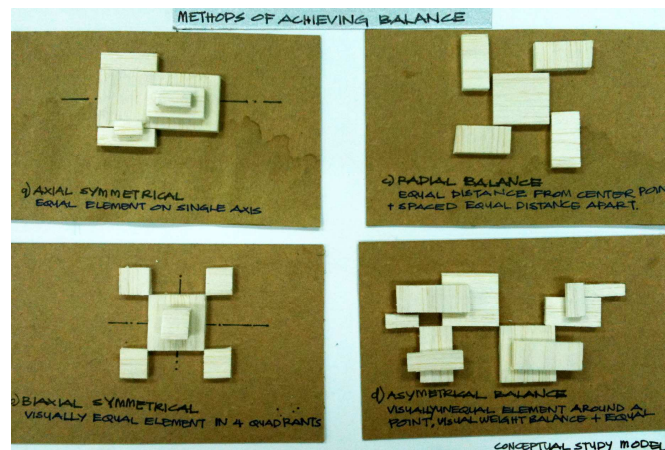


Figure 7. The conceptual models shows the design development process made by the designer architect to achieve the final built-form arrangements of the residential complex.

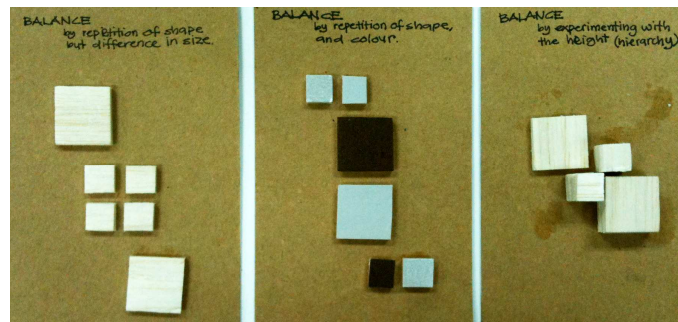


Figure 8. sketch models on composition of the order of forms in achieving the concept of balance.

The figure 5 above demonstrates the design process in achieving balance in the built-form arrangements from the axial symmetry, the biaxial symmetry before combining these orders into a harmonious composition of an asymmetrical balance of the built form arrangement.

The building arrangement is finally composed from the composition of repetitive square shape of different sizes at both horizontal and vertical levels in order to establish visual continuous visual experience within the site at both exterior and interior circulation for the entire building complex.

The next stage is further development of the design ideas as illustrated on the following figures below:

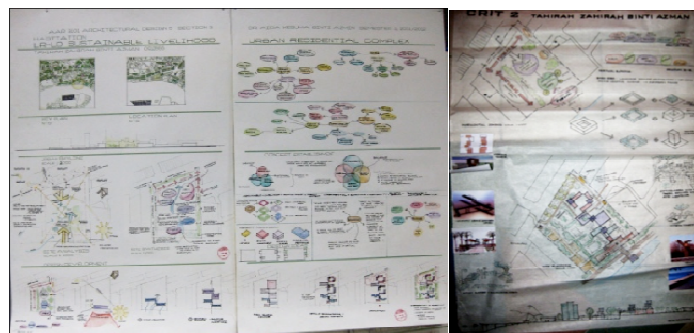


Figure 9. Above figures show further design development in the site planning, finalised conceptual model, and the initial site model.

Solution No.2:

To Create A Well-Balanced Community Housing Development With Holistic Design Approach Which Caters For Humans From All Stage Of Life, Physical And Economic Abilities.

Design For Affordability And Flexibility

In response to the concept balance and target users's needs, the residential design scheme aim to achieve affordable, and flexible design.

For fast building construction, the module system is used. In order to give more flexibility in terms of users' choices and future expansions, there are 4 different types of unit to give more option to the people. This is an attempt to achieve holistic design.

It is also one of the project aim create a variety of housing sizes, characters and types in support of different age, lifestyle and status. Studio type is set as the smallest module, apartment is two times of studio, duplex is two times the apartment and penthouse is addition -of the module of studio and apartment.

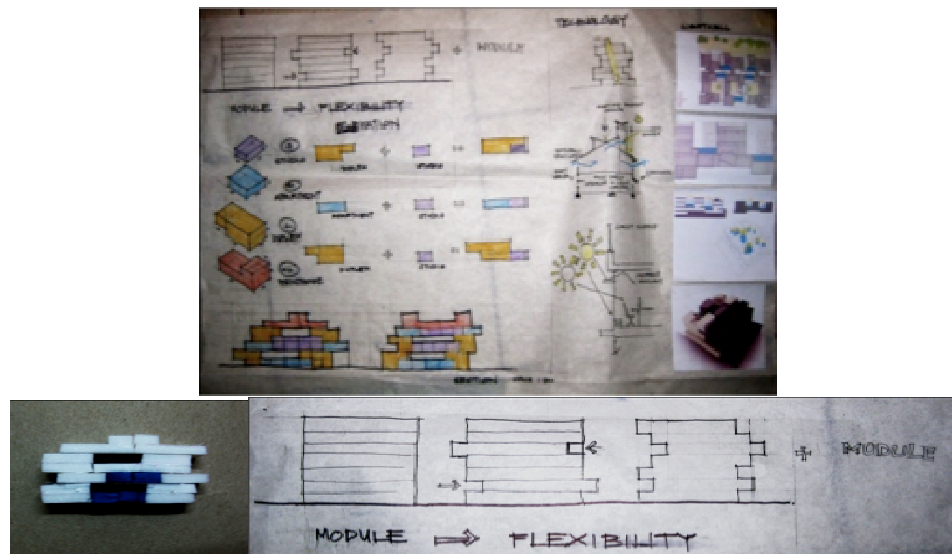


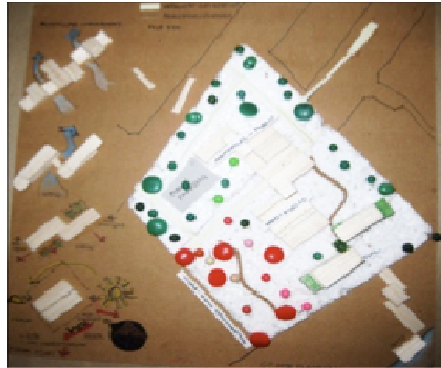
Figure 10. The figure shows the idea of push and pull the building shape to provide community space, green, and maximise the wind flow throughout the building complex.

Responsive Design Development

The site is an urban infill at the heart of Kuantan's city centre. Designing in urban site, the designer take into consideration of the urban studies as it has to response to the overall site context. The urban elements of the site such as paths, edges, district, nodes, and landmarks of the city are taken into consideration.

On Site Planning

The site planning attempts to enhance the quality of life by **integrating cultural, recreational activities and education** into the development to ensure civic dimension is established. It also will accommodate a full range of human activities including living, working, shopping, recreation, entertainment, civic life and religious life through:



Community Participation



In response to urban design context, the project aims to encourage community participation, create neighbourhood identity, build a vibrant public space, protect environmental resources, vary transportation options by providing alternative transportations such as bicycle and water taxi, as well as respecting the urban setting by addressing the main road and Kuantan's river.



Pedestrian Urban Life

The project would also create vibrantly stimulating recreational urban places for people and increase the pedestrian experience is one of the aims in site planning. The designer aims to create an urban community that is more in contact with nature.



Bridges and viewing tower **promote pedestrian-rich experience** from many perspectives and angles, not just at the ground level, by being above ground level between the blocks of buildings. Both bridges and viewing tower also act as connecting elements for the residential building blocks.



Figure 11. Cross section through the water body from the main street entrance of housing complex showing the interplay of levels, circulation paths, connectivity and hierarchy.



Figure 12. Viewing tower promotes pedestrian-rich experience from many perspectives and angles, not just at the ground level, by being above ground level between the blocks of buildings. Viewing tower also acts as connecting elements for the residential building blocks

The circulation inside the site is reduced as well. Circulation of motor vehicle is limited to only the half part of the site which is the front that facing the main road. This is to promote personal health by designing to more pedestrian based circulation. This is also due to the aim of the designer to increase the quality of life of the residential block by not bringing motor vehicle to the further part of the site. Thus, the level of noise will decrease and air quality will increase as well as the security of children not crossing road with motor vehicle in the compound of resident.

Efficient energy consumption

The site would cleverly utilize the energy consumption through energy efficient technologies such as solar power and wind turbine. The site is situated at front of Kuantan River, which is blessed with continuous wind flow from the river, this give the site opportunity to manipulate the wind by using attractive wind turbine. This wind turbine is used to generate energy for the street lamp all over the site as well as acting as one of the site feature to attract visitor from the promenade that is anticipated will go through the site from the promenade park after the development of the project.

Creation of eco-friendly images



The project also aims to create eco friendly image to educate the people of the significance of a sustainable design. It also aims to bring more public participation into the building. It strives to be the exemplary sustainable building that will become the catalyst for more green buildings to be built in the future within Kuantan and nationwide.

The provision of street library is another step to educate the people surround the site and tenants. This attempt is an effort to educate the local tenant users, whilst cultivating reading habits among the community.

The Sustainable design approach here among others include the following strategies:

Construction method: the combination of pre-cast concrete and modular units as the main construction method for speed of production;

Shading devices: the use of recycled timber for the fin walls and balconies, with the inclusion of vine trees trellises and light shelves as vertical shading devices for natural shading, cooling and light control;

The **Viewing Tower** also doubly acts as a water tank that collect water from rain for harvesting, as well as the waterfall screen wall for evaporative cooling water feature;

The viewing towers are located at four points at each of the separate buildings.

The buildings are arranged to obtained maximum natural cross ventilation throughout the site;

At the **vertical space configuration**, the designer elevates the ground floor on stilts or columns to increase privacy, views, ventilation, security and minimum contact to the ground floor.

Optimal ceiling heights for each floor levels to enhance wind flow; and

Inclusion of green technologies such as the green roofs, photovoltaic generators, skylights, and infinity pools, which are included in the design to increase the absorption of sustainable energy.

The design develops into the final design stages as follows:

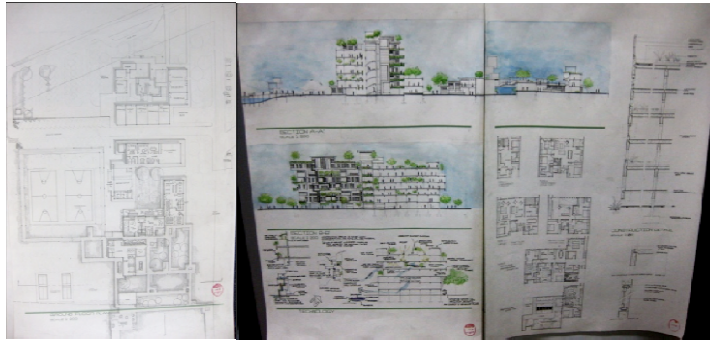


Figure 15. Finalised floor plan, elevations, sustainable design strategies, housing units types design, and sectional details.

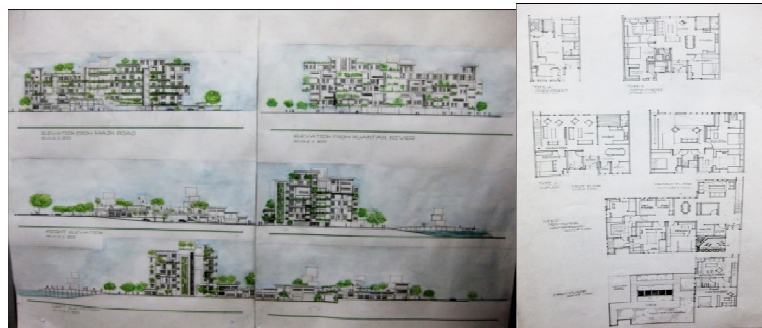


Figure 16. Finalised elevations and individual housing unit types design details.



Figure 17. Exterior Perspective of the building from the waterfront body.

Conclusions

Outcomes of the Proposals

In principle, the project has attempted to respond to the three main factors of sustainability- Social, Economic

The project, as an academic project, produces a pedagogical means to cultivate awareness among the local municipality, the developers and the general public about the real issues confronting the chosen site and its locality, specifically and in Malaysia, generally. The overall message is so that architects, local authorities and housing developers can work together to respond and respect to the ecological and sustainability issues holistically from the inception to completion of any housing projects that faces these issues.

The results of this project may become a reference or guide to a sustainable medium sized, mixed occupancy (flexible choice housing units: For single individuals, home-office, family with children, elderly and PWDs) multiple functions self-sufficient community living at the urban waterfront.

The project has responded to the context, urban issues, fused with universal design ideas. Its design approach has attempted to resolve the major issues of the site, be it the wetland issue, the problem of urban migration, and farming supply.

The project includes among others, the exploration of the concept of research and learning; innovative, flexible space planning and design of spaces for mixed group users with multiple volumes and spans.

The design proposal also addresses the alternative “Green Technology” aspects of residential development (e.g., renewable energy systems, use of recycled buildings and construction materials, active or passive design, eco/green design, etc.) as well as relevant building services.

In addition, the project also assimilates the idea of interactivity, public participation, and communal self-sustenance, Islamic values and sustainability. Overall, proposal aims to:

Become the pioneer residential development, which is not only self-sustenance, but also responsive towards the local context, its environment, and society’s living culture.

Create awareness among the built environment professionals, developers, and general public regarding Eco-housing design, Urban farming and respecting the natural eco-system.

Be a cutting edge innovative Urban Housing Complex which maintains the cultural sustainability, hence displaying authentic architectural identity for waterfront housing development in Malaysia.

As a summary, this proposed Mixed-Residential Development Complex is envisioned to be the national reference for “*Sustainable Urban Livelihood*” approach in Malaysia, as well as public interaction to disseminate awareness about individual and social responsibility towards keeping the urban environment green.

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