Chapter 4

Formulation of Master Plan for Development Hub

This chapter proposes a framework, land use, and urban design image for the Bangar and Labu Estate areas, which are identified as suitable locations for the development hub, based on the vision, development policy, and framework for Temburong district in Chapter 3.

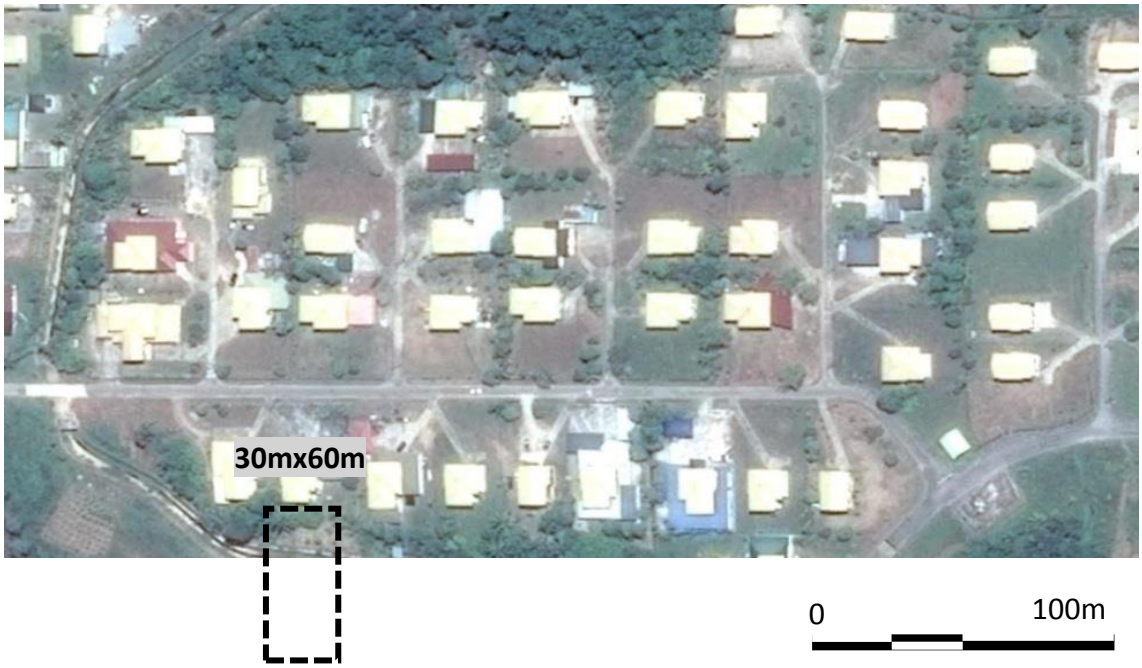
4.1 Master Plan of Bangar

4.1.1 Framework of Bangar

(1) Residential

Based on the predicted population of 6,395 in 2030, the assumed residential area is 213 ha (Table 4.1). The average density of the residential area is 30 persons/ha, which is the same as the residential density in Rataie, which is a standard suburban residential area in Brunei Darussalam (Figure 4.1).

Figure 4.1: Rataie Residential Density



Note: About 30 persons per hectare.
Source: Study team.

Table 4.1: Bangar District Housing Land Demand Forecasts to 2030

Item	Amount
Population (number of persons)	6,395
Population density (persons per hectare)	30
Housing area demand (hectare)	213

Source: Study team.

(2) Education

Based on the predicted population of 6,395 in 2030, the assumed primary and junior high school area in Bangar district is 2.5ha for Primary School land and 2.1ha for Secondary School Land as shown in Tables 4.2 and 4.3.

Table 4.2: Bangar Growth Centre Primary School Land Forecasts to 2030

Item	Amount
Population (number of persons)	6,395
Students (number of persons)	491*
Area per person (m^2)	50
Area (hectare)	2.5

m^2 = square metre.

* United Nations Population Division.

Source: Study team.

Table 4.3: Bangar District Secondary School Land Forecasts to 2030

Item	Amount
Population (number of persons)	6,395
Students (number of persons)	428*
Area per person (m^2)	50
Area (hectare)	2.1

m2 = square metre.

* United Nations Population Division.

Source: Study team.

Table 4.4: Bangar Growth Centre Hospital Land Forecasts to 2030

Item	Amount
Population in 2030 (Temburong)	17,819
Demand for hospital beds (beds)*	71
Floor area per bed (m^2)	200
Floor area (m^2)	14,256
Gross FAR (%)	50
Area (m^2)	28,511

m^2 = square metre, FAR = Floor area ratio.

* 4 beds/1,000.

Source: Study team.

(3) Hospital

The hospital targets all Temburong district. Based on the predicted population of 17,819 in 2030, the assumed hospital area is about 3 ha (Table 4.4).

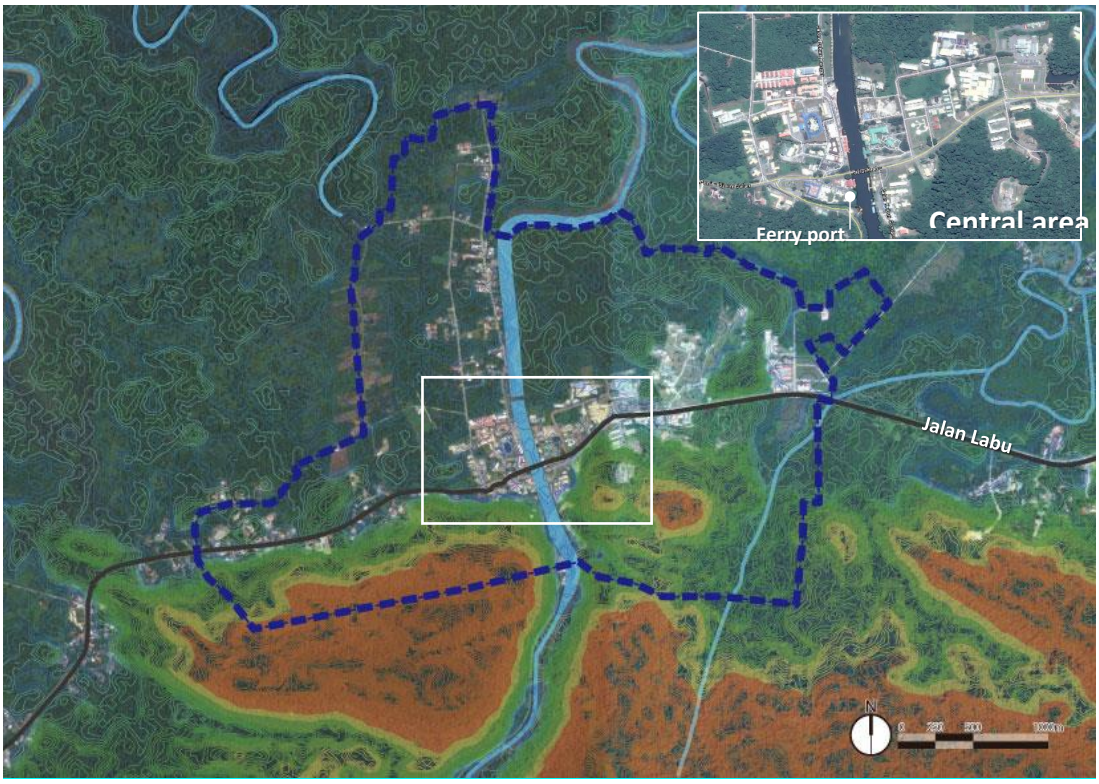
4.1.2 Assessment of Land Use of Current Condition and Current Land Use Plan by Department of Town and Country Planning (TCP)

(1) Current condition

The central town of Bangar area is located along the Jalan Labu Bridge, which runs across the Temburong River. Administrative and public facilities as well as residences are concentrated in this area of about 1 km^2. The town is surrounded by abundant forested areas. The south of the town has mainly steep hills, so residences and public facilities are mainly located in the flat land in the north as well as along the Jalan Labu road, and expand slowly from there. Access to the Bangar area is mainly by land via the Jalan Labu road or by water via the fast ferry port in the south of the town.

The current condition of Bangar area is shown in Figure 4.2 and 4.3.

Figure 4.2: Condition of Bangar Growth Centre



Source: Study team.

Figure 4.3: Central Area of Bangar Town

Source: Temburong – Tranquility In Diversity, 2015.

Jalan Labu Bridge

Inner road and buildings

Residence

Source: Study team.

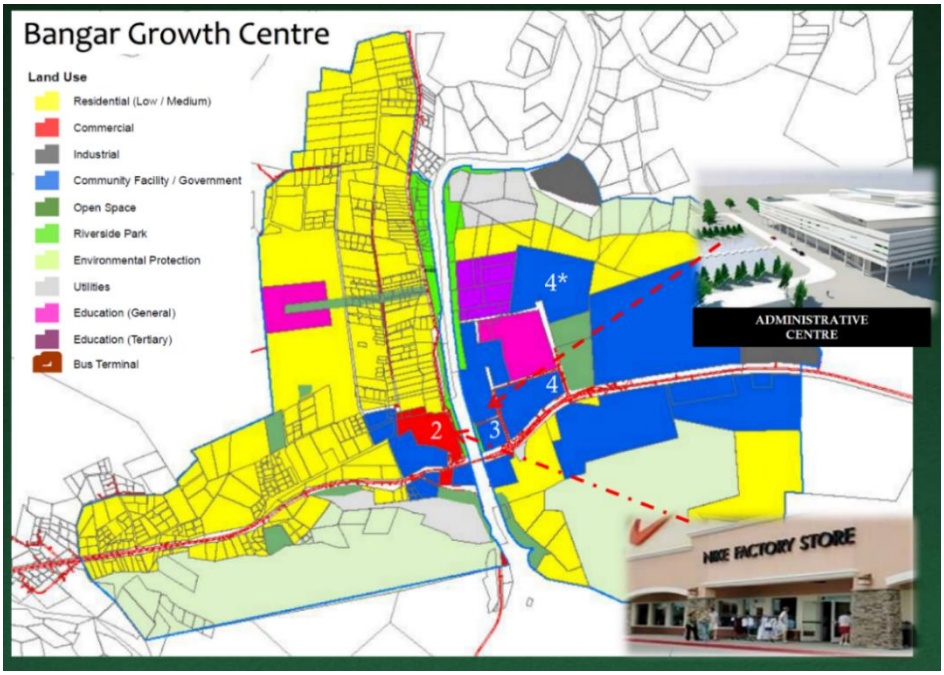
(2) Current land use plan by Department of Town and Country Planning (TCP)

The TCP developed the land use plan for Bangar growth centre is shown in Figure 4.4 and it was proposed with the following key elements:

- Principal tourist node
- Provision of enhanced commercial area building in the current shopping and services area at the centre of Bangar (3.2 ha of additional land)
- Retention of the east bank of Bangar as the administrative zone for the district
- Allowance for future expansion of the hospital at its existing site or relocation in a new complex
- Identification of land suitable for tertiary education campus
- Amenity improvement, such as riverside park, in Bangar

- Modern port facility in north-east Bangar
- Provision of green space within the settlement and environmental protection of the ridge
- Improvement in road circulation along Jalan Temburong and Jalan Labu

Figure 4.4: Land Use Plan of Bangar Growth Centre



Source: TCP (2017), Proposed Developments in Temburong District.

4.1.3 Proposed Master Plan in Bangar District

(1) Land use plan in Bangar

This study agrees with the key elements proposed in 2.1.2 (2) by the TCP regarding the development of Temburong district. In addition, based on the vision and other elements proposed in Chapter 3 for the entire Temburong area (e.g. dealing with the increasing traffic volume in the future and the need for tourism facilities) from the perspective of eco-friendly development as well as effective land use, this study proposes the following improvement and enhancement of functionality (Figure 4.5, Figure 4.6, and Table 4.5).

1) Construct internal roads and bridges connecting both sides of the river

The Temburong River divides Bangar district and the Jalan Labu road is the only connection between the two areas. Considering the increase in population and expansion in the logistics sector, through traffic should be separated from inner-city traffic by constructing more inner roads and bridges.

2) Arrange housing area based on demand

Despite the demand estimation of about 213 ha for housing, the TCP's land use plan allocates too much land for housing. This study believes that the current natural environment should be

preserved as much as possible. Housing areas in the lowlands in the north and the hills in the south of the east side area of the Temburong River should be considered a reserve area to deal with the long-term expansion of the urban area. This area should not be developed in the short term.

3) Locate schools in densely populated area in the west

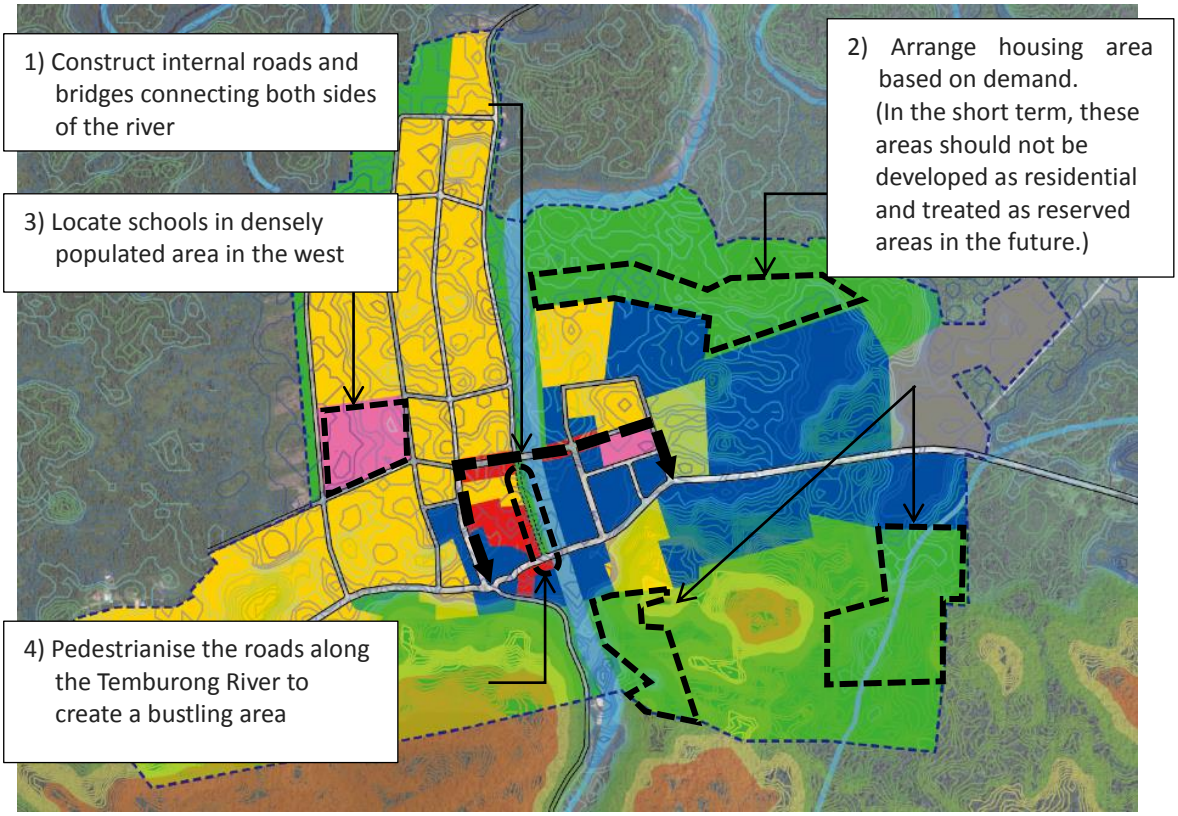
Schools are located east of the Temburong River in the TCP's land use plan. For convenient commuting to school and traffic safety, this study proposes that schools be positioned in the housing area west of the river.

The TCP plan sites the new university on the east of the river. However, because of the decision from the Brunei authorities to establish the university in Labu Estate district, this study does not include tertiary education facilities in the Bangar district land use plan.

4) Pedestrianise the roads along the Temburong River to create a bustling area

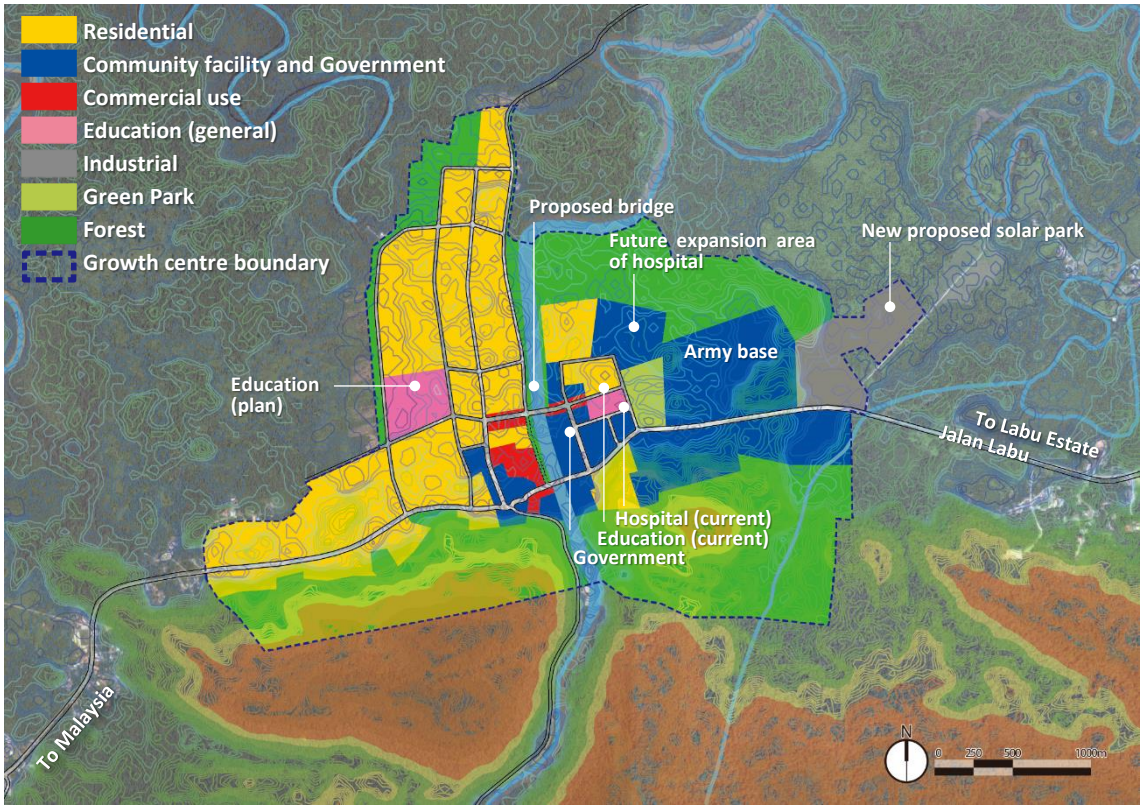
By pedestrianising part of the roads between the current commercial area and the Temburong River, this study aims to make a bustling area with uninterrupted shopping space. This will create an urban space for local residents and tourists to enjoy.

Figure 4.5: TCP Land Use Plan Proposal for Improvement



Source: Study team.

Figure 4.6: Land Use Plan in Bangar Growth Centre



Source: Study team.

Table 4.5: Bangar Growth Centre Land Use Area

Land Use	**Area** (hectare)
Residential	228
Community facility and Government	145
Commercial use	10
Education (general)	18
Industrial	34
Green park	9
Forest	345
Road	44
Water	22
Total	**855**

Source: Study team.

(2) Urban Design Image

The centre of Bangar district is mainly located in the downstream area near the Jalan Labu Bridge. The left bank of the river is the commercial district and the right side has stately administrative buildings. The current small population, with very few pedestrians or cars, results in a peaceful neighbourhood. However, an increase in population and growing demand from tourism are expected. Therefore, Bangar area will need to be prepared. The current condition of central area along the Temburong river are shown in Figure 4.7.

Figure 4.7: Condition of Central Area

View from the Jalan Labu Bridge (downstream)

Administrative area with Islamic building

Commercial district I

Road in the commercial district along the Bangar River (Jalan Pekan Bangar road)

Note: These images show the downstream area of Jalan Labu Bridge.
Source: Study team.

This central area across the Temburong River has significant potential to become a bustling riverside space. This study proposes a space design that focuses on creating an area of about 500 m along the river, between the ferry port and the new bridge, to become the bustling centre of Bangar district. This design will take into account the future expansion of the urban area as well as the proposed new bridge construction plan.

Primary policies in space creation of the bustling central area

The primary policies of bustling central area are followings. (Figure 4.8 and 4.9)

- Revitalise the Bangar River and its riverside.
- Construct space for social exchange
- Improve accessibility
- Ensure safety and security

1) Construction of transit mall[1] in front of the commercial centre on the left bank (part of Jalan Pekan Bangar)

The Jalan Pekan Bangar road on the left bank is one of the main roads on the north–south axis of the town's inner city transportation. However, the road separates the commercial area and the space along the river.

To avoid this separation when pedestrian and traffic volumes increase, and to create a continuous bustling space from commercial facilities to the open space near the river, part of the Jalan Pekan Bangar road will be converted to a transit mall. This will prioritise pedestrians and public transportation (e.g. buses).

2) Preservation of the landscape of the administrative area on the right bank

The administrative area at the foot of the bridge on the right bank has beautiful architecture surrounded by nature. This landscape should be preserved as much as possible by avoiding constructing with too much decoration.

3) Construction of river walk and recreation area

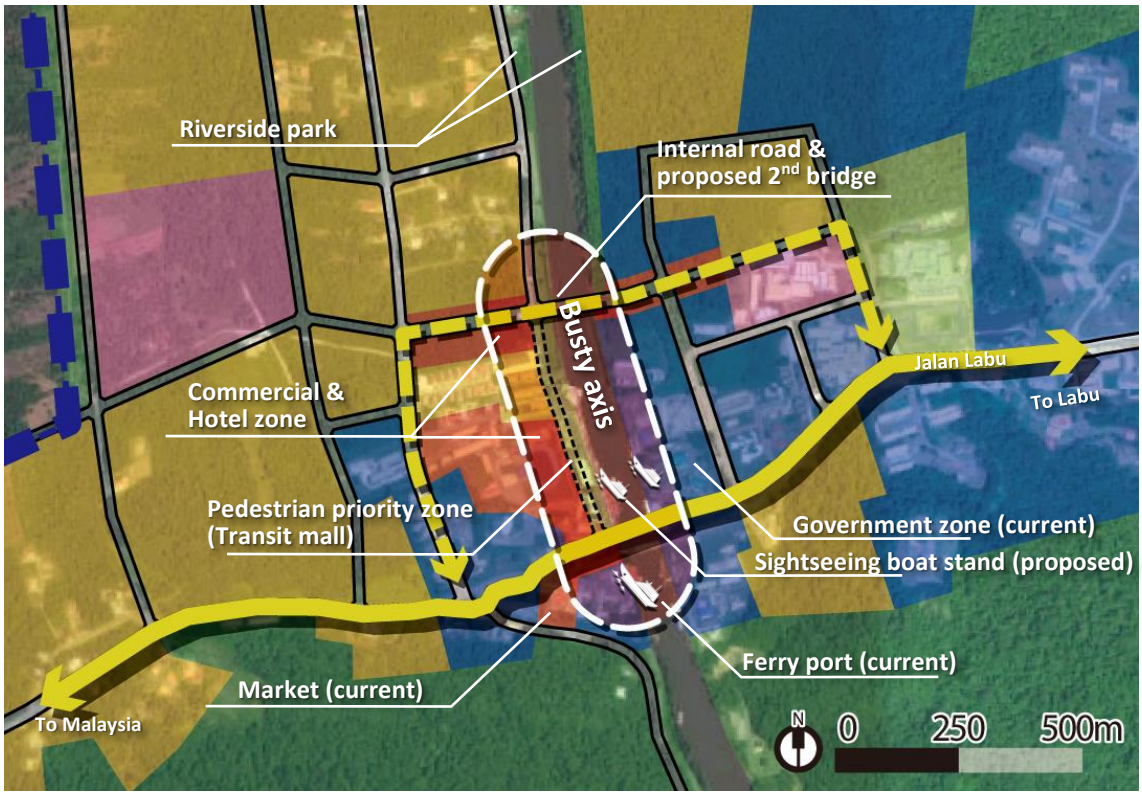
The study plans to build new boardwalks and open spaces on the walkway, along with resting zones, for walking or using small mobility devices (e.g. wheelchairs and Segways) on both sides of the river.

4) Introduction of river-related activities and sightseeing dock

The main ferry port, downstream from Jalan Labu road, is the terminal for high-speed, large vessels used to travel to BSB and neighbouring countries. The study plans to introduce new river-related activities in Bangar and Labu, along with a sightseeing dock in the transit mall area in front of the commercial district on the left bank as well as the administrative area on the right bank. These new docks will avoid the complication with the high-speed, large vessel ferries and create a lively river space.

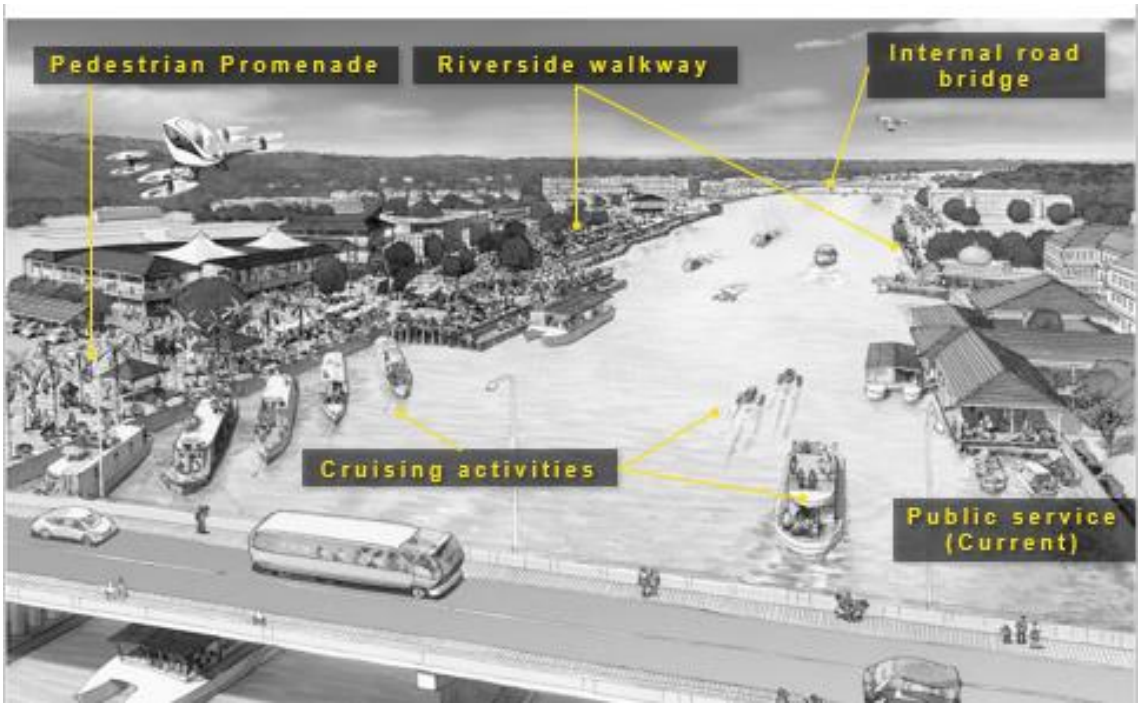
[1] A transit mall is a street that restricts private cars and prioritises public transportation (e.g. buses, trams, light rail transport, and taxis) and pedestrians. It is frequently introduced to revitalise town centres.

Figure 4.8: Location of Bustling Central Area



Source: Study team.

Figure 4.9: Creation of Bustling Central Area



Source: Study team.

Figure 4.10: Bustling Central Area

Source: Study team.

4.2 Master Plan of Labu Estate

4.2.1 Framework of Labu Estate

(1) Residential

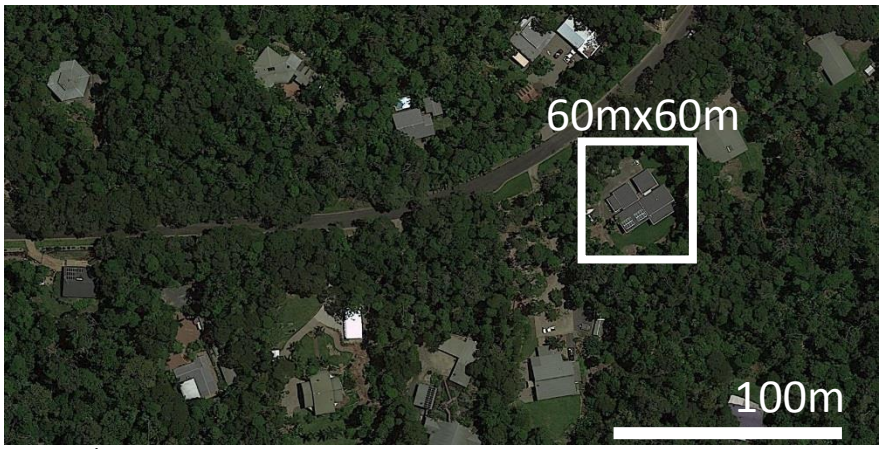
Based on the predicted population of 4,582 in 2030, the assumed residential area is 229 ha and the average density is 20 persons/ha (Table 4.6). In low-density residential areas like Cairns in Australia (Figure 4.11 approx. 3,600m^2 for one housing area), it will be possible to develop residential areas with minimal impact on forest.

Table 4.6: Labu Estate Growth Centre Housing Land Forecasts to 2030

Item	Amount
Population (number of persons)	4,582
Population density (persons per hectare)	20
Area (hectare)	229

Source: Study team.

Figure 4.11: Residential Density in Cairns, Australia



m = metre.
Source: Study team.

(2) Education

From the predicted population of 4,582 in 2030, the assumed area is 1.8ha for Primary School land and 1.5ha for Secondary School, as shown in Tables 4.7 and 4.8. And landuse are for the university is 310ha (Table 4.9).

Table 4.7: Labu Estate Growth Centre Primary School Land Forecasts to 2030

Item	Amount
Population (number of persons)	4,582
Students (number of persons)*	352
Population density (number of persons per hectare)	50
Area (hectare)	1.8

* United Nations Population Division.

Source: Study team.

Table 4.8: Labu Estate Growth Centre Secondary School Land Forecasts to 2030

Item	Amount
Population (number of persons)	4,582
Students (number of persons)*	307
Population density (number of persons per hectare)	50
Area (hectare)	1.5

* United Nations Population Division.

Source: Study team.

Table 4.9: Labu Estate Growth Centre University Land Forecasts to 2030

Sultan Sharif Ali Islamic University (UNISSA) is planned to be located at Labu Estate.

Item	Amount
Area (hectare)	310
Students (number of people)	3,000

Source: Study team.

(3) Hotel, Convention Centre

The hotel targets tourists to Perdayan Forest Recreation Park and Labu Estate (Table 4.10).

Table 4.10: Labu Estate Growth Centre, Hotel, and Convention Centre Land Forecasts to 2030

Item	Amount
Area (hectare)	20
Floor area (square metre)	20,000
Rooms (number)	200

Source: Study team.

(4) R&D

Based on Table 4.11, the study proposes a target of 3,000 R&D workers on 50 ha (Table 4.12).

Table 4.11 shows a case study of global R&D facilities. Many successful R&D facilities have more than 3,000 workers.

In this master plan, the R&D area is proposed approx. 50ha. (Table 4.12)

Table 4.11: Case Study of R&D Facilities

Location	Area (ha)	Floor area (m^2)	Gross FAR (%)	Working population (persons)	Floor area (m^2/person)	Category
Stanford Research Park (US)	283	991,515	35	23,000	43.1	ICT, biotechnology
Cambridge Science Park (UK)	62	145,540	23	5,000	29.1	
Singapore Science Park I+II	50	400,000	80	10,000	40.0	High-tech R&D, ICT, biomedical
Hong Kong Science Park	28.2	320,000	113	13,800	23.2	Biotechnology, electronics, green technology, ICT, precision engineering
Thailand Science Park	32	264,000	82	3,000	88.0	Biotechnology, materials, electronics, software nanotechnology
One-North (Singapore)	200	5,000,000	250	138,000	36.2	Biomedical sciences, ICT, media, physical sciences & engineering

ICT = information and communication technology, FAR = floor area ratio, ha = hectare, m^2 = square metre, R&D = research and development, UK = United Kingdom, US = United States.
Source: Study team.

Table 4.12: Labu Estate Growth Centre R&D Land Forecasts to 2030

Item	Amount
Area (hectare)	50
Gross FAR (%)	50
Floor area (m^2)	250,000
Floor area per person (m^2 per person)	80
Working population (number of persons)	3,000

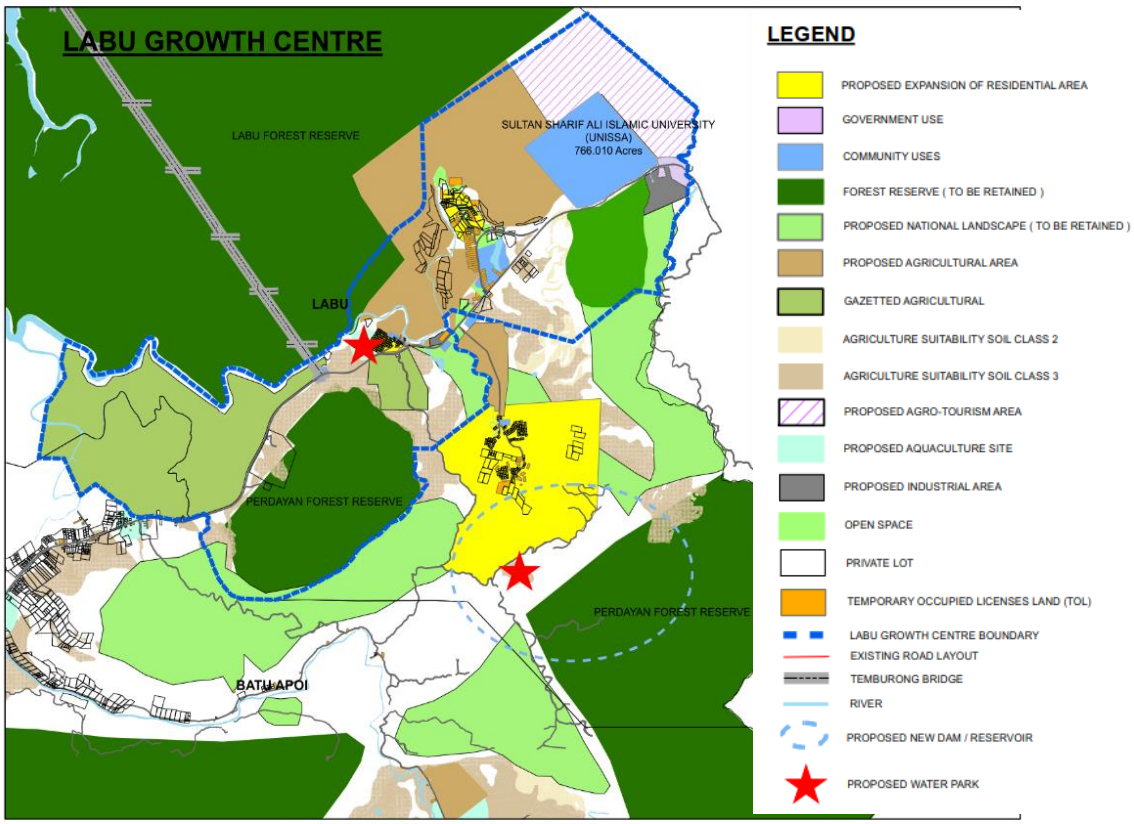
FAR = floor area ratio, m^2 = square metre.
Source: Study team.

4.2.2 Assessment of Land Use of Current Condition and Current Plan

TCP is studying the following Labu district land use plan.(Figure 4.12):

- UNISSA (about 300 ha=766 acre), an industrial zone, and a golf course are planned near the border with Malaysia
- Housing is proposed to expand near the south of the growth centre boundary
- Dam and reservoir are planned to be constructed in the south of the housing area
- Water park is proposed, but the location is still unknown
- Agricultural land and forest reserve areas are also specified based on the current land conditions.

Figure 4.12: Labu Growth Centre Land Use Plan



Source: Proposed Developments in Temburong District (TCP).

4.2.3 Proposed Master Plan

(1) Zoning plan

Base on the TCP plan, we propose the following revised zoning plan（Figure 4.13）from viewpoints: 'creating a diverse community with interaction across the university, R&D, residential', and 'building resorts to use Perdayan Forest Recreation Park'.

1) Form a community in which the university, R&D, and residential areas collaborate

In the current plan, land for the university is far from the town, so it is hard to form a symbiotic

relationship. By rearranging the university, R&D, and residential areas to be close to each other, we can build a diverse creative community.

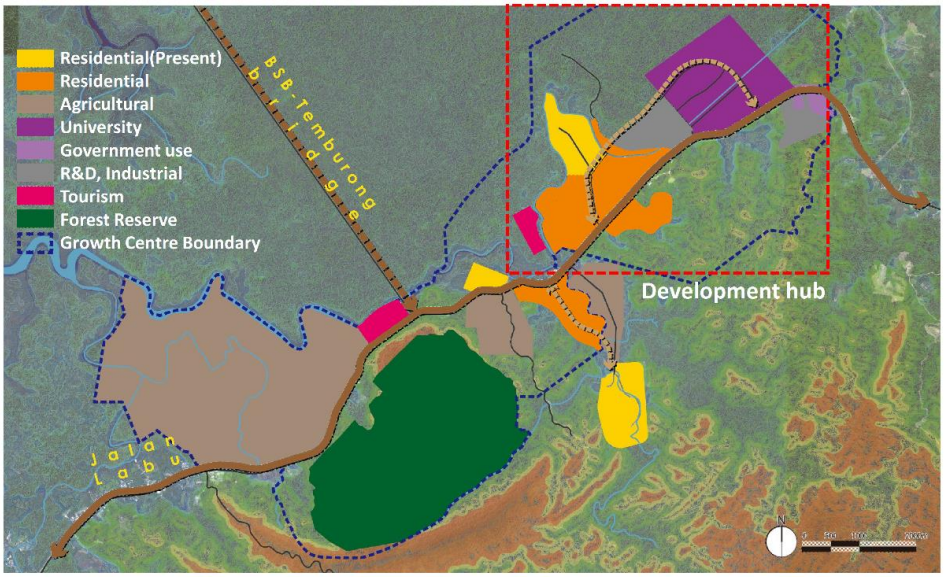
2) Form residential areas with excellent transport links

The current plan divides the housing area into three villages. By developing housing in between the three villages to connect them, we can provide better service based on the optimisation of public services and the effect of scale.

3) Set up priority projects

To advance the plan for Labu district, we need to set up priority projects which can become a driving force for the development. This study proposes (i) a tourism hub, (ii) a convention facility for the 2024 APEC meeting, and (iii) a facility for research in agriculture and tourism using the construction yard for the bridge.

Figure 4.13: Labu Estate Growth Centre Zoning Plan



R&D=Research and development.
Source: Study team.

(2) Land Use Plan

This study proposes a land use plan for the university, R&D, and housing area based on the zoning plan (Figure 4.14) (Table4.13).

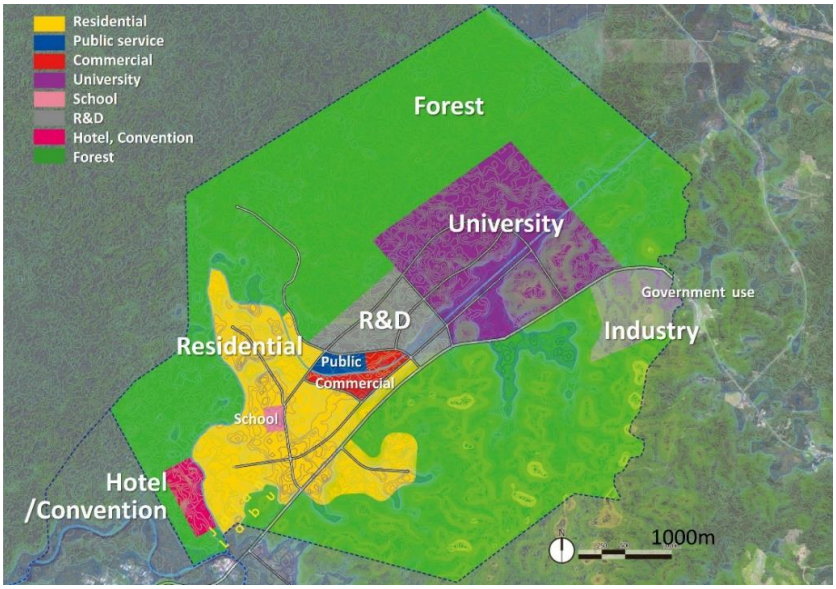
1) Commercial area and public service area

A commercial area and a public service area, serving as a collaborating hub, will be located between the R&D and housing area facing the river.

2) Inner city roads

We plan to build three inner city roads connecting the university, R&D, and housing area in the southwest taking advantage of the geographical features.

Figure 4.14: Labu Estate Growth Centre Land Use Plan



R&D=Research and development.

Source: Study team.

Table 4.13: Labu Estate Growth Centre Housing Land Forecasts to 2030

Land Use	**Area** (hectares)
Residential	297
Hotel/Convention centre	24
University	296
R&D/Industry	122
School	6
Commercial	21
Public service	10
Government use	19
Forest	1,664
Total	**2,459**

Source: Study team.

(3) Urban Design Image

The project site is covered by forests with small and mid-sized trees. The existing housing area is also a low-density area surrounded by forests. A river passes through the forest and local people use docks scattered along it (Figure 4.15).

Figure 4.15: Labu Estate Growth Centre Conditions

Existing housing area

River and dock

Source: Study team.

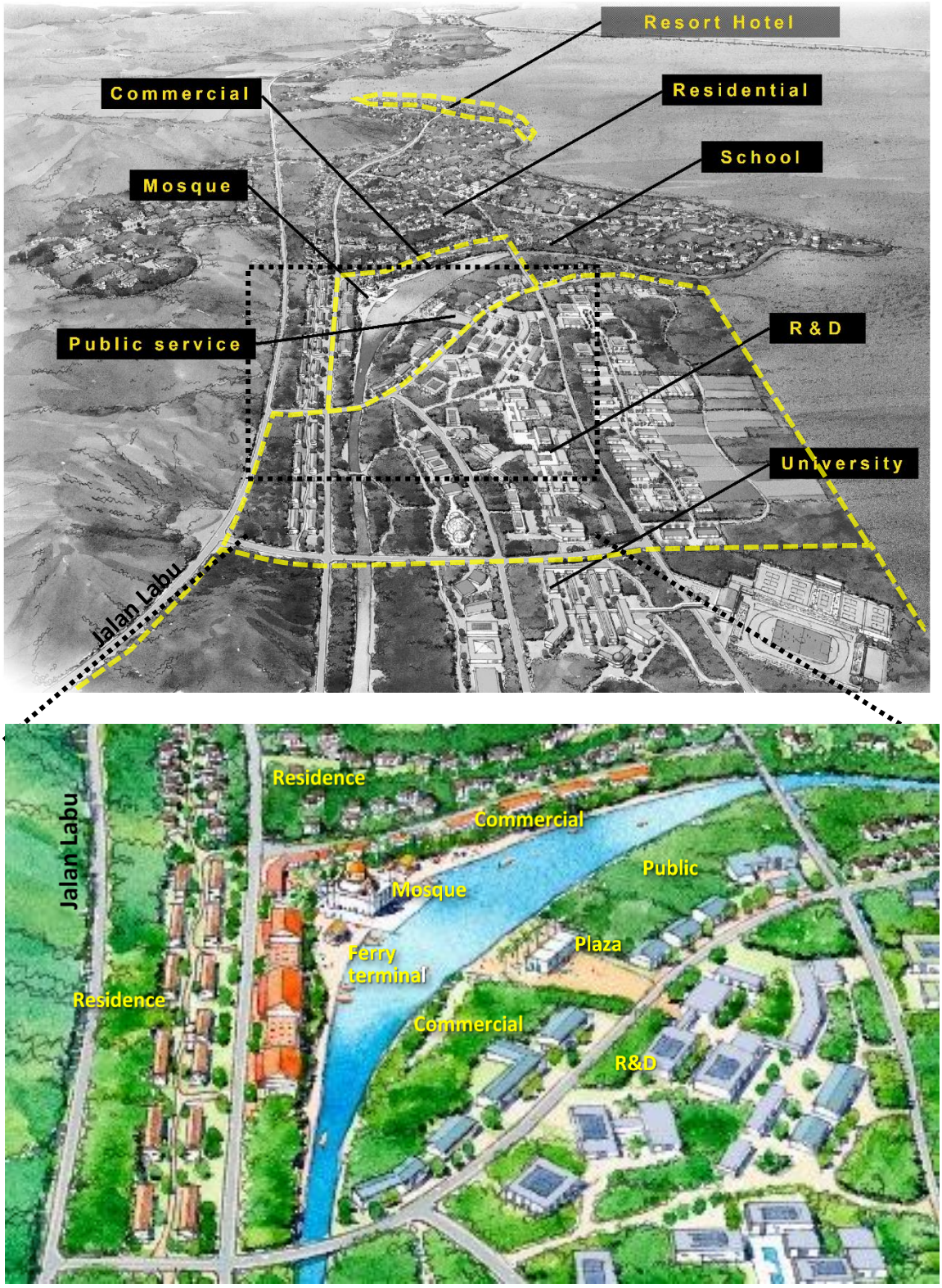
Primary policy for space design

Based on the current conditions, the primary policy for space design is as follows.

- Preserve the current forests as much as possible, and restore and value forests during development
- Integrate the river into daily life by locating riverside facilities facing the river or using the river.
- Prepare public spaces, such as parks and open spaces, to create exchange hubs

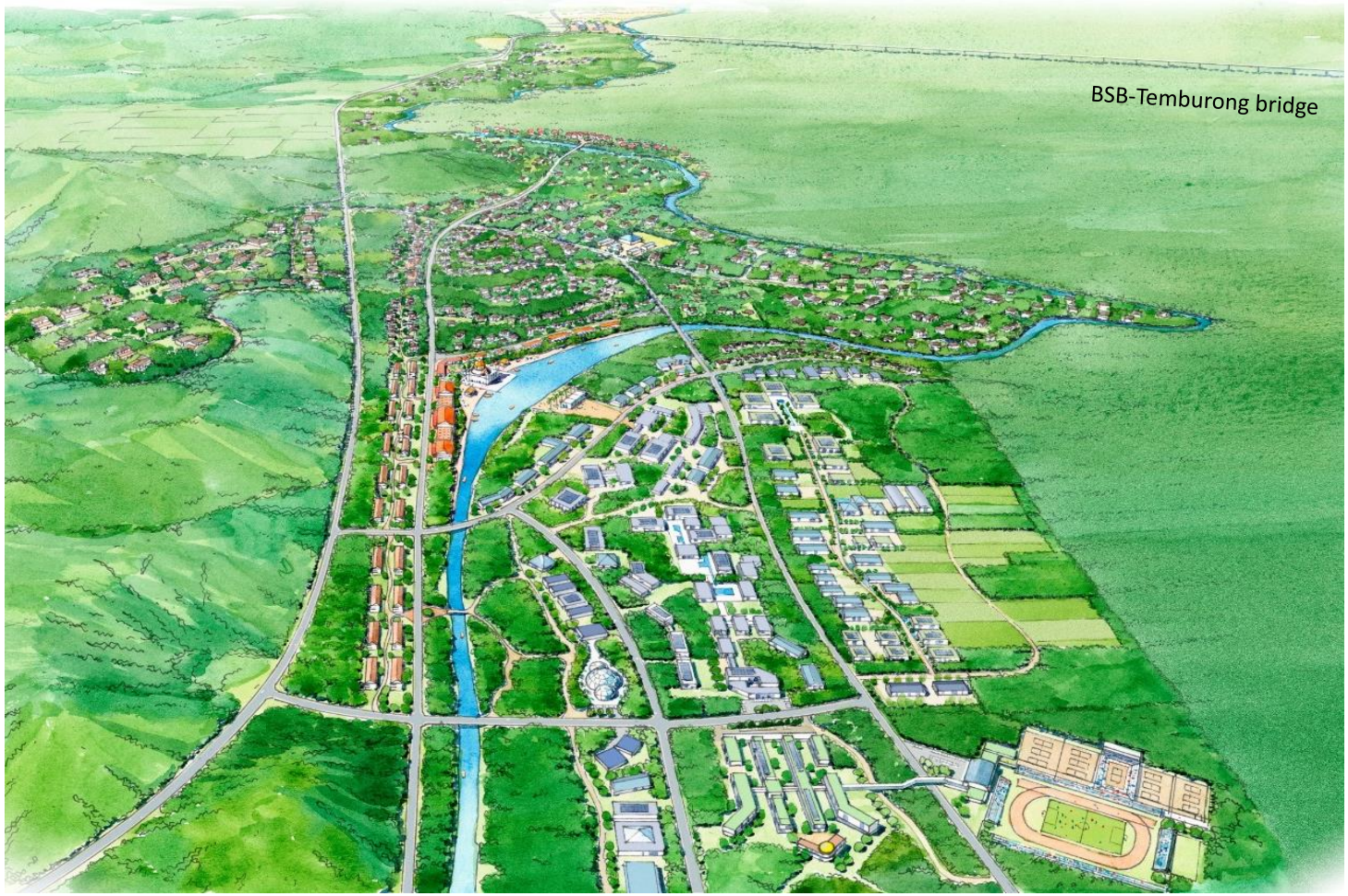
Urban design images are shown in Figure 4.16, 4.17, and 4.18.

Figure 4.16: Centre of Labu Estate Growth Centre



R&D = Research and development.
Source: Study team.

Figure 4.17: Labu Estate Growth Centre



BSB= Bandar Seri Begawan.
Source: Study team.

Figure 4.18: Public Space between R&D and University

Source: Study team.