A Strategic Urban Development Plan of Greater Yangon FINAL REPORT I Part-II: The Master Plan April 2013 JICA

Japan International Cooperation Agency (JICA)
Yangon City Development Committee (YCDC)

The Republic of the Union of Myanmar

A Strategic Urban Development Plan of Greater Yangon

The Project for the Strategic Urban Development Plan of the Greater Yangon

FINAL REPORT I

Part-II: The Master Plan

April 2013

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YACHIYO Engineering Co., Ltd.
International Development Center of Japan Inc.
Asia Air Survey Co., Ltd.
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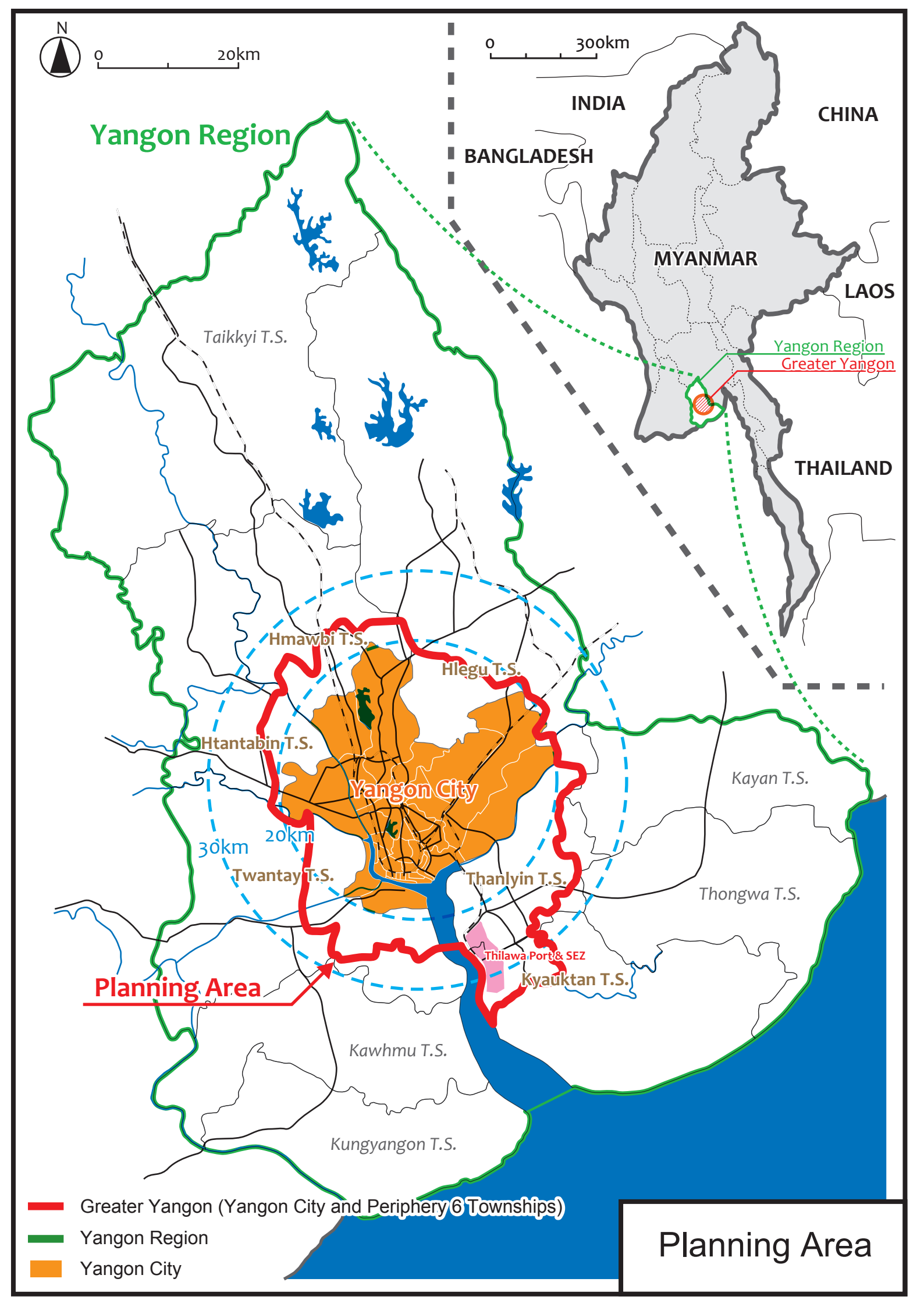
N
0
20km
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300km
INDIA
CHINA
BANGLADESH
MYANMAR
LAOS
THAILAND
Yangon Region
Yangon Region
Greater Yangon
Taikkyi T.S.
Hmawbi T.S.
Hlegu T.S.
Htantabin T.S.
Yangon City
Kayan T.S.
30km
20km
Twantay T.S.
Thanlyin T.S.
Thongwa T.S.
Thilawa Port & SEZ
Kyauktan T.S.
Planning Area
Kawhmu T.S.
Kungyangon T.S.
Greater Yangon (Yangon City and Periphery 6 Townships)
Yangon Region
Yangon City
Planning Area

The Project for
The Strategic Urban Development Plan of the Greater Yangon

Final Report I
< Part-II: The Master Plan >

The Final Report I consists of three parts as shown below, and this is Part-II.

1. *Part-I: The Current Conditions*
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AADMER	ASEAN Agreement on Disaster Management and Emergency Response
ASEAN	Association of Southeast Asian Nations
ADB	Asia Development Bank
ADPC	Asian Disaster Preparedness Center
ADRC	Asian Disaster Reduction Center
ATCS	Area Traffic Control System
AWPT	Asia World Port Terminal
BAW	Bo Aung Kyaw Wharf
BES	Business Establishment Survey
BOT	Build-Operate-Transfer
CBD	Central Business District
CBDRR	Community Based Disaster Risk Reduction
CBM	Compressed Bio Methane
CIDA	Canadian International Development Agency
CNG	Compressed Natural Gas
DCA	Department of Civil Aviation
DDA	Department of Development Affair
DEP	Department of Electric Power
DHSHD	Department of Human Settlement and Housing Development
DMH	Department of Meteorology and Hydrology, Ministry of Transport
DPMC	Disaster Preparedness Management Committees
DSW	Department of Social Welfare under the Ministry of Social Welfare
DWT	Dead Weight Tonnage
ECFA	Engineering Firms Association
EIA	Environmental Impact Assessment
FDS	Final Disposal Site
FSD	Fire Services Department
FY	Fiscal Year
GDP	Gross Domestic Products
GIS	Geographic Information System
GMS	Greater Mekong Subregion
GPS	Global Positioning System
GRDP	Gross Regional Domestic Product
HDPE	High Density Polyethylen
HHWL	Highest High Water Level

HIS	Household Interview Survey
ICD	Inland Container Depot
ID	Irrigation Department, Ministry of Agriculture and Irrigation
IPP	Independent Power Producer
ITS	Intelligent Transport Systems
ITU	International Telecommunication Union
IWT	Inland Waterway Transport
JETRO	Japan External Trade Organization
JICA	Japan International Cooperation Agency
JPY	Japanese Yen
LRT	Light Rail Transit
MAPDRR	Myanmar Action Plan on Disaster Risk Reduction
MCPT	Ministry of Communication, Posts and Telegraphs
MDPA	Myanmar Disaster Preparedness Agency
MEC	Myanmar Economic Corporation
MEPE	Myanmar Electric Power Enterprise
MES	Myanmar Engineering Society
METI	Ministry of Economy, Trade and Industry of Japan
MIP	Myanmar Industrial Port
MIPL	Myanmar Integrated Port Limited
MITT	Myanmar International Terminals Thilawa
MKRC	Mobile Knowledge Resource Centre
MLIT	Ministry of Land, Infrastructure, Transport and Tourism
MMK	Myanmar Kyat
MNPED	Ministry of National Planning and Economic Development
MOAI	Ministry of Agriculture and Irrigation
MOC	Ministry of Construction
MOE	Ministry of Education (in section 2.1.4)
MOE	Ministry of Energy (in section 2.3.7 and 4.7)
MOECF	Ministry of Environmental Conservation and Forestry
MOEP	Ministry of Electric Power
MOFA	Ministry of Foreign Affairs
MOH	Ministry of Health
MORT	Ministry of Rail Transportation
MOT	Ministry of Transport
MPA	Myanmar Port Authority
MPT	Myanmar Posts and Telecommunications

MR	Myanmar Railways
MRT	Mass Rapid Transit
MS	Myanmar Shipyards
MSPL	MPA-SMD Port Limited
MSWRR	Ministry of Social Welfare, Relief and Resettlement
MWL	Mean Water Level
MPA	Myanmar Port Authority
NDML	Natural Disaster Management Law
NGO	Non-Governmental Organization
NMV	Non-Motorized Vehicle
ODA	Official Development Assistance
PCCD	Pollution Control and Cleansing Department
PPP	Public Private Partnership
PS	Pumping Station
PTD	Post and Telecommunication Department
PwD	Persons with Disability
RET	Rangoon Electric Tramway and Supply Company
RHC	Rural Health Center
ROB	Road Flyover
RRD	Relief and Resettlement Department
R.S.	Railway Station
RTAD	Yangon Region Road Transport Administration Department
RTC	Road Transport Corporation
RTK	Real Time Kinematic
SEA	Strategic Environmental Assessment
SEZ	Special Economic Zone
SHM	Stakeholder Meeting
SLORC	the State Law and Order Restration Council
SPW	Sule Pagoda Wharf
SRHC	Sub-Rural Health Center
SWM	Solid Waste Management
TOD	Transit Oriented Development
UFW	Un-accounted For Water
UMEHL	Union of Myanmar Economic Holding Limited
UMRT	Urban Mass Rapid Transit
UN	United Nations
UNDP	United Nations Development Programme

UNESCO	United Nations Educational, Scientific and Cultural Organization
UNOSAT	UNITAR's Operational Satellite Applications Programme
UPD	Urban Planning Division
US$	US Dollar
USDA	Union Solidarity and Development Association
WHO	World Health Organization
WKRC	Water Knowledge Resource Centre
WTE	Waste to Energy plants
WTP	Water Treatment Plant
WV	World Vision
WWTP	Wastewater Treatment Plant
YESB	Yangon city Electricity Supply Board
YCDC	Yangon City Development Committee
YDDPMWC	Yangon Division Disaster Preparedness Management Working Committee

CONVERSION RATE (AT MARCH 2013)

1 MMK	=	0.108 JPY,	1 JPY	=	9.26 MMK
1 US$	=	91.84 JPY,	1 JPY	=	0.01089 US$

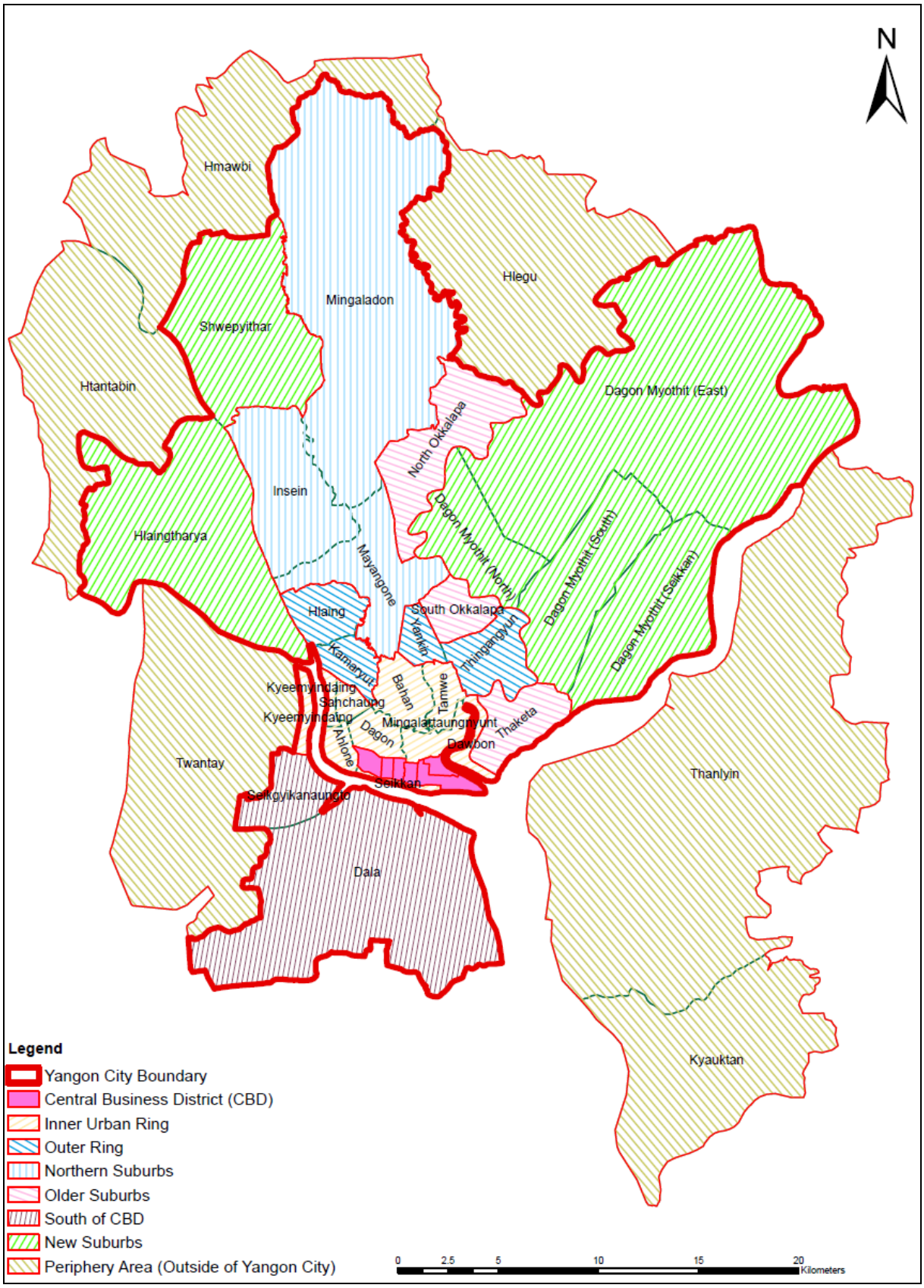
Source: JICA HP

DIFINITION OF THE STUDY AREA AND YANGON REGION

Administrative Boundary		Township Group	Township Name	Definition	
Yangon Region	Yangon City	CBD	Latha	**Whole area of those townships belongs to the target area**	**The Greater Yangon (Target Area) Total 1,535 km^2**
			Lanmadaw		
			Pabedan		
			Kyauktada		
			Botahtaung		
			Pazundaung		
		Inner Urban Ring	Ahlone		
			Kyee Myin Daing		
			Sanchaung		
			Dagon		
			Bahan		
			Tarmwe		
			Mingalar Taung Nyunt		
			Seikkan		
			Dawbon		
		Outer Ring	Kamaryut		
			Hlaing		
			Yankin		
			Thingangyun		
		Northern Suburbs	Mayangone		
			Insein		
			Mingalardon		
		Older Suburbs	North Okkalapa		
			South Okkalapa		
			Thaketa		
		South of CBD	Dala		
			Seikgyikhanaungto		
		New Suburbs	Shwe Pyi Thar		
			Hlaing Tharyar		
			North Dagon		
			South Dagon		
			East Dagon		
			Dagon Seikkan		
	Periphery Area (Outside of Yangon City)		Kyauktan	**Partial areas of each township belong to the target area**	
			Thanlyin		
			Hlegu		
			Hmawbi		
			Htantabin		
			Twantay		
			Taikkyi	*(Outside of the Target Area)*	
			Kawhmu		
			Kungyangon		
			Kayan		
			Thongwa		

Source: JICA Study Team

DIFINITION OF THE STUDY AREA AND YANGON REGION



Source: JICA Study Team

THE STUDY IN PICTURES

Steering Committee (1st)
(14th Aug 2012)

Technology Transfer Workshop (6th)
(12th October 2012)

Kick-Off Seminar
(14th Nov 2012)

Steering Committee (3rd)
(9th Jan 2013)

Stakeholder Meeting (1st)
(18th Jan 2013)

Seminar in Tokyo, Japan
(21st March 2013)

Source: JICA Study Team

CHAPTER 3

Development Visions and Structure Plan

< Part-II: The Master Plan >

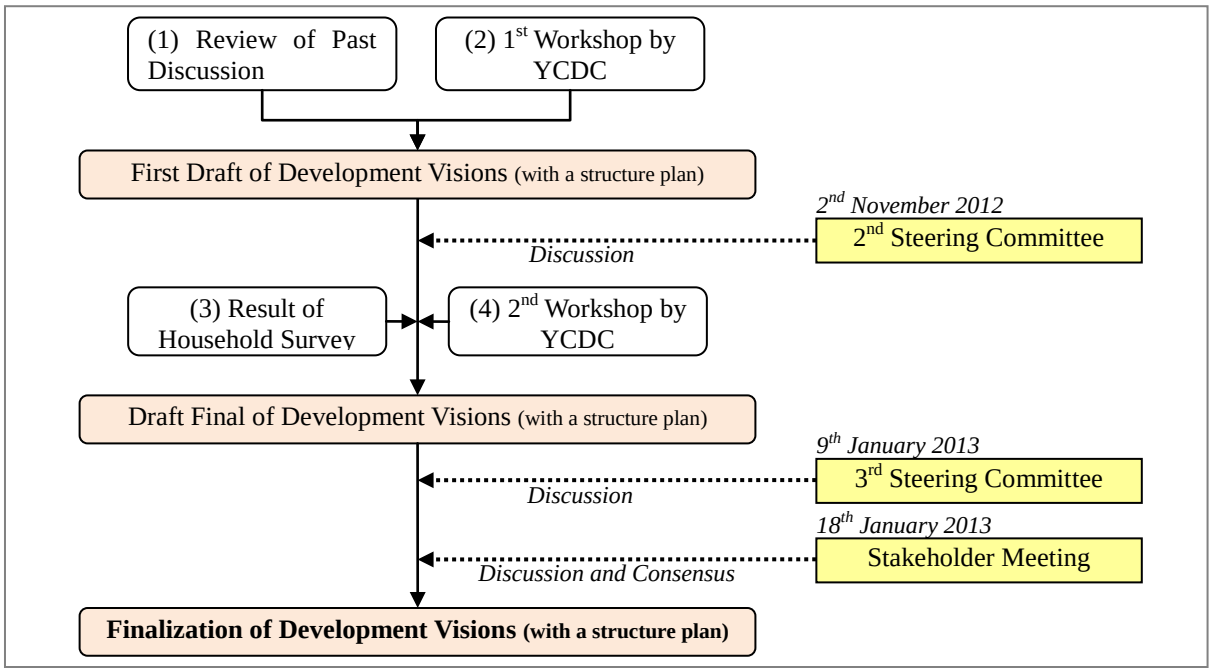
CHAPTER 3: DEVELOPMENT VISIONS AND STRUCTURE PLAN

3.1 Development Visions

3.1.1 Necessity and Formulating Process of Development Visions

A development vision is an ideal future image of a city which can be attained through addressing problems and issues, catering to the citizens' needs, and integrating foresight of the stakeholders and experts regarding urban planning, and other disciplines. Without setting clear development visions, it would be difficult to implement an integrated urban development plan efficiently. Consequently, the administration would come to a deadlock, as there are a number of concerned sectors playing important roles in developing, improving, and managing a large city.

In this context, it must be noted that the proposed development visions in this Final Report I were discussed and modified in the subsequent steps to reach the ultimate visions commonly shared by all stakeholders that are suitable for the future development of Greater Yangon. The development visions for Greater Yangon have been formulated clearly, through discussions not only with Yangon City Development Committee (YCDC) and Japan International Cooperation Agency (JICA) Study Team but also with other relevant government organizations and stakeholders through stakeholders meetings and the steering committee meetings. Moreover, the citizens' needs analyzed by means of household interview survey were reflected in the development visions as well. The formulating process of the development visions is shown in Figure 3.1.1.



Source: JICA Study Team

Figure 3.1.1: Formulating Process of the Development Visions

3.1.2 Formulating Process of the Development Visions

(1) Review of Past Discussion

In December 2011, a workshop was held for two days to discuss the Yangon Concept Plan (Vision 2040) participated by YCDC, Department of Human Settlement and Housing Development (DHSHD), and other relevant organizations. In this meeting, discussions were focused on the urban challenges and difficulties of Yangon City, including possible outcome of the rapid population growth in the past, and foresights were shared among attendees as follows;

Table 3.1.1: Urban Challenges and Difficulties Discussed in a Workshop held in December 2011

Item	Contents
Urban Challenges and Difficulties	• Yangon City ranked 73rd in the world megacities ranking wherein the population is more than 1 million. • Yangon City population is estimated to be about 4.7 million in the YCDC area. • Population growth is expected to increase by 2% or 3% or maybe unpredictable in the next 30 years. • If the government develops the Economic Development Project like the special economic zone, population growth would be higher and the city will reach up to a megacity level.
Urban Challenges coming along with the population Growth	• Food Security. • Increase in quantity of low quality buildings and expansion of illegal territory invaders. • Current traffic jams problems and difficulties in the inefficient public transportation. • Requirement of accessibility to a clean and healthy water supply. • Inefficient infrastructure for a city and physical requirement weakness. • Inefficient basic infrastructure for social, education, and health of the public. • Requirement in implementing development systems to promote jobs for the increasing population of Yangon City. • Along with the development of Yangon City, surrounding small cities need to be developed. • Environmental pollution caused by the expansion of housing projects and destruction of fertile lands in order to catch up with the needs of the city's population growth. • Environmental pollution caused by illegal waste disposal by industrial zones due to weak implementation of rules and regulations. • Greater possibility of encountering environmental and man-made disasters for the citizens.

Source: Yangon Concept Plan in Workshop in Dec 2011 (reported by Ministry of Construction)

Based on the discussions in the workshop, the roles of Greater Yangon expected in the future are as follows:

＜Expectations for the Future of Greater Yangon＞

- To be a country's main economic HUB;
- To be developed into a city with inland and international port integration;
- To be a green and healthy city;
- To be a multiethnic city of heritage, culture and tourism; and
- To be a city of education and knowledge.

(2) First Workshop to Discuss Visions by Urban Planning Division, YCDC

A workshop was held to discuss visions among the staff of Urban Planning Division (UPD), YCDC on September 11, 2012.

In the workshop, attendees were initially divided into three teams, and each team discussed future visions by sorting ideas and writing them on a number of small sheets of paper showing each attendee's expectation for the future of Yangon. Then, each team presented their ideas. Dr. Kyaw Lat and the Team Leader of JICA Study Team commented on the presentations before the closing of the workshop.

Categorizing attendee expectation papers and putting titles

Giving presentations by all three teams

Making visions in the workshop

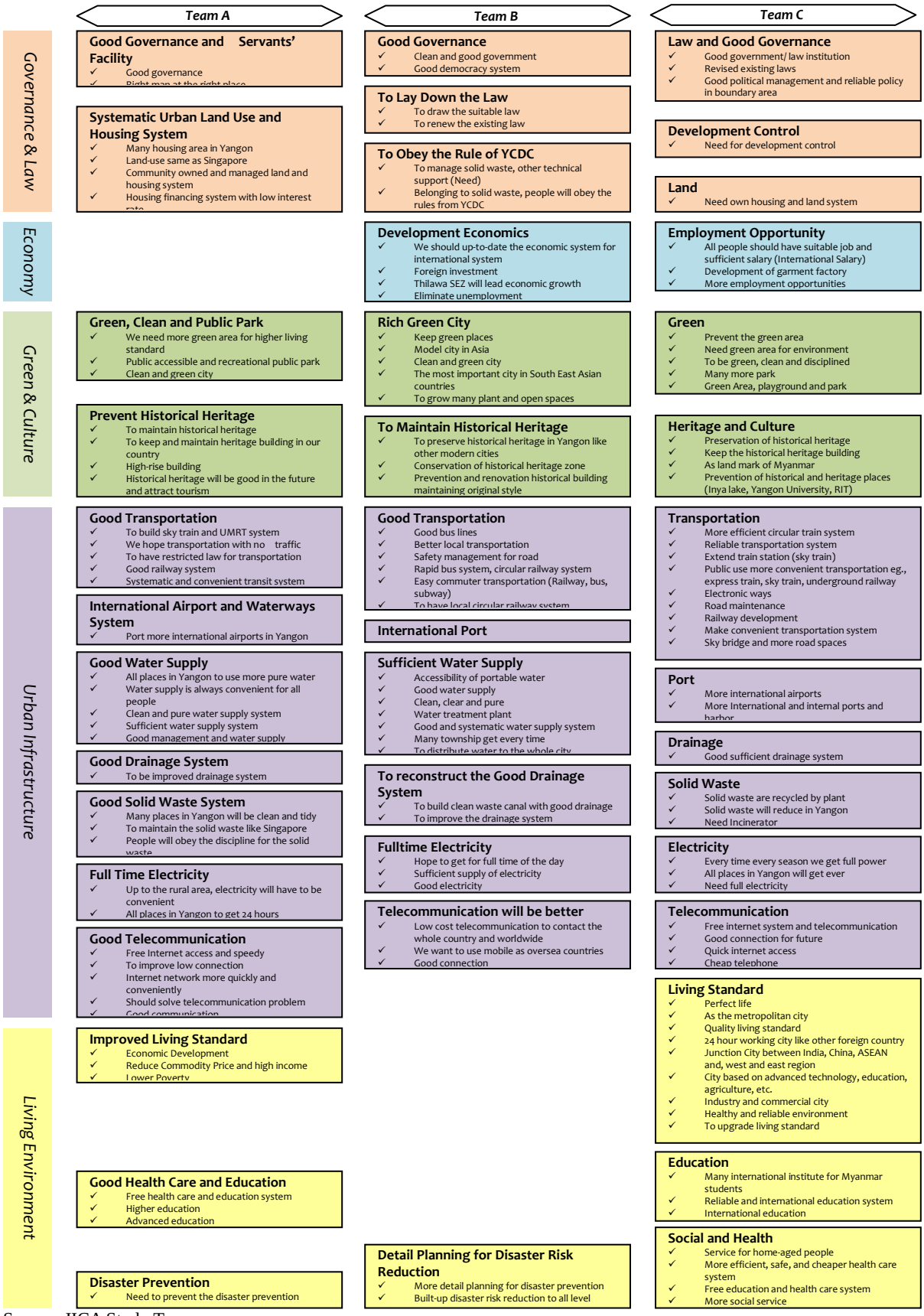
Source: JICA Study Team

Figure 3.1.2: A Workshop to Discuss Visions by UPD

Figure 3.1.3 shows the result of the workshop as divided in three groups. All expectations written by the attendees are included in the figure and were categorized into groups and were given new titles. Based on the results, the key themes that have become apparent are as follows:

＜Expectations for the Future of Greater Yangon＞

- To be a city with good governance and law enforcement
  (Keywords: good governance, system, control, rule, etc.);
- To be a city with economic growth
  (development economy, employment opportunity, etc.);
- To be a city with green and culture
  (green, clean, public park, historical, heritage, culture, etc.);
- To be a city with urban infrastructure
  (transportation, port and airport, water, electricity, waste, telecommunication, etc.); and
- To be a city with living environment
  (living standard, health care, education, disaster risk, social, etc.).



Source: JICA Study Team

Figure 3.1.3: Results of the UPD-YCDC Workshop for the Development Visions

(3) Results of the Household Interview Survey

According to the results of the household interview survey (HIS) Question No. 93 'How do you find the living environment and services in your neighborhood with regard to the following aspects?', more than 20% of the respondents have selected the rating of 'Highly Unsatisfied/Unsatisfied' on power supply, water supply, solid waste collection (Urban Services), and public transport (Access to Services).

Since water supply and solid waste collection are selected by more than 25% of the respondents, many households expect improvements in that area.

Moroever, 'flood, sanitary condition, landscape/historical places, parks/greenery (Living Environment), sewage system (Urban Services), and park and green space (Access to Services) were selected by more than 15% of the respondents.

Table 3.1.2: Results of the Household Interview Survey Question No. 93

		Highly Unsatisfied	Unsatisfied	So-so	Satisfied	Highly Satisfied	No Answer	**Total**
Living Environment	Safety/Security	0.4%	3.7%	11.0%	82.5%	2.2%	0.2%	**100.0%**
	Flood	0.9%	16.4%	33.3%	47.4%	1.2%	0.8%	**100.0%**
	Housing	0.4%	12.3%	27.0%	59.0%	1.0%	0.3%	**100.0%**
	Air Quality	1.6%	14.3%	32.1%	51.0%	0.7%	0.3%	**100.0%**
	Tranquility	0.2%	3.9%	16.1%	78.1%	1.6%	0.1%	**100.0%**
	Sanitary Condition	1.3%	17.8%	33.6%	46.6%	0.6%	0.1%	**100.0%**
	Landscape/ Historical Places	0.5%	17.3%	37.6%	32.5%	0.6%	11.4%	**100.0%**
	Parks/ Greenery	0.8%	18.8%	39.6%	30.7%	0.5%	9.6%	**100.0%**
	Primary Health Care	1.0%	12.2%	26.0%	59.3%	1.0%	0.6%	**100.0%**
	Primary Education	1.0%	6.4%	24.1%	67.3%	1.0%	0.2%	**100.0%**
Urban Services	Power Supply	1.7%	21.4%	21.7%	53.9%	0.8%	0.4%	**100.0%**
	Water Supply	2.8%	25.2%	26.3%	41.2%	0.7%	3.8%	**100.0%**
	Sewage System	0.8%	18.9%	38.6%	37.5%	0.2%	3.9%	**100.0%**
	Telecom	1.0%	12.6%	37.3%	47.3%	0.6%	1.1%	**100.0%**
	Solid Waste Collection	4.2%	33.8%	28.8%	31.8%	0.5%	0.9%	**100.0%**
Access to Services	To Market (Daily Supply)	0.5%	9.1%	18.3%	70.7%	1.1%	0.2%	**100.0%**
	To Health Care	0.8%	11.2%	27.4%	59.4%	0.9%	0.3%	**100.0%**
	To Public Transport	2.8%	23.8%	35.4%	37.2%	0.5%	0.2%	**100.0%**
	To Primary School	0.4%	5.4%	26.1%	67.2%	0.7%	0.2%	**100.0%**
	To Park and Green Space	0.8%	16.4%	40.0%	34.9%	0.3%	7.6%	**100.0%**
	To Entertainment Facilities	0.5%	13.3%	46.2%	34.6%	0.4%	4.9%	**100.0%**
	To Public Administrative Office	0.5%	4.5%	24.1%	67.9%	2.7%	0.3%	**100.0%**

Source: JICA Study Team

According to the results of HIS Question No. 95 (a) 'Location of central urban functions of business and commerce', about 50% of the respondents have selected 'Some of the business and commercial functions will be redistributed to several new sub-centers with high-rise buildings'. Over 50% of the respondents selected 'Building construction (Height, Size, etc.) will be strictly controlled in designated areas such as Shwe Dagon Pagoda surrounding areas' (HIS Question No.95 (b)). And over 70% of the respondents selected 'Road network infrastructure is improved' in HIS Question No.95 (c).

＜Expectations for the Future of Greater Yangon＞

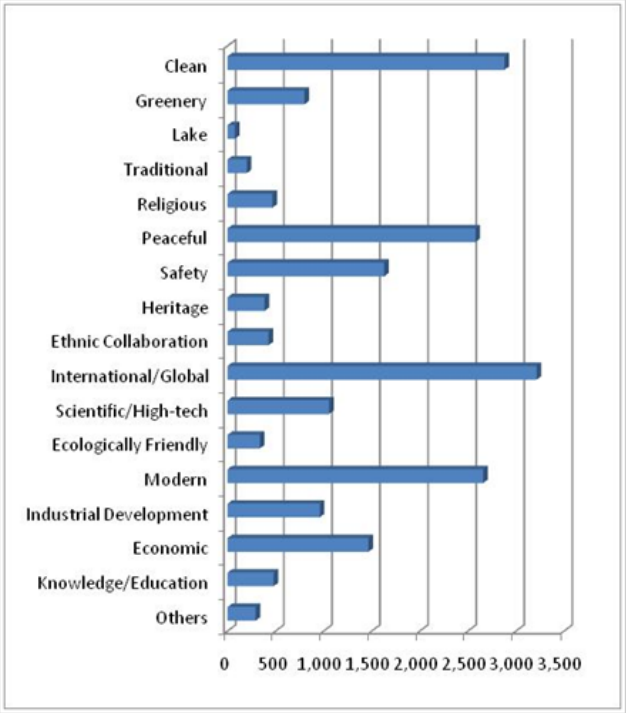
- To be a city with sufficient supply of power and water
  (New power plant and water supply system, etc.);
- To be a city with improvement of solid waste collection
  (Increase of refuse collectors, improvement of the solid waste collection system, etc.);

- To be a city with construction of new roads, road network, and parking spaces (Ring road, new arterial roads, and off-street parking spaces, etc.);
- To be a city with new building lots not submerged under water (Housing land development with retarding basin and development control of retarding basin, etc.);
- To be a city with conservation and activity of heritage and conservation of historical and excellent view with pagoda (settle on Yangon landscape plan and regulation of landscape, etc.);
- To be a city with construction of new sewage system; and
- To be a city with construction of new parks and greenery.

Additionally, according to the results of HIS Question No. 96 'Suitable image for the future of Greater Yangon', more than 2,500 respondents have selected 'International/Global, Clean, Modern and Peaceful'. And further, about 1,000 respondents have selected 'Safety, Economic, and Scientific/High-tech'.

＜Expectations for the Future of Greater Yangon＞

- To be an international and global city (Keywords: foreign businesses, airport, sea port, inter-city cooperation, etc.);
- To be a clean city (waste, water and sewerage, exhaust fumes, renewable energy, etc.);
- To be a modern city (electric train, barrier-free, new buildings, etc.);
- To be a peaceful and safe city (affluent society, safety society, etc.); and
- To be a economic and scientific/high-tech city (foreign businesses, airport, sea port, industrial park, etc.).



Source: JICA Study Team

Figure 3.1.4: Results of HIS Question No. 96

(4) Second Workshop to Discuss Vision by Urban Planning Division, YCDC

Second workshop was held to discuss one slogan based on the development visions among the staff of Urban Planning Division (UPD), YCDC on February 8, 2013.

In the workshop, attendees put ideas out to set one slogan of future image of Greater Yangon based on for pillars of the development visions which has been discussing so far. The followings show the result of the workshop. All ideas were written by the attendees. Based on these ideas, one slogan "Yangon 2040 The Peaceful and Beloved Yangon -A City of Green and Gold-" has been formulated through the discussions.

＜Collected Ideas of one Slogan for the Future of Greater Yangon＞

- Green and Peaceful Yangon Land
- Green city of Golden Land
- Green, Clean and sustainable Yangon
- Green and clean around Yangon City
- Green and peaceful Yangon Land
- To a new Yangon city with green and developed
- Green and Beauty Yangon city
- Try to upgrade the city's landscape into a green and prosperous state
- Yangon steps forward with international development
- "Our Yangon city steps in catch with the Global steps"
- Green Paradise City
- "Internationally comparable is Yangon appearance"
- Peaceful and Pleasant City Yangon is a peaceful and pleasant city to live
- Newly green is Asia, Developed is Yangon areas
- To a green, developed and peaceful Yangon City
- Perfect Beauty Yangon Thee!
- From a freshly green Yangon City to a proudly wealthy nation
- "Let's try and give a hand to become a development and peaceful Yangon City!
- Public satisfies in the future prosperity of the city
- Fresh & Pleasure Yangon Pastures!
- Clean, developed and modernized city
- "Green beauty, Sophisticated progress systematic Yangon's Ethic"
- "To a beautiful and developed Yangon"
- Growth with Standard of living
- Greater Yangon develops with the world for ages!
- "Steps forward with development to beautiful Golden Yangon City!"
- "Development measure Yangon is greater!"
- "Aiming to a perfect development for Yangon City"
- "Let's step forward to a newly developed Yangon City"
- "All round development in Yangon City"
- "Upgraded City"
- Yangon Beauty everlasting long term shinny
- All round progress, Brightly peaceful, Yangon Delightful
- Fashionably developed city is the beauty of the Yangon city!
- Perfect progress Yangon City!
- Well disciplined, modernized developed, stable laws, infrastructure upgraded portrait of the Golden Yangon City!
- "To a fresh developed Yangon City"
- Clear progress, Yangon visual
- Every once year, more peaceful Yangon Region
- "To a developed and progress city"
- Keep the tradition for a green developed Yangon perfection
- "The future Ultimate Yangon"
- Rebirth of Ancient City & Renew of Urbanization
- Modern green in the Nation, Golden brightness in Yangon Region!
- Yangon as the image of a public!
- Neat and tidy freshly Green and prosperously satisfy
- Hub City of Myanmar
- Live & loveable City
- The pleasant City of Asia, Yangon
- "Clean and developed Yangon City"
- "To a clean and developed Yangon
- "Clean, Green, Progress, Better is our Yangon"
- "Grand beauty and clean progressing Yangon City"
- "Internationally developed and peaceful Yangon City"
- Golden Yangon is the best among the Nation's beautiest
- "Grandly developed Yangon City"
- New Version of Greater Yangon
- Modern Beauty, green prosperous, systematically clean is the Golden beauty of the Yangon City!
- "The perfect Golden Yangon"
- "Our golden future with sustainable development measure"
- Golden features green colors, Industrial global roar Clean and progress every grasp Moving forward Yangon steps.
- "Everything is green and updated peacefully quite and upgraded incomparable is Yangon status.
- Stepping forward with the ages develop for the golden city's sake.
- Rainbow flatters for the city greater holding hands together for clear progress of the city better.
- "Good communication well developed, peacefully green, helping hands, the future of the golden Yangon.

(5) Stakeholder Meeting

First stakeholder meeting was held on 18th January 2013 at Meeting Hall of YCDC in order mainly to discuss and build consensus on development visions with a structure plan through selection among alternatives for future Greater Yangon by means of strategic environmental assessment (SEA) procedure. A total of 169 people attended the meeting. In the meeting, the development visions with the structure plan were basically accepted by the attendees as shown in the next page. The details of the stakeholder meeting are mentioned in Chapter 7.

3.1.3 The Development Visions of Greater Yangon for 2040

In consideration of past discussions among YCDC, Ministry of Construction (MOC), and other relevant organizations, and outputs and discussion form the workshops with YCDC, household interview survey and the stakeholder meeting, one slogan and development visions are summarized as follows;

A slogan, "Yangon 2040 The Peaceful and Beloved Yangon –A City of Green and Gold", expresses our goal of urban images which are "Peace" to be achieved by Myanmar democratization and "Beloved Yangon". And the slogan also images rich green of natural environment and lighting gold of Shwe Dagon Pagoda.

Based on the slogan, four pillars of development visions are summarized into four main points: 1) to be an international hub city; 2) to be a comfortable city; 3) to be a well-managed infrastructure city; and 4) to be a city of good-governance.

Source: JICA Study Team

Figure 3.1.5: The Development Visions of Greater Yangon for 2040 (Relational Structure)

The one slogan and four visions are detailed below:

(1) The Peaceful and Beloved Yangon - A City of Green and Gold-

Myanmar's current government led by President Thein Sein is promoting the reforms of democratization and reconciliation with public. In workshop held for making visions, many attendees chose 'peaceful' for key word. According to the result of HIS, , more than 2,000 respondents have selected 'Peaceful' in the question of 'Suitable image for future Yangon'. In future, many respondents of HIS have chose 'Clean, Peaceful, International/Global, and Modern'. Because of this output is that citizens will want to beloved with foreign country's people. And Myanmar has many cultural heritages and nature environments that have high potential for sightseeing resources. It is very important to be loved by foreign tourists. 'Beloved Yangon' is a very precious keyword.

In December 2011, a workshop was held for two days to discuss the Yangon Concept Plan (Vision 2040) participated by YCDC, Department of Human Settlement and Housing Development (DHSHD), and other relevant organizations. And they chose some keywords for future Yangon. 'To be a green and healthy city' is a one of their outputs. And in workshop held for making visions, 'Green and Blue (water) ' is very important keywords for concept. In future, for increasing population, some new districts will be constructed, then the new forests and lakes must be layout with the plan. This keyword 'Green' is very important for future planning. The Gold is a symbol color of Myanmar and Yangon, because of the symbol of Yangon 'Shwe Dagon Pagoda' and 'Sule Pagoda's color. Gold is a happy color of Myanmar's citizen and their hope and dream are symbolized by gold color.

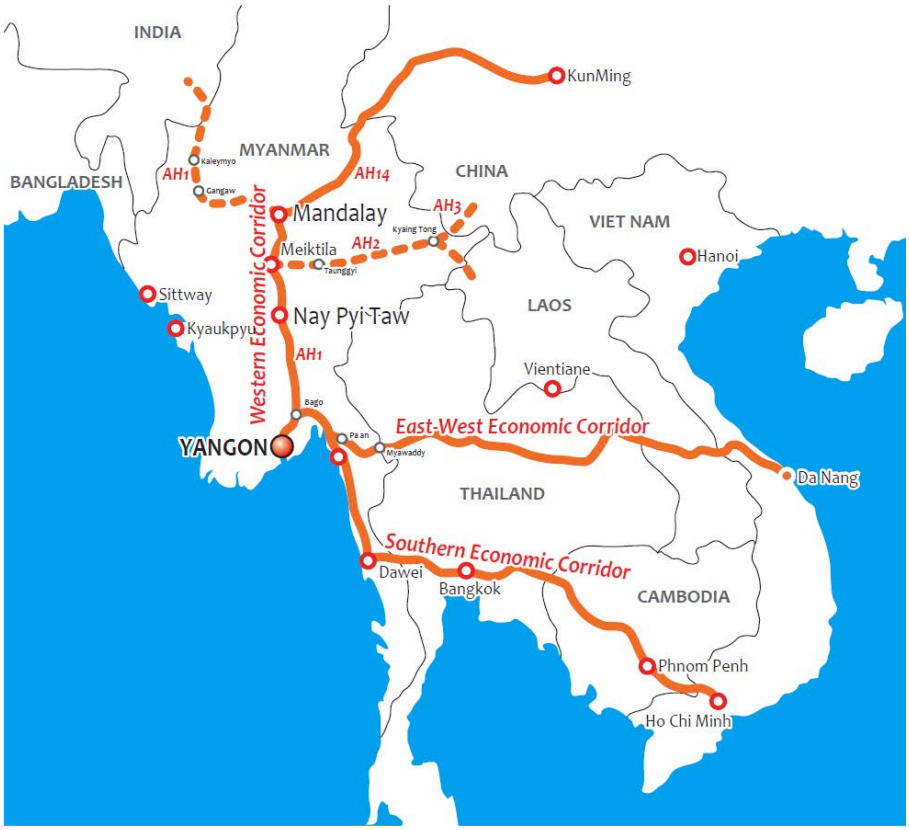
Then Green and Gold will give courage and dream to Yangon's people for developing new city. And 'Peaceful' and 'Beloved' are catchphrases for foreign countries interesting Myanmar or Yangon City.

(2) To be an International Hub City

<Keywords from past discussions>
International Gateway, Economical Development, Employment Opportunity, Center of Nation, Growth Center, Non-traditional Industry, etc.

Yangon is the largest city and an international gateway of Myanmar, which is currently a country with increasing attractiveness and growing world attention. Moreover, Yangon is the focal node city of the Greater Mekong Sub-region (GMS) economic corridors (East-West Economic Corridor, Western Economic Corridor, and Southern Economic Corridor) and Asian highways. To be ready to host the ASEAN summit in 2014 and the planned tariff elimination among ASEAN member nations in 2015, development visions shall be proposed for Yangon to be a HUB city. In addition, it will prepare the city to play an important role in the economic, social, and cultural aspects in consideration of the demarcation of Yangon with the capital city, Nay Pyi Taw.

In the future, Greater Yangon is expected to be an "International Hub City" with attractive and competitive urban functions where more people and companies (businesses) gather from surrounding areas. Also, when goods and people movement becomes freer, the international gateway functions for exports/imports and exchange of knowledge shall be improved, thereby leading to accelerated and sustainable economic development.



Source: JICA Study Team

Figure 3.1.6: Location of Yangon in GMS

Yangon, Nay Pyi Taw, and Mandalay, which are the main cities of the country, will share their respective roles in the future in terms of economics, politics, culture, etc. Yangon will be the city with the largest economy in Myanmar even in the future, and both Yangon and Mandalay will be the gateway and base for tourism. Nay Pyi Taw will have its consolidated function as the capital of Myanmar. These main cities will be connected with highway and railway networks and form the main frame of the nation. According to the results of population projections, Yangon, Mandalay, and Ayeyarwady Region's populations will be over 10 million in 2040. Myanmar union's economics, politics, culture, and agriculture (Ayeyarwady Region) will be developed by increasing population. Dawei Special Economic Zone (SEZ) located in Tanintharyi Region will share the role of the industry. Thilawa and Dawei will be the strong sea ports and industrial zones of the Bay of Bengal. Sagaing, Mandalay Regions, and Kachin State will be developed through mining of mineral resources. Furthermore, Magway Region, Mon, and Shan States will be developed through mining of non-mineral resources. In the future, Kachin and Shan States will be developed into permanent forest estates. In order to create well-balanced development in the whole country, it is very important to construct the highway systems all over the country.

Greater Yangon has been, and will be expected to enhance the central functions of service, trade, and distribution. This means that Greater Yangon will further accommodate the increasing population and employment as the city with the largest economy in Myanmar. Developing the industrial and commercial sectors would need a labor force either by in-migration from other areas or a shift from the agricultural sector to the manufacturing and services sectors in the future.

In pursuit to becoming an international HUB city as one of the development visions for 2040, the development of Thilawa area shall be necessary and significant. Development of a special economic zone and an international port in Thilawa, located in Greater Yangon, shall play an important role as an industrial and logistic core area to accelerate economic growth and industrial promotion for Yangon

and Myanmar. This shall contribute to, not only new job creation but also, economic development by means of attracting advanced manufacturing factories such as motor, electronic, and electrical assembly.

＜Visions and Policies to be proposed in Sectors' Strategies＞

- ✧ Development of Thilawa SEZ and Thilawa Area Port,
- ✧ Vitalization and renewal of CBD, current urban center,
- ✧ Decentralization of urban center's functions by creation of new "Secondary CBD" and "Sub-centers" to avoid over-concentration at the existing CBD,
- ✧ Supply of industrial parks and residences for foreign and domestic investors,
- ✧ Establishment and improvement of law and services for foreign investors,
- ✧ Development of the gateway and main destination of the tourism,
- ✧ Consolidating the urban structure for promoting economic growth with intensive land use and efficient logistics system,
- ✧ Establishment of efficient port terminal operating system,
- ✧ Development of functional road network as urban backbones (logistic routes),
- ✧ Increase people' mobility through the effective public transport system led by the urban mass rapid transit (UMRT), and
- ✧ Establishment of new airport system between Yangon and other cities in Myanmar.

(3) To be a Comfortable City

<Keywords from past discussions>
Living Standard, Health Care, Rich Green, Multiethnic, Knowledge and Education, Heritage and Culture, Disaster Risk Reduction, etc.

Everyone who lives and works in Greater Yangon should be able to enjoy a more comfortable living in consideration of environmental and social aspects. Greater Yangon would be required to provide people and visitors with time and space for relaxation to be accommodated on rich green and water spaces and attractive historical and cultural landscapes.

Greater Yangon is expected to supply of houses more than 1 million units to accommodate the families in 2040. To achieve good living environment, housing supply will be one of the most important measures for Greater Yangon.

Currently, Yangon has 189 registered historical heritage buildings. However, some of these heritage buildings are in decrepit condition without much care and utilization. To be a comfortable city in the future, the characteristics of these historical heritages should be maintained and enhanced further. Greater Yangon also plays the role of an international gateway for visitors to popular domestic tourism destinations such as Bagan, Mandalay, Inle, Pyu heritage, etc. Succession of historical heritages for the future and enhancement of the required functions as an international gateway should be carried forward to the future.

Also, it is necessary to strengthen the function of education and knowledge for improving human resources. Human resources will be a key factor for foreign and domestic investors in making sound

investment decisions to put their businesses in Greater Yangon. Therefore, it is recommended to enhance education and knowledge accumulation.

＜Visions and Policies to be proposed in Sectors' Strategies＞

- ✧ Supply of houses to accommodate the families in 2040,
- ✧ Mitigation of disaster risks,
- ✧ Maintenance of good relations in the community,
- ✧ Provision of equal opportunity of education and healthy and secure living environment,
- ✧ Urban regeneration with utilizing heritage buildings,
- ✧ Improvement of green and water network,
- ✧ Construction of new public parks and open spaces,
- ✧ Provision of potable water to more citizens with appropriate volume, pressure and price,
- ✧ Development of functional road network as urban backbones, and
- ✧ Increase people's mobility through the effective public transport system led by the urban mass rapid transit (UMRT).

(4) To be a Well-Managed Infrastructure City

<Keywords from past discussions>
Transportation and Road, Railway, Port and Logistics, Electricity, Sewerage and Drainage, Water Supply, Solid Waste Management, Telecommunication, etc.

To achieve the vision of becoming an international HUB city, urban infrastructures should be the focal factors. To provide a safer, more reliable, and more convenient urban life and to realize economic development and industrialization, the vision of becoming a "well-managed infrastructure city" must be realized for the future, especially in transportation and road, electricity, and water supply.

For the future of Greater Yangon, the existing transportation system and facilities are inadequate as compared to what they should be. Consequently, it may be necessary to examine how to encourage more commuters to use the existing railway and/or whether to introduce the urban mass rapid transit (UMRT). Regarding electricity, improvement of power supply is one of urgent needs. Power demand is increasing by 7% annually and economic growth is projected to likewise increase by 7% to 10% annually in the current condition. It means that the pace of power demand and supply capacity is nearly equal. In Greater Yangon, which has a share of almost half of the domestic power demand, it is important to draw the appropriate vision and strategies of power supply and transmission for the future. In addition, urban infrastructure (water supply, sewerage, drainage, solid waste, and telecommunication) and social services (education, medical, public facility, and tourism) are in relatively lower level than neighboring countries. In this study, sustainable and reliable infrastructure development visions shall be proposed with consideration on effective O&M.

＜Visions and Policies to be proposed in Sectors' Strategies＞

- ✧ Realization of Environmental friendly and comfortable/ convenient transport system
- ✧ Provision of potable water to more citizens with appropriate volume, pressure and price
- ✧ Creation of clan water environment
- ✧ Realization of stable electrical power supply of high quality and sufficient quantity

- ✧ Creation of a city with a sound material cycle with proper solid waste management
- ✧ Creation of advanced information and communication society

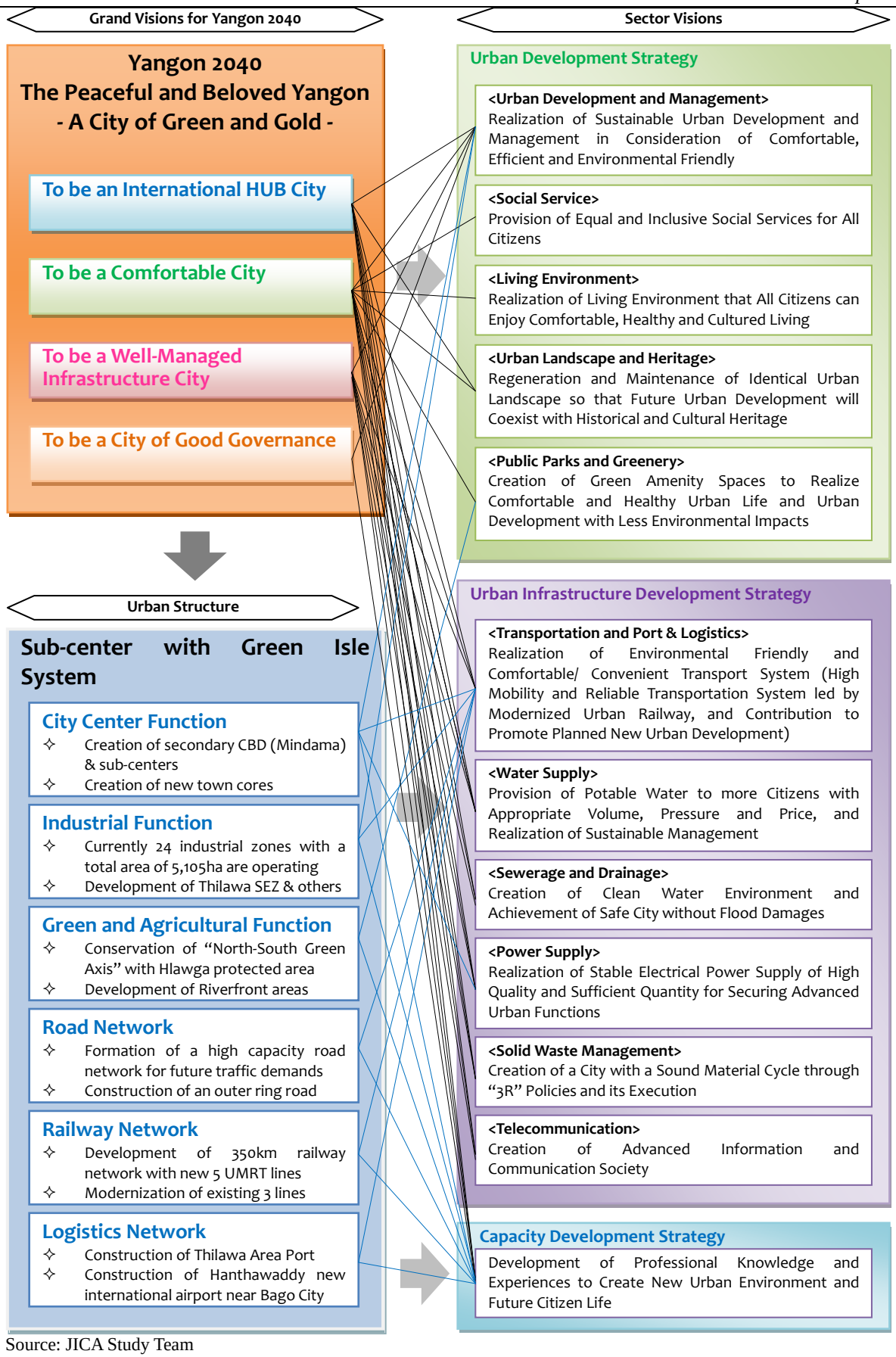
(5) To be a City of Good-Governance

<Keywords from past discussions>
Sustainability, Law, Rule and Regulation, Housing System, Good Governance, Systematic Land-Use, Leader of Nation, Development and Building Control, etc.

To establish a good city both for living and business, good governance is an indispensable key factor. To realize the urban plan to be formulated in this study, it is necessary to establish a system that will control and direct urban development and building constructions based on the land use plan. Since preparation and enactment of new laws take time, the tentatively enacted by-laws of Greater Yangon shall be examined. On the other hand, the necessity of legislating new laws is proposed for this Study.

＜Visions and Policies to be proposed in Sectors' Strategies＞

- ✧ Development of professional knowledge and experiences to create new urban environment and future citizen life
- ✧ Enactment of law, by-laws about urban planning,
- ✧ Ensure budget for construction of urban infrastructures,
- ✧ Enactment of legislation in order to give preferential treatment to foreign companies, and
- ✧ Rules in order to maintain and improve beautiful landscape (heritage) of Greater Yangon.



Source: JICA Study Team

Figure 3.1.7: Relationship of Development Visions and Sector Visions

3.2 Socio-economic Framework

The JICA Study Team established appropriate socio-economic framework in Greater Yangon, the planning area, through the examination of various alternatives for socio-economic development from the viewpoint of different development scenarios.

3.2.1 Demographic Framework

(1) Three Demographic Alternatives for Greater Yangon

In the projection of the future population of Greater Yangon, JICA Study Team prepared three different scenarios using the examples from other Asian cities, e.g., the population growth rate in Bangkok was 2.61% (1975-2000), the rate in Hanoi was 2.75% (1975-2000), and the rate in Jakarta was 3.3% (1975-2000). These scenarios are low, middle, and high population growth scenarios, respectively. The differences of urban growth rates are described in the following table.

Table 3.2.1: Assumption of Future Population Growth Rate

Population Growth Scenario	Assumption of Annual Growth Rate	Remarks
Low Scenario	2.4%	Less than the past trend of YCDC
Middle Scenario	2.6%	Past Trend of YCDC (Bangkok level)
High Scenario	3.3%	Jakarta level

Source: JICA Study Team

Table 3.2.2: Population Growth Rate of Major Cities in Neighboring Countries (1975-2000)

City/Country	Population Growth Rate
Bangkok/ Thailand	2.61%
Hanoi/ Vietnam	2.75%
Jakarta/ Indonesia	3.30%

Source: 'World Urbanization Prospect (The 2001 Revision)', World Bank

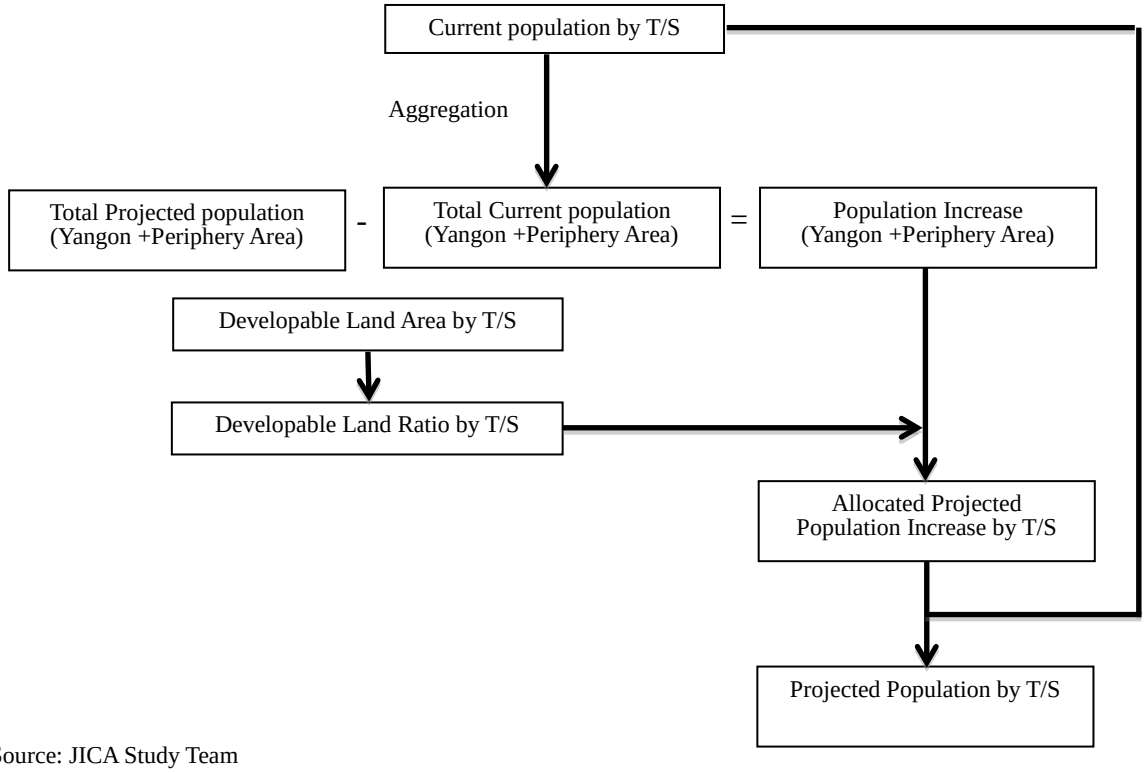
The population volume in Bangkok City was 6.7 million in 2011 while the population in Bangkok Metropolitan Area, consisting of not only Bangkok City but also the suburban area, was estimated to be more than 10 million by the National Economic and Social Development Board (NESDB). Industrial infrastructure in the eastern seaboard region such as road, railway, seaport, industrial port, power, water resource, etc., namely the 'Eastern Seaboard Development Program (ESDP)' has progressed remarkably from the 1980s era to the first half of the 1990s era. At the same period of the progress of ESDP, the rapid rising yen after the Plaza Accord of 1985 has made the Japanese to invest capital intensively in Thailand especially in the eastern seaboard region. Furthermore, the worldwide huge production base has been formed with a central focus on the eastern seaboard region. The appearance of huge production area has brought about absorbing redundant workers in Bangkok City that have moved from the rural areas, and has influenced the formation of Bangkok Metropolitan Area remarkably.

The period from the timing of the rapid rising yen to the present time is about 30 years which is the same as the projection period of the socio-economic framework. Therefore, JICA Study Team assumed that the future socio-economic scenario of Greater Yangon would be comparable to the past trend of the Bangkok Metropolitan Area.

In consideration of the abovementioned circumstances, the 'Middle Scenario' is the recommendable scenario to be adopted for deliberation through consultation with JICA Study Team and YCDC officers.

(2) Methodology of Population Projection

The following figure shows the methodology of population projection in Greater Yangon. The method of population projection by each township in future was to allocate the increment of population growth based on the constitution rate of developable land area by each township.



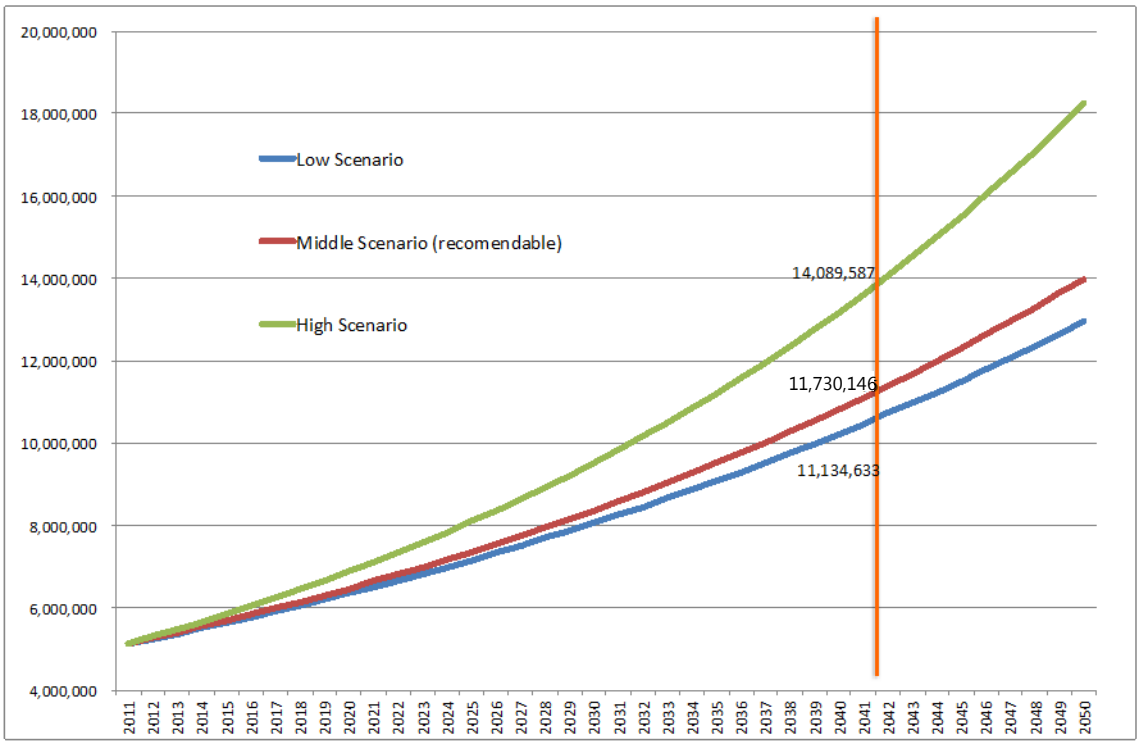
Source: JICA Study Team

Figure 3.2.1: Methodology of Population Projection

(3) Population Projection of Greater Yangon

In this Study, the Planning Area is set as Greater Yangon, which includes the area of Yangon City as well as the additional periphery area of six townships - Kyauktan, Thanlyin, Hlegu, Hmawbi, Htantabin, and Twantay.

The following figure and table show the population projection of Greater Yangon. JICA Study Team selected the 'Middle Scenario' of the three scenarios mentioned above as the recommendable scenario of Greater Yangon. The future population was estimated to be 11.73 million in 2040.

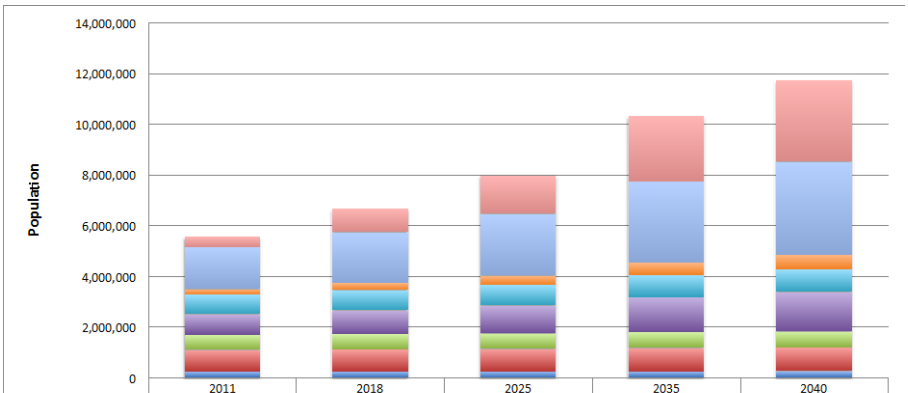


Source: JICA Study Team

Figure 3.2.2: Population Projection in Greater Yangon

(4) Population Allocation for the Township

JICA Study Team reallocated the future population increase into each township in Greater Yangon based on the volume of developable area by township. The developable area consists of improved land, agricultural area, etc. The projected population is shown in the following figure by township groups, e.g., CBD, Inner Urban Ring, Outer Ring, Northern Suburbs, Older Suburbs, South of CBD, New Suburbs, and Periphery Area.



	2011	2018	2025	2035	2040
Periphery Area	430,114	925,343	1,518,047	2,572,677	3,210,619
New Suburbs	1,642,030	2,003,702	2,436,562	3,206,771	3,672,669
South of CBD	219,512	280,948	354,477	485,310	564,451
Older Suburbs	778,156	800,059	826,274	872,919	901,134
Northern Suburbs	805,461	938,484	1,097,689	1,380,971	1,552,328
Outer Ring	596,425	603,370	611,682	626,472	635,418
Inner Urban Ring	848,152	864,179	883,360	917,491	938,136
CBD	252,392	252,926	253,566	254,703	255,391

Source: JICA Study Team

Figure 3.2.3: Population Projection by Township Group

Table 3.2.3: Population Allocation by Each Township

Code	Township Name	Township Group	District	No. of Wards	Area (m2)	Current	Projected					
						2011	2018	2020	2025	2030	2035	2040
1	Latha	CBD	Yangon (West)	10	604,770	34,125	34,125	34,125	34,125	34,125	34,125	34,125
2	Lanmadaw	CBD	Yangon (West)	12	1,310,572	43,137	43,137	43,137	43,137	43,137	43,137	43,137
3	Pabedan	CBD	Yangon (West)	11	618,984	37,551	37,551	37,551	37,551	37,551	37,551	37,551
4	Kyauktada	CBD	Yangon (West)	9	701,876	34,797	34,797	34,797	34,797	34,797	34,797	34,797
5	Botahtaung	CBD	Yangon (East)	10	2,601,921	49,134	49,134	49,134	49,134	49,134	49,134	49,134
6	Pazundaung	CBD	Yangon (East)	9	1,067,498	53,648	54,182	54,353	54,822	55,354	55,959	56,647
			Sub total	61	6,905,623	252,392	252,926	253,097	253,566	254,098	254,703	255,391
7	Ahlone	Inner Urban Ring	Yangon (West)	11	3,380,984	65,510	66,044	66,215	66,684	67,216	67,821	68,509
8	Kyee Myin Daing	Inner Urban Ring	Yangon (West)	22	4,570,110	115,841	121,718	123,600	128,751	134,607	141,265	148,835
9	Sanchaung	Inner Urban Ring	Yangon (West)	18	2,404,656	105,208	105,742	105,913	106,382	106,914	107,519	108,207
10	Dagon	Inner Urban Ring	Yangon (West)	5	4,894,633	24,492	28,766	30,135	33,881	38,140	42,982	48,488
11	Bahan	Inner Urban Ring	Yangon (West)	22	8,474,439	100,695	102,298	102,811	104,216	105,813	107,629	109,693
12	Tarmwe	Inner Urban Ring	Yangon (East)	20	4,985,869	191,114	192,182	192,525	193,461	194,526	195,737	197,113
13	Mingalar Taung Nyunt	Inner Urban Ring	Yangon (East)	20	4,943,032	155,767	157,370	157,883	159,288	160,885	162,701	164,765
14	Seikkan	Inner Urban Ring	Yangon (West)	3	1,174,225	2,241	2,241	2,241	2,241	2,241	2,241	2,241
15	Dawbon	Inner Urban Ring	Yangon (East)	14	3,111,295	87,284	87,818	87,989	88,458	88,990	89,595	90,283
			Sub total	135	37,939,242	848,152	864,179	869,312	883,360	899,332	917,491	938,136
16	Kamaryut	Outer Ring	Yangon (West)	10	6,472,493	87,881	90,552	91,408	93,749	96,411	99,437	102,878
17	Hlaing	Outer Ring	Yangon (West)	16	9,820,283	151,014	153,151	153,835	155,708	157,838	160,259	163,012
18	Yankin	Outer Ring	Yangon (East)	16	4,791,565	125,909	125,909	125,909	125,909	125,909	125,909	125,909
19	Thingangyun	Outer Ring	Yangon (East)	39	13,120,302	231,621	233,758	234,442	236,315	238,445	240,866	243,619
			Sub total	81	34,204,643	596,425	603,370	605,594	611,682	618,603	626,472	635,418
20	Mayangone	Northern Suburbs	Yangon (West)	10	25,834,479	205,403	216,622	220,215	230,049	241,229	253,940	268,392
21	Insein	Northern Suburbs	Yangon (North)	21	31,397,616	311,200	322,953	326,718	337,019	348,732	362,048	377,188
22	Mingalardon	Northern Suburbs	Yangon (North)	32	127,943,855	288,858	398,909	434,158	530,621	640,293	764,983	906,748
			Sub total	63	185,175,949	805,461	938,484	981,091	1,097,689	1,230,254	1,380,971	1,552,328
23	North Okkalapa	Older Suburbs	Yangon (East)	19	27,755,247	333,484	349,511	354,644	368,692	384,664	402,823	423,468
24	South Okkalapa	Older Suburbs	Yangon (East)	13	8,217,705	191,388	192,456	192,799	193,735	194,800	196,011	197,387
25	Thaketa	Older Suburbs	Yangon (East)	19	13,448,713	253,284	258,092	259,632	263,846	268,638	274,086	280,279
			Sub total	51	49,421,665	778,156	800,059	807,075	826,274	848,102	872,919	901,134
26	Dala	South of CBD	Yangon (South)	46	98,400,859	181,087	236,112	253,737	301,968	356,804	419,150	490,032
27	Seikgyikhanaungto	South of CBD	Yangon (South)	9	12,101,872	38,425	44,836	46,889	52,508	58,897	66,160	74,419
			Sub total	55	110,502,731	219,512	280,948	300,626	354,477	415,701	485,310	564,451
28	Shwe Pyi Thar	New Suburbs	Yangon (North)	27	52,706,107	295,993	334,992	347,483	381,666	420,531	464,717	514,954
29	Hlaing Tharyar	New Suburbs	Yangon (North)	29	77,614,147	488,768	533,109	547,311	586,177	630,366	680,605	737,724
30	North Dagon	New Suburbs	Yangon (East)	27	24,177,408	221,200	232,953	236,718	247,019	258,732	272,048	287,188
31	South Dagon	New Suburbs	Yangon (East)	39	37,506,127	370,403	402,457	412,724	440,819	472,763	509,080	550,371
32	East Dagon	New Suburbs	Yangon (East)	60	170,871,278	145,505	330,348	389,553	551,573	735,779	945,210	1,183,320
33	Dagon Seikkan	New Suburbs	Yangon (East)	48	42,035,707	120,161	169,844	185,758	229,306	278,818	335,111	399,111
			Sub total	230	404,910,773	1,642,030	2,003,702	2,119,546	2,436,562	2,796,988	3,206,771	3,672,669
	Yangon City Total			676	829,060,625	5,142,128	5,743,669	5,936,343	6,463,609	7,063,078	7,744,637	8,519,527
34	Kyauktan	Periphery Area	Yangon (South)	13	76,120,987	48,473	67,171	73,160	89,549	108,183	129,368	153,454
35	Thanlyin	Periphery Area	Yangon (South)	36	254,846,226	181,959	371,076	431,650	597,416	785,881	1,000,154	1,243,770
36	Hlegu	Periphery Area	Yangon (North)	14	101,003,839	50,793	136,804	164,353	239,744	325,458	422,910	533,707
37	Hmawbi	Periphery Area	Yangon (North)	18	84,228,570	83,719	167,059	193,752	266,802	349,854	444,280	551,636
38	Htantabin	Periphery Area	Yangon (North)	18	81,770,250	40,234	103,807	124,170	179,893	243,247	315,277	397,170
39	Twantay	Periphery Area	Yangon (South)	10	107,864,054	24,936	79,427	96,881	144,644	198,947	260,687	330,882
	Periphery Township Total			109	705,833,925	430,114	925,343	1,083,966	1,518,047	2,011,571	2,572,677	3,210,619
Greater Yangon Total				785	1,534,894,550	5,572,242	6,669,012	7,020,309	7,981,656	9,074,649	10,317,314	11,730,146

Source: JICA Study Team (2011 data in above table was estimated by the JICA Study Team based on YCDC)

(5) Labor Force

Based on the population projection in the previous section, the number of working population or Economically Active Population (EPA) (hereinafter referred to as Labor Force) for each alternative has been estimated under certain assumptions described as follows:

(i) Low Case: corresponding to the middle scenario of the population as the recommendable case, and calculated under an assumption that the labor participation rate (defined as proportion of labor force to the total population) will be constant due to limited economic development and industrialization in Greater Yangon;

(ii) Middle Case: corresponding to the middle scenario of the population as the recommendable case, and calculated under the assumption that the labor participation rate will increase due to industrial development in Greater Yangon; and

(iii) High Case: corresponding to the middle scenario of the population as the recommendable case, and calculated under the assumption that the labor participation rate will increase due to industrial development and unemployment relief project, e.g., public project, job training, establishment of unemployment office, etc., in Greater Yangon. At the same time social cost, e.g., traffic congestion, uprush of living cost, rise of high-crime areas, etc., would emerge as well as excessive economic growth.

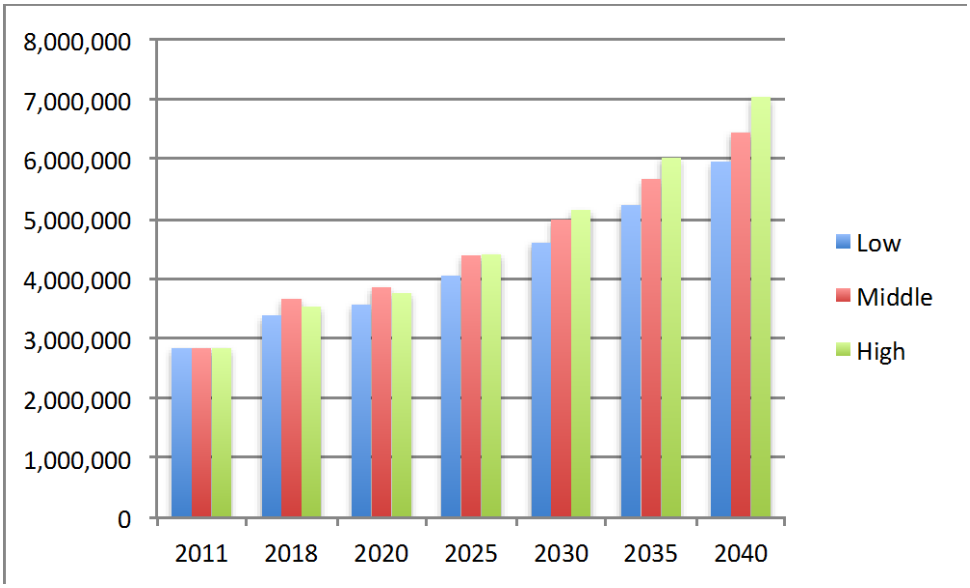
The following table shows the population and labor force projection in three different alternatives. The labor participation rate (proportion of labor force to the total population) was recorded at 50.8% in 2011. JICA Study Team assumes that the labor participation rate would be 50.8% in the low case throughout the term, and will improve gradually from 50.8% in 2011 to 55.0% in 2040 in the middle case, and from 50.8% in 2011 to 60.0% in 2040 in the high case. As a result, the labor force will be 5.96 million people in 2040 in the low case, 6.45 million people in the middle case, and 7.04 million people in the high case. The 'Middle Case' is recommendable to be adopted based on the consultation between JICA Study Team and YCDC officers.

The following figure shows the projection of labor force in three alternatives.

Table 3.2.4: Labor Force in Three Alternatives (Unit: Person)

Year	Low Case	Middle Case	High Case	Remarks
2011	2,845,557	2,845,557	2,845,557	Actual
2018	3,387,858	3,667,957	3,535,956	Projected
2020	3,566,317	3,861,170	3,766,759	
2025	4,054,681	4,389,911	4,409,177	
2030	4,609,922	4,991,057	5,156,904	
2035	5,241,195	5,674,522	6,026,734	
2040	5,958,914	6,451,581	7,038,088	

Source: JICA Study Team



Source: JICA Study Team

Figure 3.2.4: Labor Force Projection in Greater Yangon

(6) Labor Force Allocation by Industrial Category

Table 3.2.5 shows the Labor Force projection by industrial category. JICA Study Team selects the 'Middle Scenario' mentioned above as the recommendable scenario. JICA Study Team divided the future labor force volume into industrial category based on the present pattern in 2011. The table provided some implications of Greater Yangon in the future as follows:

- The fact that the share of primary industries rose from 1.9% in 2011 to 3.7% in 2040 could be interpreted that the demand for high value-added suburban agriculture might be raised due to the increase in the wealthy class population in Greater Yangon in the future in spite of the decrease in agricultural area;

- Currently, huge unused industrial land in Greater Yangon is retained, and the fact that the share of secondary industries also rose from 7.3% in 2011 to 11.8% in 2040 could be interpreted that the unused industrial area will be used due to the development of industrial infrastructure, e.g., railway, road, power, water supply and so on; and

- The fact that the labor force share of 'New Suburbs' and 'Periphery Area' as suburban zone in Greater Yangon would increase drastically it could be interpreted that the upper income group would increase particularly in the central part of Greater Yangon, meanwhile, the other groups would be distributed in the suburb area of Greater Yangon.

Table 3.2.5: Labor Force Allocation by Township Group

Township Group	Labor Force in 2011 by Industrial Category				Labor Force in 2040 by Industrial Category			
	Total	Primary	Secondary	Tertiary	Total	Primary	Secondary	Tertiary
CBD	119,573	0	8,400	111,173	140,465	0	8,932	131,533
Inner Urban Ring	653,564	789	17,359	635,416	784,877	1,338	22,674	760,865
Outer Ring	270,473	5,714	1,677	263,082	349,480	6,261	2,977	340,242
Northern Suburbs	375,366	1,011	18,043	356,312	852,131	3,743	80,044	768,344
Older Suburbs	587,241	538	41,770	544,933	498,923	418	31,639	466,866
South of CBD	85,932	386	2,556	82,990	293,951	1,213	8,512	284,226
New Suburbs	597,025	36,437	93,605	466,983	1,759,314	117,858	329,348	1,312,109
Periphery Area	156,385	9,544	24,519	122,322	1,772,439	108,174	277,892	1,386,373
Total	2,845,557	54,419	207,928	2,583,209	6,451,581	239,005	762,018	5,450,558
Structural Ratio	100.0%	1.9%	7.3%	90.8%	100.0%	3.7%	11.8%	84.5%

Source: JICA Study Team estimated based on labor force data from General Administration Department of the Yangon Region Parliament.

3.2.2 Economic Framework

In this sub-section, JICA Study Team examines the future gross regional domestic products (GRDP) and GRDP per capita corresponding to the three scenarios as economic framework.

Bangkok is one of the major cities in the GMS countries, and the population in Bangkok City was 6.87 million in 2011, while the population in Bangkok Metropolitan Area was estimated to be more than 10 million in 2011 according to the National Statistical Office of Thailand.

Table 3.2.6: Population in the Major Cities in GMSs

City/ Country	Year	Population (million)	Source
Yangon/ Myanmar	2011	5.14	Yangon City
	2040	10.82	'Middle Scenario' estimated by the JICA Study Team
Bangkok/ Thailand	2011	6.73	National Statistical Office of Thailand
Hanoi/ Vietnam	2009	6.45	JETRO
Ho Chi Minh/ Vietnam	2009	7.12	JETRO

Source: JICA Study Team

JICA Study Team assumes that the GRDP per capita in Greater Yangon would reach the current Thailand level in 2040 in the low case, in 2035 in the middle case, and in 2030 in the high case. As a result, GRDP in Greater Yangon will be US$ 111,436 million in 2040 in the low case, US$ 122,330 million in 2040 in the middle case, and US$ 141,004 million in 2040 in the high case.

The assumption of economic growth from 2011 to 2016 is subject to the 5th National 5-year Plan (Planning Department Yangon Regional Office). And the growth rate of GRDP per capita is supposed to slow down to half of the past rate in each scenario after reaching the level of the whole Thailand.[1]

Japanese industry centering on machinery and transport equipment has grown increasingly global and borderless owing it to the shift of production to overseas locations in response to the appreciation of the yen after the Plaza Accord on exchange rate in 1985. Thailand is the biggest country to take over the Japanese industry in the world, and the Japanese industry lead Thailand's economy to grow sustainably. It takes roughly 25 years to carry out the current level of the economy in Thailand.

The '5th National 5 Year Plan (2011/12 to 2015/16)' made by the Planning Department of Yangon Region Office, MNPED, has the future GRDP constitution projection by industrial categories, manufacturing sector, service sector, and trade sector, and only the GRDP share of the manufacturing sector was projected to increase.

The industrial constitution of Yangon City is supposed to differ from the Yangon Region because the location of Yangon City is in the center of the Yangon Region. However, the industrial core in Yangon City in the future would be the manufacturing, service, and trade sectors.

There are many issues that make an interception to realize sustainable economic growth. Issues that need to be overcome are expensive land rent, utilization of human resource development, and industrial infrastructure; e.g., power supply, water supply, transportation, etc.

Industrial infrastructure and human resource development is projected to proceed robustly with the support from donors. Meanwhile, the issue of expensive land rent might be affected by supply quantity of the number of hotel/accommodation by private and land policy by the National Government.

'Middle Case' is recommendable to be adopted for the result of deliberation through consultation with the JICA Study Team and YCDC officers.

Table 3.2.7: GRDP per Capita in Three Alternatives

City/ Country	Year	GRDP/CAPITA (US$)	Average Annual Growth Rate of GRDP/CAPITA (%)	Remarks
Yangon	2011	1,465	-	Planning Department, Yangon Office, MNPED, Exchange rate: 856.5 (MMK/US$) (October 2012)
(Low Case)	2040	9,500	6.7	The GRDP per capita in Yangon would be accomplished in 2040.
(Middle Case)	2035	9,500	8.1	The GRDP per capita in Yangon would be accomplished in 2035, and after year 2036 the growth rate will slow down by half of the past rate.
(High Case)	2030	9,500	10.3	The GRDP per capita in Yangon would be accomplished in 2030 and after year 2031 the growth rate will slow down by half of the past rate.
Thailand	2011	9,500	-	CIA Factbook, PPP basis

Source: JICA Study Team

[1] In general, developed country is defined by GDP per capita that is over USD 10,000 annually. The GDP per capita in whole of Thailand in 2011 was 9500 according to CIA Factbook, and the Thailand's level of GDP per capita is just below the level of developed countries. The JICA Study Team assumed that the path of economic growth of Yangon City would fit a 'logistics growth curve' whose feature consists of two phases; one phase is to increase rapidly, and another phase is to increase gradually. The JICA Study Team set that GRDP per capita of Yangon would change the speed of economic growth to be slow after the achievement of the level of Thailand.

Table 3.2.8: GRDP and GRDP/CAPITA in Three Alternatives

Year	Low Case		Middle Case		High Case		Remarks
	GRDP (US$ Mil.)	GRDP/CAP (US$)	GRDP (US$ Mil.)	GRDP/CAP (US$)	GRDP (US$ Mil.)	GRDP/CAP (US$)	
2011	8,165	1,465	8,165	1,465	8,165	1,465	Actual
2018	20,209	3,030	21,241	3,185	23,011	3,450	Projected
2020	25,402	3,618	27,576	3,928	31,301	4,459	
2025	40,617	5,089	46,176	5,785	55,707	6,979	
2030	59,523	6,559	69,354	7,643	86,209	9,500	
2035	82,844	8,030	98,014	9,500	111,018	10,760	
2040	111,436	9,500	122,330	10,429	141,004	12,021	

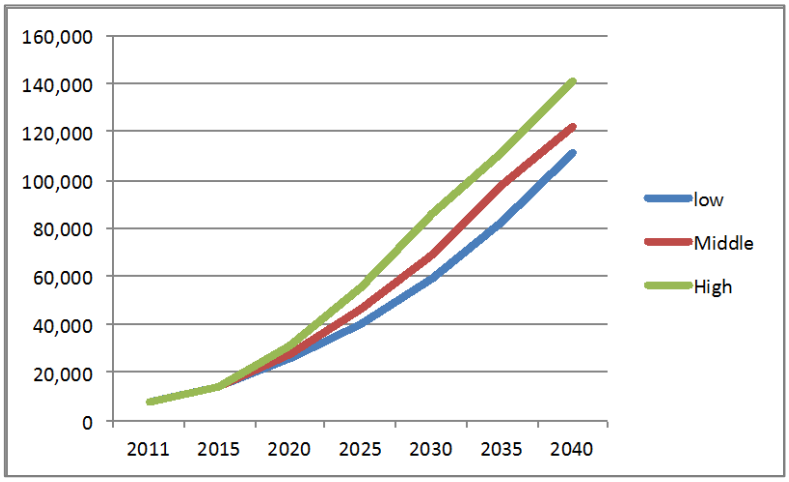
Source: JICA Study Team (2011 data in above table is estimated by the JICA Study Team based on YCDC)

Table 3.2.9: Average Annual Growth Rate of GRDP and GRDP per Capita in Three Alternatives

	GRDP	GRDP per Capita	Remarks
Low Case	8.8%	6.1%	Period covered is from 2012 to 2040
Middle Case	9.2%	6.5%	Period covered is from 2012 to 2040
High Case	9.7%	7.0%	Period covered is from 2012 to 2040

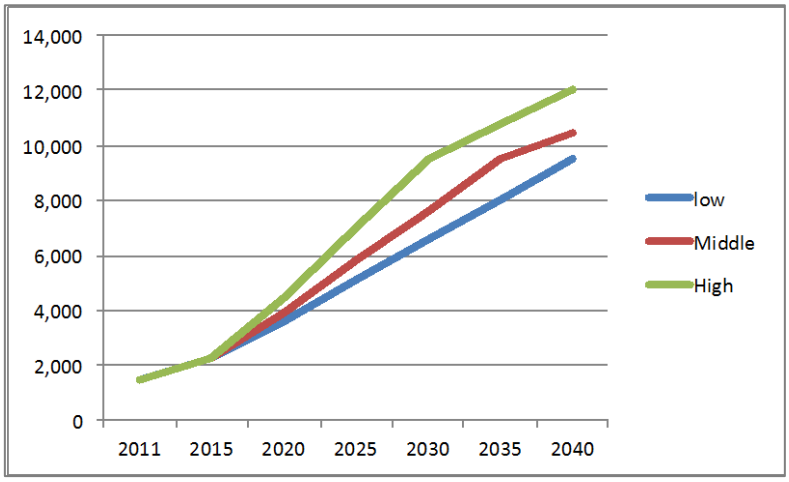
Source: JICA Study Team

The following figures show the projection of GRDP and GRDP per capita in three alternatives in Greater Yangon.



Source: JICA Study Team

Figure 3.2.5: GRDP Projection of Greater Yangon (Unit: US$ million)



Source: JICA Study Team

Figure 3.2.6: GRDP per Capita Projection of Greater Yangon (Unit: US$)

3.3 Economic Development Strategy

Greater Yangon has been, and will certainly be, playing the role as an engine for economic growth in Myanmar. The economic growth in the Yangon Region was projected at an average rate of 8.5% p.a. during the five-year period from 2011-2012 to 2015-2016.

In addition, the following subsection describes the basic development strategies for manufacturing, commerce, and service sectors that have been formulated to deal with the actual problems faced by business establishments in Greater Yangon.

3.3.1 Five-Year Economic Development Plan in Yangon Region

Table 3.3.1 shows the projected economic growth in Yangon Region during the five-year period from 2011-2012 to 2015-2016. This may have been prepared as basic data for the Fifth National 5-year Development Plan[1] by the Planning Department of the Yangon Regional Office, Ministry of National Planning and Economic Development (MNPED).

The projected economic growth was 8.5% p.a. on average for five years. The manufacturing sector was projected to grow at a high rate of 11.1% p.a.

Table 3.3.1: Projected Economic Growth in the Yangon Region (from 2011-12 to 2015-16)

Unit: MMK million

Sector	2010-2011 (Base)	2011-2012		2015-2016		Annual Av. Growth Rate (%)
	Value	Value	Growth Rate (%)	Value	Growth Rate (%)	
Production Value	4,498,448	4,886,051	8.6	7,222,445	11.4	9.9
Agriculture	367,616	368,015	0.1	402,835	1.7	1.8
Livestock and Fishery	314,059	318,027	1.3	457,960	8.1	7.8
Forestry	1,888	1,355	-28.2	1,414	1.3	-4.8
Energy	22					
Mining	18,915	19,656	3.9	10,795	7.9	-7.7
Process and Manufacturing	3,246,235	3,590,659	10.6	5,484,946	11.7	11.1
Electric Power	92,661	102,709	10.8	149,936	7.0	10.1
Construction	457,051	485,631	6.3	714,560	18.5	9.3
Services Value	2,089,474	2,174,864	4.1	3,043,124	8.0	7.8
Transportation	1,504,852	1,606,736	6.8	1,805,118	2.2	3.7
Communications	137,563	139,977	1.8	651,602	29.3	39.7
Financial Institution	18,560	12,160	-34.5	19,170	10.3	3.0
Social and Administrative Service	327,019	289,506	-11.5	360,717	7.0	2.0
Rental and Other services	109,479	126,485	15.5	206,517	7.2	13.5
Trade Value	2,230,423	2,446,605	9.7	2,985,778	6.5	6.0
Net Production Value	8,818,345	9,507,520	7.8	13,251,347	9.5	8.5

Source: JICA Study Team based on the projection of the 5th National 5-year Development Plan (from 2011-2012 to 2015-2016) made by the Planning Department of the Yangon Regional Office, MNPED

As described in Section 2.1.2, the industrial structure of Yangon Region has a high percentage of manufacturing, service, and trade sectors. Table 3.3.2 summarizes the projected growth rates and changes in the industrial structure of these sectors. A high growth rate (11.1% p.a.) is expected in the manufacturing sector. Due to this growth, it is projected that the industrial structure will further concentrate on manufacturing at 41.4%, services at 23.0%, and trade sectors at 22.5%.

[1] 5th National 5-year Development Plan has not been obtained yet.

Table 3.3.2: Projected Growth Rate and Industrial Structure Change in the Three Major Sectors

Sector	Annual Average Growth Rate (% p.a.)	Industrial Structure (Net Production Value Basis) (%)	
		In the Year 2010-2011	In the Year 2015-2016
1. Manufacturing	**11.1**	**36.8**	**41.4**
2. Service	**7.8**	**23.7**	**23.0**
(1) Transportation	3.7	17.1	13.6
(2) Communications	39.7	1.6	4.9
(3) Financial Institution	3.0	0.1	0.2
(4) Social and Admin. Service	2.0	3.7	2.7
(5) Rental and Other Services	13.5	1.2	1.6
3. Trade	**6.0**	**25.3**	**22.5**
Total of Three Major Sectors		85.8	86.9

Source: JICA Study Team based on the projection of the 5th National 5-year Development Plan (from 2011-2012 to 2015-2016) made by the Planning Department of the Yangon Regional Office, MNPED

3.3.2 Basic Development Strategy for the Manufacturing Sector

The basic development strategy for the manufacturing sector consists of three pillars: (i) improvement of foreign investment climate; (ii) strengthening of domestic industry, including small and medium enterprises (SME); and (iii) improvement of industrial zones.

(1) Improvement of Foreign Investment Climate

1) Background

With the increase in foreign investors' interests due to the relaxation and gradual lifting of economic sanctions, it is necessary to improve the investment climate for foreign investment in Yangon City as well as in the whole country. It is suggested that the following measures be taken for that effect.

2) Institutional Measures

- To improve investment climates by executing the amended Foreign Investment Law;
- To set up the office of the Directorate of Investment and Company Administration (DICA) and one-stop service unit in Yangon City to shorten the processing period and approval of the applications of foreign investors; and
- To amend the SEZ law and to lay down rules and regulations to encourage foreign companies to invest in Thilawa SEZ in Greater Yangon.

3) Development of Infrastructure and Facilities

- To develop Thilawa SEZ so that foreign companies would invest. Foreign investors are anxious to see the completion of the Thilawa SEZ project because they are experiencing difficulty in obtaining appropriate industrial lands with good access to infrastructure and services in Greater Yangon. The Thilawa SEZ project is discussed in Section 2.4 of this report;
- To set up an organization for the implementation of the Thilawa SEZ project and its operation and maintenance; and
- To develop external infrastructure in parallel to the Thilawa SEZ project.

(2) Strengthening of the Domestic Industry, including SMEs

1) Background

Yangon City is leaning heavily towards an industry that is concentrated on the manufacturing sector such as the manufacture of food, fabricated metal products, rubber and plastic products, wearing apparel, wood and wood products, basic metal, and repair and installation of machinery and equipment.

However, the business environment of Myanmar's manufacturing sector is not in a stable condition. A lot of factories have closed in the existing industrial zones in Yangon City. Most of them have closed their doors following profit losses due to a sudden downturn in product demand and/or higher costs of raw materials, fuel, shipping, land rental, etc.

With the relaxation and gradual lifting of economic sanctions and progress in the reduction and elimination of tariffs among ASEAN countries after 2015, competition among foreign companies is expected to increase. Under such situation, the existing domestic industries are seeking for survival.

They have difficulty in acquiring advanced technology to participate in new businesses and employment of skilled labors. Small and medium enterprises (SME) with less than 50 employees account for nearly 80% of the number of manufacturing industry enterprises, according to the Business Establishment Survey. It is particularly necessary to extend measures to enforce SMEs that have weak business structure.

2) Measures to be taken

It is recommended to conduct an industrial development study in Greater Yangon in order to formulate strategies to strengthen the domestic manufacturing sector. It is likely to include the following tasks:

- To conduct a field survey of approximately 100 factories in the various subsectors such as food processing, garment, wood processing, machinery, metal working, electrical, and electronic industries in order to identify their problems;
- To analyze the problems for each subsector;
- To formulate strategies to strengthen each subsector; and
- To propose projects and programs to realize the strategies.

(3) Improvement of Industrial Zones

1) Background

- A large part of the industrial land in the existing industrial zones is left unused. Some land-use right owners merely bought the industrial land as an investment and are waiting for land price increases. They did not comply with the regulation that factories should be built within a specified duration. The Government has not yet developed a mechanism that will promote the sale and purchase of the rights to use and access unused land. Therefore, investors who are really in need of the appropriate land to build their own factories are having difficulty in purchasing the rights to use the unused land at a reasonable price.

- No matter how many industrial zones are developed, without an established mechanism, Greater Yangon will always be in short supply of industrial land. On the premise that such mechanism would be created, a structure plan for Greater Yangon is being worked out as discussed in Section 3.4.

- The existing industrial zones have problems with infrastructure as shown in Section 2.1.3. These problems disrupt factory operations and reduce productivity. The industrial zones need stable power supply and enough YCDC pipe water supply. They also need to improve or adequately maintain the road and drainage system inside the industrial zones. Recently, YCDC issued a directive that requires the investors to install wastewater treatment facilities. Despite this, only a small number of factories have followed the directive. The government should support the upgrading of infrastructure in the industrial zones as necessary.

- Solid waste collection is usually arranged by the management committee of industrial zones and fees are borne by factories. This often imposes a heavy burden on the factories. The industrial zone's management committee has appealed to YCDC for support on solid waste collection. Factories sometimes object to bear the costs of solid waste collection and end up throwing the garbage out of the industrial zones. It is necessary for YCDC to support solid waste collection as well as strengthen the control over illegal dumping of wastes.

2) Measures to be taken

The government needs to take measures to increase transparency in industrial land transactions.

YCDC needs to support the solid waste collection from industrial zones. At the same time, people need to follow the rules and regulations on waste disposal.

It is recommended that a study on efficiency upgrading of industrial zones be conducted in Greater Yangon in order to formulate and realize strategies to: (i) promote sales and purchase of rights to use unused land, (ii) upgrade infrastructure, and (iii) improve operation and maintenance.

- To set up an executive committee that will have the authority to settle problems within the industrial zones in Greater Yangon;

- To conduct a field survey on existing industrial zones that have already been developed or are being developed to find out specific problems on infrastructure and operations and maintenance system;

- To prepare draft strategies for each industrial zone;

- To exchange views with various stakeholders as regards to the draft strategies for each industrial zone such as management committee, owners of land use right, developers, potential purchasers and YCDC;

- To finalize strategies for each industrial zone;

- To formulate projects and programs to realize the strategies; and

- To select a priority project to conduct a preliminary feasibility study.

3.3.3 Basic Development Strategy for the Commerce Sector

The basic development strategy for the traditional markets and modern commerce sector is described separately in this section. The traditional markets mean municipal markets, which carry on business for daily life of citizens from the past. Modern commerce sector means the new style shops such as shopping complex, supermarkets and convenience stores, which are gradually increasing after the year 2000.

(1) Basic Development Strategy for the Traditional Markets

1) Background

- In Yangon City, there are about 170 traditional markets of varying sizes that are supervised by YCDC. In addition, there are a lot of traditional markets in the neighboring townships of Greater Yangon supervised by the Ministry for the Progress of the Border Areas and National Races Development Affairs. A lot of retail shops gather within these traditional markets to sell meat, fish, vegetables, dried foods, flowers, pet food, household goods, clothing, etc. They contribute to the lives of residents visiting these traditional markets.
- Problems and issues facing the traditional markets and retail shops differ according to their location. There appears to have strong competition with supermarkets in some locations, or are prone to natural disaster in other locations. Retail shops in the markets appear to have problems on high transportation costs in some cases. Garbage are dumped on open land near the market area, however, there are also some markets in other places that are kept clean.
- Recently, traffic is getting heavy. Delays in the transportation of commodities due to traffic congestions are hindrances of trade flows and the cause of high transport costs.

2) Measures to be taken

- The location of a traditional market is mostly determined by government directive. YCDC and/or the Ministry for the Progress of the Border Areas and National Races Development Affairs need to formulate location planning of new traditional markets based on changes in population distribution in the long-term.
- YCDC needs to take measures to reduce traffic congestions.
- Regular inspection of cleanness is necessary for traditional markets and its adjoining areas.

(2) Basic Development Strategy for the Modern Commerce Sector

1) Background

- The number of business establishments in the modern commerce sector has greatly increased in recent years. It includes 1) large shopping complexes such as Ocean Super Center, Super One Shopping Center, Junction Center, and Capital Shopping Mall, 2) supermarkets such as City Mart, Orange, and Victoria, and 3) convenience stores such as 108 Shop. According to the Business Establishment Survey (BES), about 70% of business establishments in the modern commerce sector were founded after 2000 and

about 40% were founded after 2010. In addition, most of these companies have business expansion plans.

- Traffic congestion may obstruct customer's access to the modern establishments.
- Frequent power blackouts increase fuel consumption costs for standby generators.
- Under an upward trend, the business establishments are facing problems on skilled labor shortages and strong competition. For labor recruitment, they rely more on printed media such as newspapers and magazines and recruitment agencies than other sectors. They tend to put emphasis on employee training. BES revealed that about 85% of establishments are training employees with their own programs and more than 30% of establishments are outsourcing employee training programs to schools.

2) Measures to be taken

- Modern commercial companies need to work out their business expansion plans based on the analysis of geographical distribution of potential customers and competitors' trend.
- YCDC needs to take measures to reduce traffic congestion. Modern commerce establishments need to provide enough parking space for customers. Otherwise, modern commerce establishments in the congested area may lose their customers.
- The government needs to take measures to improve power supply.
- Under an upward trend, the modern commerce sector would continue to have problems on skilled labor shortages and employee training. They need to continue to take measures to solve these problems.

3.3.4 Basic Development Strategy for the Service Sector

The basic development strategy for the service sector such as hotel, restaurant, bank, amusement, etc is described as follows.

(1) Background

- The number of business establishments in the service sector has increased in recent years. According to BES, more than 60% of business establishments in the service sector were founded after 2000 and more than half of those establishments had business expansion plans.
- Business establishments in the service sector commonly face problems of strong business competition and skilled labor shortages just like in the modern commerce sector. In addition, a lot of hotels responded in the BES that frequent power supply shortages is a problem. and the amusement industry responded that high fuel costs for standby generators is also a problem.
- Banks are competing only against other domestic banks at present. However, they may begin to compete with foreign banks in 2015, when foreign banks will be allowed to operate or trade in Myanmar.

(2) Measures to be taken

- Employees who can provide high-quality service is necessary to be competitive in the service sector. Comfortable hotel always provides high-quality service to guests. Therefore, they have to continue to address the issue on skilled labor employment and

employee training. Banks require skilled labor and employee training, since they have to run new types of financing services.

- With a significant increase in foreign guests, a lot of hotels have raised the room rates in Yangon City in recent years. Even the medium and economy classes of hotels have raised the room rates even it is beyond the quality of service. Under conditions of keen business competition, they cannot compete unless they reduce the room rates and/or increase the quality of service to match the high charges. In this way, it is expected that strong business competition will have a positive impact on customers by improving the quality of service and/or by bringing the rates down to a reasonable level.

- It is expected that a stock exchange market will be established in Yangon City possibly with a support from the Tokyo Stock Exchange and Daiwa Institute of Research. Listing on a stock exchange market increases the capacity of the registered companies to raise funds. The government should continue to deregulate financial market. At the same time, the government should also support domestic banks to be able to compete with the forthcoming strong foreign banks.

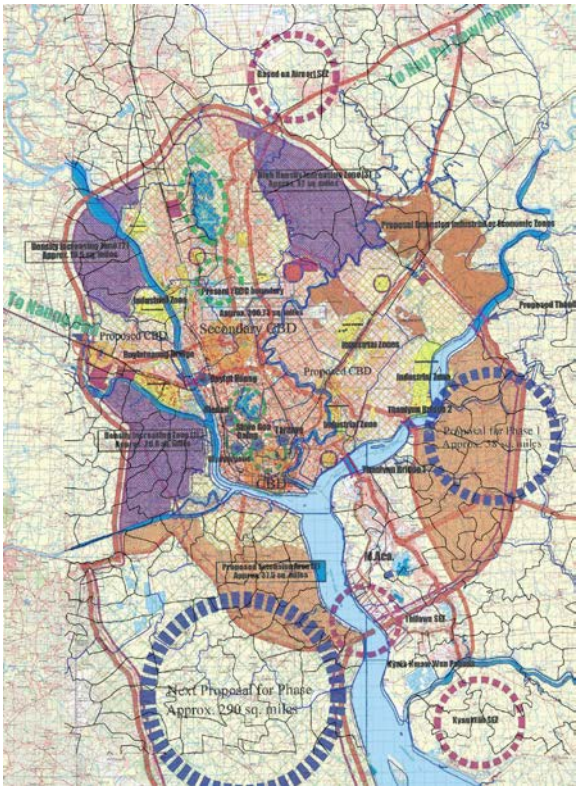
3.4 Structure Plan for Greater Yangon

3.4.1 Review of Existing Conceptual Plans

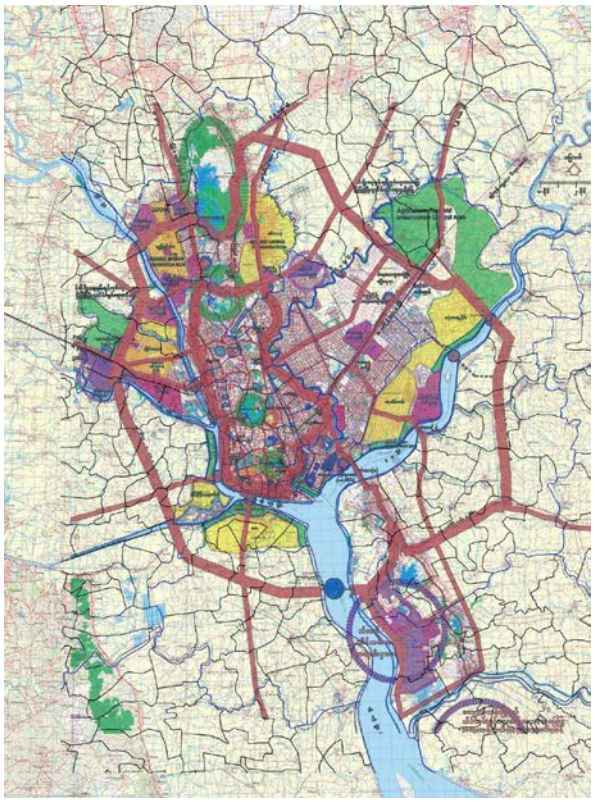
(1) Overview

Prior to the examination and discussion of a desirable structure plan in this Study, it is necessary to undertake a review of the existing conceptual plans. In December 2011, a workshop was held for two days to discuss the Yangon Concept Plan (Vision 2040). This workshop was participated in by YCDC, Department of Human Settlement and Housing Development (Ministry of Construction), and other relevant organizations. Before and after this meeting, both YCDC and MOC tried formulating their own conceptual plans respectively. The "Yangon City Development Conceptual Plan", which includes the conceptual plan as shown at the left side of Figure 3.4.1, was drawn by YCDC and reportedly approved in the "Planning Commission Meeting" attended by the President and the Union Ministers on 14th August 2012. On the other hand, MOC also made the conceptual plan as shown at the right side of Figure 3.4.1. Each drawing seems to resemble the other, especially from the viewpoints of future urbanization volume in size and introduction of an outer ring road. On the other hand, there are some different points between the two drawings such as the presence or absence of an inner ring road and the next CBD areas. The YCDC plan has a secondary CBD at the Mindama area, but it does not have an inner ring road. Detailed comparisons are discussed in the next page.

In line with these past examinations, a structure plan will be formulated in this Study through discussions in the Steering Committee, and other opportunities.



YCDC Conceptual Plan



MOC Conceptual Plan

Source: JICA Study Team based on the YCDC and MOC conceptual plans

Figure 3.4.1: Review of Existing Conceptual Plans

(2) Comparison of the Two Plans

In order to integrate the two plans into one in the Study, these were compared from the viewpoints of their characteristics and highlighting their good points, as shown in Table 3.4.1.

Table 3.4.1: Comparison of Alternatives

Items		YCDC Concept Plan	MOC Concept Plan
Urban Area	Size of Urban Area	Size of urban area of YCDC plan is much larger than that of MOC, especially the next proposal in the Dala area which has an area of approximately 290 mi^2.	MOC's plan seems to aim for a more compact city than YCDC's.
	New Center City	The YCDC plan proposed to create one "Secondary CBD" at Mindama, and two "Proposed CBDs" at Dagon Myothit and Hlaing Tharya.	The MOC plan proposed to create five "Sub-CBDs" at Mindama, East Dagon, Hlaing Tharya, Shwe Pyi Tar, and Mingaradon.
	Industrial Zone	The YCDC plan proposed several "Special Economic Zones", namely Thilawa SEZ, Kyauktan SEZ, and Airport SEZ. Additionally, in East Dagon, an industrial or economic zone extension was proposed. Five existing industrial zones were designated at around 10-20 km distance from the city center.	The MOC plan seems to have about ten existing industrial zones except Thilawa SEZ.
Road and Transportation	Inner Ring Road	The YCDC plan does not have an inner ring road.	The MOC plan proposed to create an inner ring road, making good use of existing roads such as Thanthumar Road, CBD Road, and Bayint Haung Road.
	Outer Ring Road	An outer ring road proposed by YCDC passes through the north of Hlawga Lake and center of Thilawa SEZ. For the most part other than above, it seems similar to MOC's.	As mentioned in the left column, the outer ring road of MOC passes through the south of Hlawga Lake and north of Thilawa SEZ. Therefore, the ring size is smaller than YCDC's.
	Other Roads	The YCDC plan proposed less new road constructions than MOC's.	The MOC plan proposed several new road constructions, two roads heading to northeast, one heading to southwest, and one heading to west.
	Bridge	The YCDC plan proposed three new bridges between Thilawa and Dala, Thanlyin and East Dagon, and Hwawbi and Htantabin.	The MOC plan proposed to build a total of five more new bridges than YCDC's. These are between not only Thilawa and Dala, Thanlyin and East Dagon, Hwawbi and Htantabin, but also Dala and CBD, and Twantay and CBD.
	Railway	Some new railways were proposed, including a monorail.	Not mentioned.
Nature Conservation	Green Area	The YDCD plan aims to conserve five main green areas which are all located on the central hill.	The MOC plan also aims to conserve four main green areas which are located on the central hill.
	Agricultural Area	Not mentioned.	Some areas outside of the outer ring road were designated as agricultural reserve and urbanization control area, such as East Dagon, Hlaing Tharya, and Dala.
Others		Redevelopment zones are proposed in the plan, which are located on the suburbs such as Hlaing Tharya.	Shwe Dagon Pagoda and Sule Pagoda Preservation Zone were mentioned in the plan. Tourism promotion zones along the rivers were proposed.

Source: JICA Study Team

3.4.2 Points of Consideration for Urban Structure of the Greater Yangon

(1) Development of Thilawa SEZ

Thilawa SEZ is located in Thanlying and Kyawktan Townships. Currently, the Ministry of Economy, Trade and Industry (METI) of Japan has conducted a study, namely the "Thilawa SEZ Development Study". The study is aimed to formulate a master plan of Thilawa SEZ under the "Memorandum of Intent on the Cooperation for the Development of the Master Plan for the Thilawa", which was agreed upon between the Ministry of National Planning and Economic Development of the Republic of the Union of Myanmar and the Ministry of Foreign Affairs and METI of Japan on 21st April 2012. In the master plan, the visions of Thilawa SEZ were set as enumerated below:

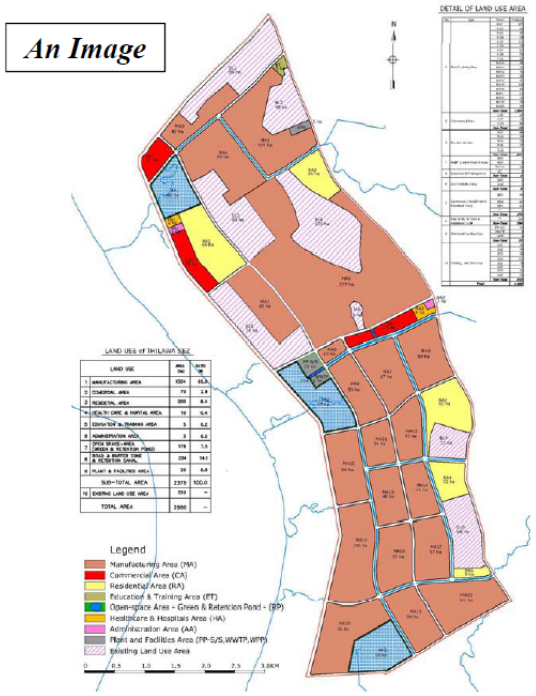
Visions

1. *Growth Center by inducing FDI and utilizing the resources of the Greater Yangon Area*
2. *Trigger to create non-traditional industries in the nation by absorbing new technologies from FDI and transferring them to the local business society*
3. *Core to diversify the industries of Myanmar by accumulating various types of industries in SEZ*
4. *International gateway in the regional and global supply chain by building up a firm manufacturing base and creating efficient logistics system*

In the master plan, a composite-purpose development scenario including manufacturing, residential and commercial land uses was proposed as one of the future development scenarios to be adopted.

A Land Use Scenario (tentative)

Land Use Plan	FS
1. Manufucturing Area (including Logistic, IT-Software and R & D)	ha 1,554 (65.5%)
2. Commercial Area (including International Wholesale)	ha 70 (2.9%)
3. Residential Area	ha 200 (8.4%)
4. Public Institution Area (inculuding Healthcare & Hospital, Education and Administration)	ha 20 (0.8%)
5. Open-Space & Recreation Area (including Green & Flood Control Reservor)	ha 178 (7.5%)
6. Major Infrastructure (including Road, Canal, PP・S/S, WWTP, WPP)	ha 354 (14.9%)
Total Development Area	ha 2,376 (100.0%)
7. Existing Land Use Area (Land with restrictions of development)	ha 510
Total Area	ha 2,886



Source: METI Study "The Basic Master Plan for the Thilawa SEZ"

Figure 3.4.2: A Land Use Image of Thilawa SEZ

According to the forecasts in the master plan, the final development of Thilawa SEZ will have a resident population of 163,000, with a labor population for manufacturing of 204,000 and for commercial and business of 3,000, as shown in Table 3.4.2.

Table 3.4.2: Development Volume of Thilawa SEZ

Items	Volume
Development Area	2,400 ha
Population (Resident)	163,000 persons
Population (Labor)	204,000 (for manufacturing) 3,000 (for commercial)

Source: METI Study "The Basic Master Plan for Thilawa"

(2) Development of an Airport and Ports

1) Hanthawaddy New International Airport

The existing Yangon International Airport in Mingaladon in the north of Yangon, which has one runway, reached a total of 2.5 million passengers in 2011, i.e., 1.5 million international and 1 million domestic passengers. The average annual growth of passengers for Yangon International Airport was estimated to be around 18% from 2008 to 2011. Considering the past trend, air traffic forecast demand for Greater Yangon is estimated to reach 42.7 million passengers in 2040, according to the forecast of Myanmar Government. In light of the forecast, as the current airport capacity shall definitely be in short supply, a new international airport shall be necessary in the future. The Myanmar Government has a plan to construct a new international airport in Hanthawaddy located at about 65 km from Yangon, near Bago City. The new international airport is expected to start its operation around the year 2018, while the existing airport will need to expand its capacity up to then.

2) Thilawa Area Port

Currently, Yangon Port, a river port on the Yangon River, is composed of two port areas, i.e., Yangon Port in Yangon City (Yangon Main Port) and Yangon Port in Thilawa (Thilawa Area Port). The Thilawa Area Port will have some definite advantages for entrance, because it takes 12 hours to enter Thilawa Area Port from Elephant Point, while it takes 24 hours to reach Yangon Main Port due to the additional time spent waiting for the tidal cycle. Also, the hinterland conditions are much more favorable for Thilawa Area Port, which has wide spaces for operation and the SEZ in its hinterland. The total container throughput forecast is estimated to be more than 4 million TEUs annually in the high scenario in 2030. As the capacity of Yangon Main Port is limited up to less than 1 million TEUs, the main logistics function will have to shift to Thilawa Area Port gradually in the future.

(3) Development of Dala and Twantay Areas

Due to their location being near to Yangon CBD, Dala and Twantay areas are likely to have a latent potential for urban development in the future. Both areas, however, have setback for development, such as the lack of connecting bridges that would be costly to build and may involve extensive resettlement, and the low elevations which might inflict damages by flooding or high tides.

According to YCDC, some foreign investors are interested in developing these areas, and made proposals for the urban and housing development to the Myanmar side. Currently, it is still difficult to realize these projects because of the constraints mentioned above. Actually, one proposal in Twantay has been said to be withdrawn due to the land cost increase, which was more than what the developer had expected.

Although some difficulties exist, new development proposals for Dala and Twantay areas may be made by the developers again, and the development in these areas might be realized in the future.

(4) Improvement of the Central Business District (CBD)

1) Over-concentration, Traffic Congestions, and High Buildings

Currently, the urban central functions including administration, banking, business and commerce are located mainly in CBD. In parallel with this, the population density of the CBD has a strikingly high value of 365.5 persons/ha, and therefore, the living environment of the CBD should be improved, especially in terms of transportation and car parking, sewerage and other urban infrastructures. A large part of the buildings in the CBD have 6-8 stories with some exceptionally higher buildings having more than 20 stories.

Additionally, a new building project has just been started which reportedly has 38 stories. To avoid over-concentration and serious traffic congestions, high-rise buildings in the CBD should be either limited or thoroughly considered. In case that a high-rise building is planned, the building project should at least consider securing an appropriate access to one or more of the trunk roads, facilitating enough parking spaces in the plot, and providing green spaces.

2) Heritage Buildings

All in all, 40% of 189 heritage buildings designated by YCDC are concentrated in the CBD. By the relocation of the capital city to Nay Pyi Taw in 2006, some of the government offices moved to Nay Pyi Taw. Thus, former government buildings such as ministers' offices are left almost vacant at this moment. These buildings should be used positively for their appropriate purposes, while being conserved and preserved in good condition.

3) Riverside Spaces

The CBD follows the planning disciplines of Montgomerie-Fraser with grid pattern road network and plenty of greenery. Although one of the main ideas of Montgomerie-Fraser was to allow a wide open space along the Yangon River, the open space in the strand had dissipated due to port development along the river. In light of the future movement that the logistics function will shift from Yangon Main Port to Thilawa Area Port, at least some parts of the open space along the Yangon River strand has to be recovered for the citizens of the Greater Yangon.

3.4.3 Comparison of Asian Cities

In order to understand the scale and urban structure of Greater Yangon in the future, it is useful to compare this city with other similar cities in Asia such as Hanoi, Bangkok, Jakarta and Manila, and additionally Tokyo. The population of these cities is at around ten million people, similar with the expected population of Greater Yangon in 2040. The following points constitute the summary of the basic urban structure based on usual road and railway networks and urbanized area:

- Hanoi, which is the capital city of Vietnam, has the second largest population of 6.5 million in the country. There are some sub-centers along the ring road of about 7-8 km radius. Urbanized area has expanded in all directions along the radial roads and railways around the city center.
- Bangkok is the capital city of Thailand with a population of 8.4 million. This city is located at 25 km inland, and it has the largest airport in the world, which is located 25 km east of the city. The urbanized area has expanded towards the east and north. There is a metro line, an elevated railway (Bangkok Mass Transit System, BTS), and a ring road at about 15-20 km radius.
- Jakarta is the capital city of Indonesia with a population of 9.8 million. Including its suburbs, its population is more than 24 million, which is the fourth largest in the world. There are two ring roads, one at about 5 km radius and the other at 10-18 km radius. Urbanized areas have expanded towards the east-west and south.
- Manila is the capital city of the Philippines with a population of 12 million. Including its suburbs, its population is more than 20 million, which is the fifth largest in the world. This capital city has a special geographical feature of being sandwiched by two seas. Therefore, the urbanized area has expanded towards the north and south along with the radial road and railway. At the center of the city, there are some sub-centers connected by LRT, Metro Rail Transit (MRT), and a ring road, at about 7-8 km radius.
- Tokyo metropolitan area is the largest city in the world with a population of more than 37 million. There are seven sub-centers in the 7-8 km radius within the first ring road, which is about 10 km from the center. There are other ring roads at the 20-km and 40-km radius. Urbanized area has expanded towards every direction, but mainly along the radial and ring railway network.

Table 3.4.3: Actual Figures of Asian Cities

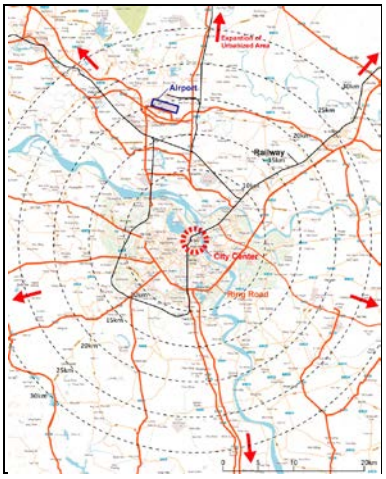
	Country	Myanmar	Vietnam	Thailand	Indonesia	Philippines	Japan
	City	**Yangon**	**Hanoi**	**Bangkok**	**Jakarta**	**Manila**	**Tokyo**
1	Population *(person)	4,457,000	6,500,000	8,426,000	9,769,000	11,862,000	37,217,000
2	Area (km^2)	599	3,345	1,569	662	639	8,547
3	Density (persons/km^2)	7,300	1,943	5,259	14,464	18,093	4,300
4	Ring Road (radius, km)	In planning stage	7-8 km	15-20 km	10-18 km	7-8 km	10, 20, 40 km
5	Railway	Ring/ Radial	Ring/ Radial	Radial	Radial	Ring/ Radial	Ring/ Radial
6	Airport (distance and direction from CBD)	15 km north	20 km north	23 km east	20 km west	10 km south	17 km south
7	Urbanization Direction	Mainly to the north	All	West, and north	East, west, and south	North and south	All
8	Sub-center	In planning stage	Some	Some	Some	8	7

Source: * Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat

Through the comparison above, the following items can be pointed out:

- Most of the cities have a city center and some sub-centers located at 7-8 km to 25 km around the center. Sub-centers function not only as junctions of commuting traffic, but also as offices, and commercial and recreational areas.
- Most of the cities have some radial roads and one or two ring roads to connect each radial road. These ring roads are needed in order to avoid traffic congestion and also to bypass the through traffic in the city center.
- Public transportations such as railways, autobuses, and LRTs are efficient ways to connect the city center, sub-center, and suburban residential areas. Without these systems, city centers will suffer from congestion, as what happened in Jakarta.

Yangon, Myanmar



Hanoi, Vietnam

Bangkok, Thailand

Jakarta, Indonesia

Manila, Philippines

Tokyo, Japan

Source: JICA Study Team

Figure 3.4.3: Comparison of Asian Cities

3.4.4 Urban Structure of Greater Yangon

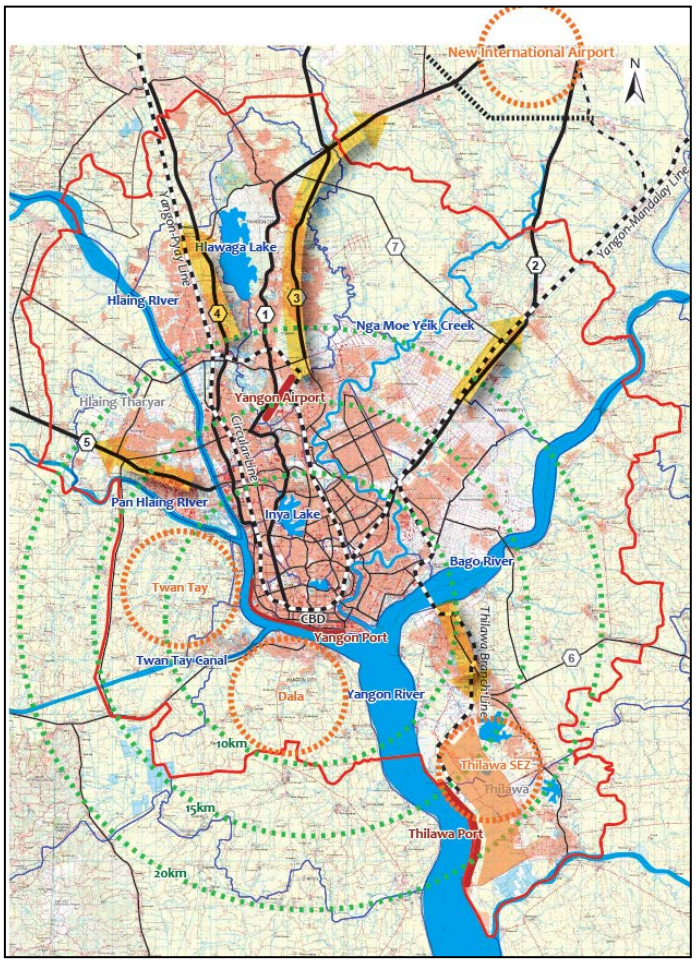
(1) Overview of Future Urban Structure

In light of the past trends and considerations above, the urbanization of Greater Yangon is likely to extend outward, especially northwards and eastwards along the main roads No.4, No.1, No.3, and No.2, rather than southwards and westwards. Additionally, a new international airport in Hantawaddy, which is planned to start its operation in 2020, might accelerate this future trend.

The CBD, which is the center of Yangon, is likely to accommodate more urban functions in the future, especially for commercial and business uses on the basis of some ongoing development projects or proposals including that of high-rise buildings. This trend in the CBD will continue for a while, however, it should shift outwards such as in sub-centers to avoid over-concentration in the CBD in the future.

On the other hand, development of Thilawa SEZ and Thilawa Area Port might be of utmost importance in accelerating the economic growth for not only Greater Yangon but also Myanmar. It means that the southeast area, including Thanlyin and Kyawktan Townships, shall be developed much further in the future.

Although urbanization is likely to expand northwards and eastwards, it should be noted that Dala and Twantay areas have large potentials for urban development in the future, particularly for people with limited means for livelihood.



Source: JICA Study Team

Figure 3.4.4: Overview of Future Urban Structure

(2) Alternatives of Urban Structure

An alternative urban structure of Greater Yangon can be elaborated by determining means as to how it accommodates the urban development issues. Greater Yangon shall be required to strengthen its urban economy functions, particularly commercial and business, industry and logistics, and to improve its living environment at the same time, under rapid population growth in the future. Alternative urban structures are examined taking into account the following factors:

(i) Urbanization pattern (decentralization or concentration on the city center)

(ii) Main urban function distribution (the city center, industrial area, residential area, etc.)

(iii) Green conservation (public park, protected area, highly productive agricultural area, etc.)

(iv) Transportation network (radial and ring trunk roads, railway, etc.)

Considering these four key factors, three alternatives of urban structure are examined as follows:

1) Sub-center System (Decentralized Urban Pattern)

This urban structure aims mainly for the decentralization of the city center. The current urban center, namely CBD, will have over-concentration both on its urban functions and population in the near future based on the past trend. This will cause serious urban problems such as perennial traffic jam, environmental pollutions, skyrocketing land prices, and others. To avoid over-concentration in the CBD, several "sub-centers" will be created as new business, commercial, industrial and/or residential centers with high-rise buildings. These sub-centers will be located at around 10-15km radius from the CBD. Led by the sub-centers' development, urbanization will be promoted at these areas, namely the "sub-center growth belt". Outside of the sub-center growth belt, urbanization will be followed by the market demands without any strict urban control measures. Green areas will be conserved properly such as the Hlawga protected area and Inya Lake.

2) Sub-center with Green Isle System (Decentralized Urban Pattern)

This urban structure aims for the decentralization of the urban center, which is the same as alternative-1. A few sub-centers will be created at areas within the 10-15 km radius from the CBD. Additionally, this urban structure aims to control urban expansion by means of creating an outer green belt in order to avoid continuous and extensive urban expansion with low density, and to supply urban infrastructures efficiently and effectively. Therefore, enhancement of the urban management capacity and introduction of a proper legal system will be necessary to a larger extent than for the other alternatives. An outer ring road will be provided and future urbanization along the outer ring road in the next step of development of the sub-centers growth belt will be promoted, namely an "outer ring growth belt". Green areas, including high productive agricultural areas, will be conserved as much as possible to sustain a more comfortable living environment for the citizens.

3) Super CBD Single-core System (Centralized Urban Pattern)

This urban structure follows the market demands of urbanization naturally, which probably will occur along the main radial roads, such as No.5, No. 4, No.1, No.2, and No.6. Urban functions shall continue to be concentrated in the current CBD, and this will let the CBD expand larger and rise higher as "Super CBD". On the other hand, suburban development will have minimum intervention, and green and agricultural areas will not be paid much attention due to less market demands for urbanization outside of the city's main roads. As

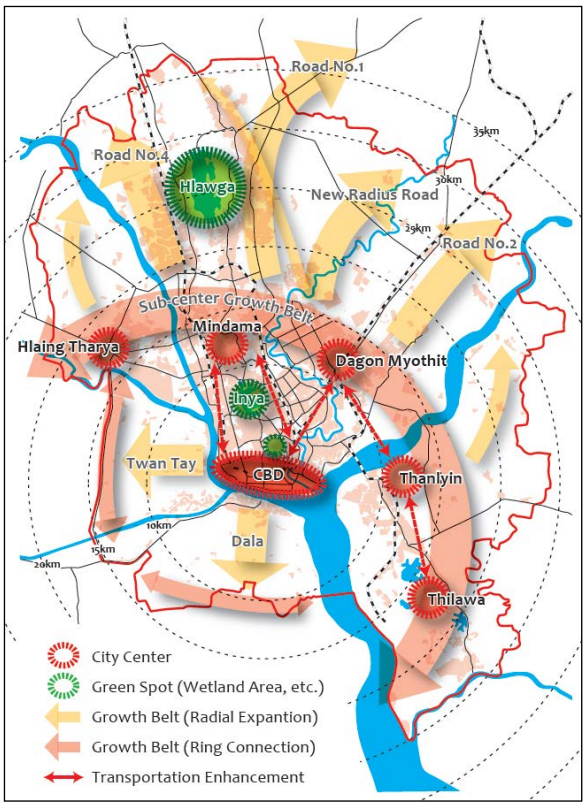
this structure essentially leaves the city to the market demand with little intervention, the initial cost to realize this urban structure will be lesser in comparison with other alternatives.

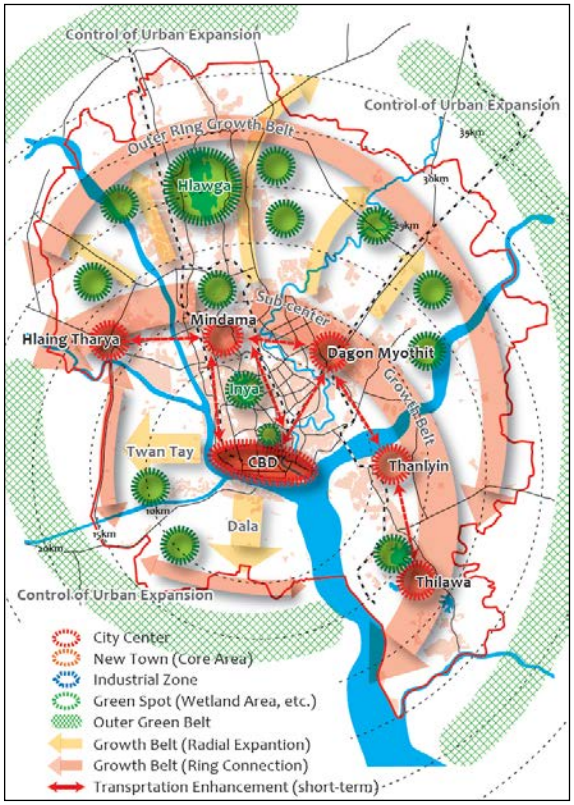
Table 3.4.4 shows the comparison among the alternatives in terms of the four key factors. The urban structure of the "super CBD single-core" is a policy-free and control-free system with minimum public interventions, while one of the "sub-centers" will need more public interventions to realize, but it may lead to a more functional city.

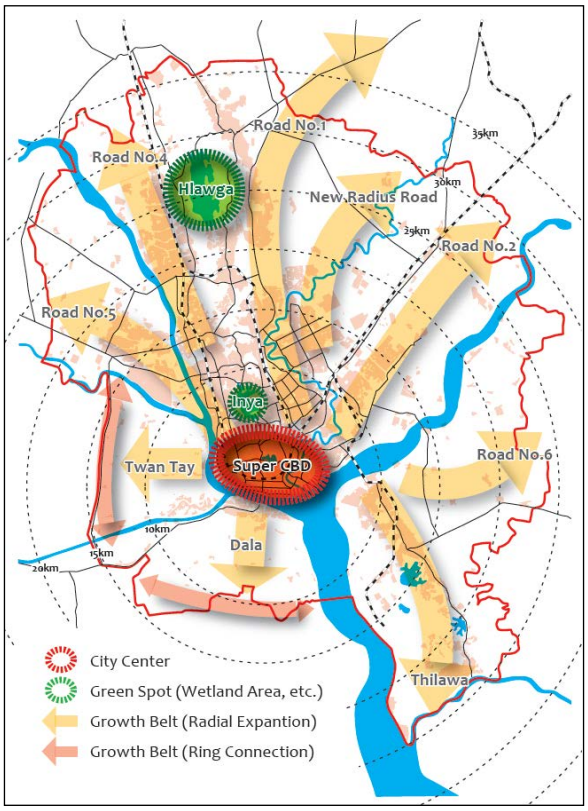
Table 3.4.4: Comparison of the Alternatives

Items	Sub-center System (Decentralized Urban Pattern)	Sub-center with Green Isle System (Decentralized Urban Pattern)	Super CBD Single-core System (Centralized Urban Pattern)
A) Urbanization Pattern (decentralization or concentration on the urban center)	- Decentralizing certain urban functions from the city center, CBD, to new sub-centers to be developed - Promoting urbanization in the sub-center growth belt at areas within the 10-15 km radius - Following market demands of urbanization outside of the sub-center growth belt	- Decentralizing certain urban functions from the city center, CBD, to new sub-centers to be developed - Promoting urbanization in the sub-center growth belt at areas within the 10-15 km radius - Promoting urbanization in the outer ring growth belt along the outer ring road	- Centralizing all urban functions to CBD as single-core city center - Following market demands of urbanization naturally, which probably will occur along the main radial roads, such as No.5, No. 4, No.1, No.2, and No.6
B) Main Urban Function Distribution (urban center, industrial area, residential area, etc.)	- Promoting to create new sub-centers, which will be located at areas within the 10-15 km radius from CBD, such as Mindama, Dagon Myothit, Thanlyin, Thilawa, and Hlaing Tharya (see Figure 3.4.5) - Controlling CBD for it to be not an over-concentrated city center	- Promoting to create new sub-centers, which will be located at areas within the 10-15 km radius from CBD, such as Mindama, Dagon Myothit, Thanlyin, Thilawa, and Hlaing Tharya (see Figure 3.4.5) - Controlling CBD for it to be not an over-concentrated city center	- Promoting the current CBD to expand larger and rise higher to be a "Super CBD"
C) Green Conservation (public park, protected area, high productive agricultural area, etc.)	- Conserving Hlawga protected area, Inya Lake, and other important green areas properly	- Designating urban planning area to control urban expansion - Conserving Hlawga protected area, Inya Lake, and other green areas to make a "North South Green Axis" - Conserving green areas and agricultural areas	- Taking priority of urban development activities over green conservation without any protection control measures
D) Transportation Network (radial and ring trunk roads, railway, etc.) *-Infrastructure Development-*	- Connecting the inner ring road by improving the existing roads or constructing elevated highways on the existing roads - Increasing railway lines (including a sky train line and/or a monorail)	- Constructing the outer ring road - Connecting inner ring roads by improving the existing roads or constructing elevated highways on the existing roads - Increasing railway lines (including a sky train line and/or a monorail)	- Improving the existing radial main roads to promote urban expansion outward - Increasing railway lines and train stations - Establishing a sky train line and a monorail

Source: JICA Study Team







Sub-center System (Upper left)	Sub-center with Green Isle System (Upper right)
Super CBD Single-core System (lower left)	

Source: JICA Study Team

Figure 3.4.5: Alternatives of Urban Structure of Greater Yangon

(3) Comparison of the Alternatives

To select the best system for Greater Yangon, three alternatives are compared considering five criteria, namely, traffic and travel time, living condition and life style, environmental consideration, cost for realization, and urban management capacity, as shown in Table 3.4.5.

Table 3.4.5: Evaluation of Alternatives in Three Criteria

Items		Sub-center System (Decentralized Urban Pattern)	Sub-center with Green Isle System (Decentralized Urban Pattern)	Super CBD Single-core System (Centralized Urban Pattern)
Public Benefit	Traffic Condition and Travel Time	**GOOD** Better mobility shall be maintained by decentralizing the city centers. Travel time shall be shorter due to the small distance between the working and living places.	**GOOD** The best mobility shall be maintained by decentralizing the city centers with the radial and ring transport networks. Travel time shall be shorter due to the small distance between the working and living places.	**NOT GOOD** Heavy traffic congestion problem shall occur in and around the super CBD. Travel time shall be longer due to the large distance between the working and living places.
	Living Condition and Life Style	**GOOD** Living condition in CBD shall be maintained as its current conditions due to mitigating the concentration on CBD. More people shall live in the suburbs with better living condition and life style, such as larger housing space and short distance of working place, although the price of land is expected to increase further in the future.	**GOOD** Living condition in CBD shall be maintained as its current conditions due to mitigating the concentration on CBD. More people shall live in suburbs with better living condition and life style, such as larger housing space, short distance of working place, and easier access to public parks, although the price of land is expected to increase further in the future.	**NOT GOOD** People who live in CBD shall enjoy the urban life with easier access to urban functions, although the living condition will be more comfortable than the current condition due to heavy traffic, etc. Many people who work in CBD shall be required to go to the working place with longer travel time than with other alternatives. The natural environment in the suburbs is expected to be remained.
	Environmental Consideration	**NOT GOOD** The inside portion of the sub-center growth belt green areas shall be conserved as much as possible, while urban development activities shall be prioritized outside of the growth belt.	**GOOD** To sustain a more comfortable living environment for the citizens, environmental matters shall be paid attention to as much as possible by means of green area conservation, etc.	**NOT GOOD** Less environmental consideration shall be done due to prioritizing the urban development activities.
Public Intervention	Cost to Realize	**NEEDED** Initial investment cost shall be necessary for the transfer of urban functions to the new city centers and to facilitate urban infrastructures and utilities.	**NEEDED MUCH** Initial investment cost shall be necessary for the transfer of urban functions to the new city centers and to facilitate urban infrastructures and utilities.	**NEEDED LITTLE** No special investment shall be needed for this to be realized, because this urban system naturally follows the market demands of urbanization.
	Urban Management Capacity	**NEEDED** To achieve this structure, more urban management capacity and legal system shall be necessary than with the current conditions.	**NEEDED MUCH** To achieve this structure, much more urban management capacity and legal system shall be necessary than with the current conditions.	**NEEDED LITTLE** Improvement of the current urban management capacity and legal system shall not be necessary.

Source: JICA Study Team

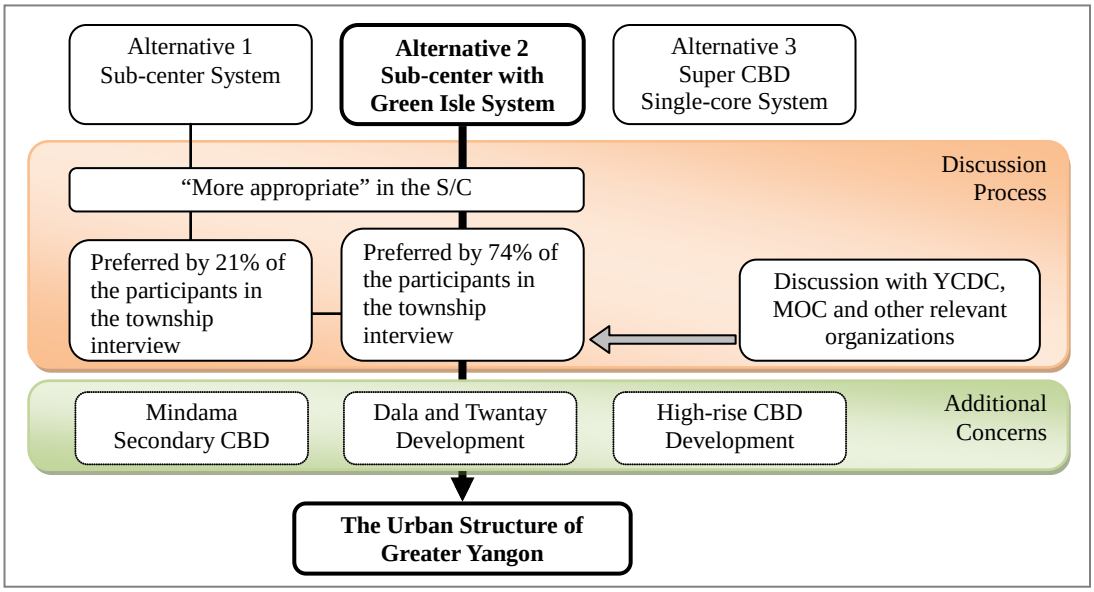
(4) Urban Structure of Greater Yangon "Sub-center with Green Isle"

In the 2nd Steering Committee on 2nd November 2012, the future urban structure was discussed, and "a structure plan was basically accepted by the Chairman and other members of the Steering Committee to push the Study forward, in line with the preliminary ideas", and also "regarding the structure plan, the 1st and 2nd alternatives which aim to establish the sub-centers seem to be more appropriate for the future Yangon. The Study shall be carried forward by the YCDC and JICA Study Team, together, based on today's preliminary ideas".

Additionally, an interview survey whose targets are the chief of the townships was conducted in the Study to discuss the alternatives of the urban structure in October 2012. According to the result of the survey, 29 chiefs (74%) preferred the plan of the "sub-centers with green isle system", eight chiefs (21%) preferred the "sub-center system", and two chiefs (5%) had no answer among the chiefs of the 39 townships.

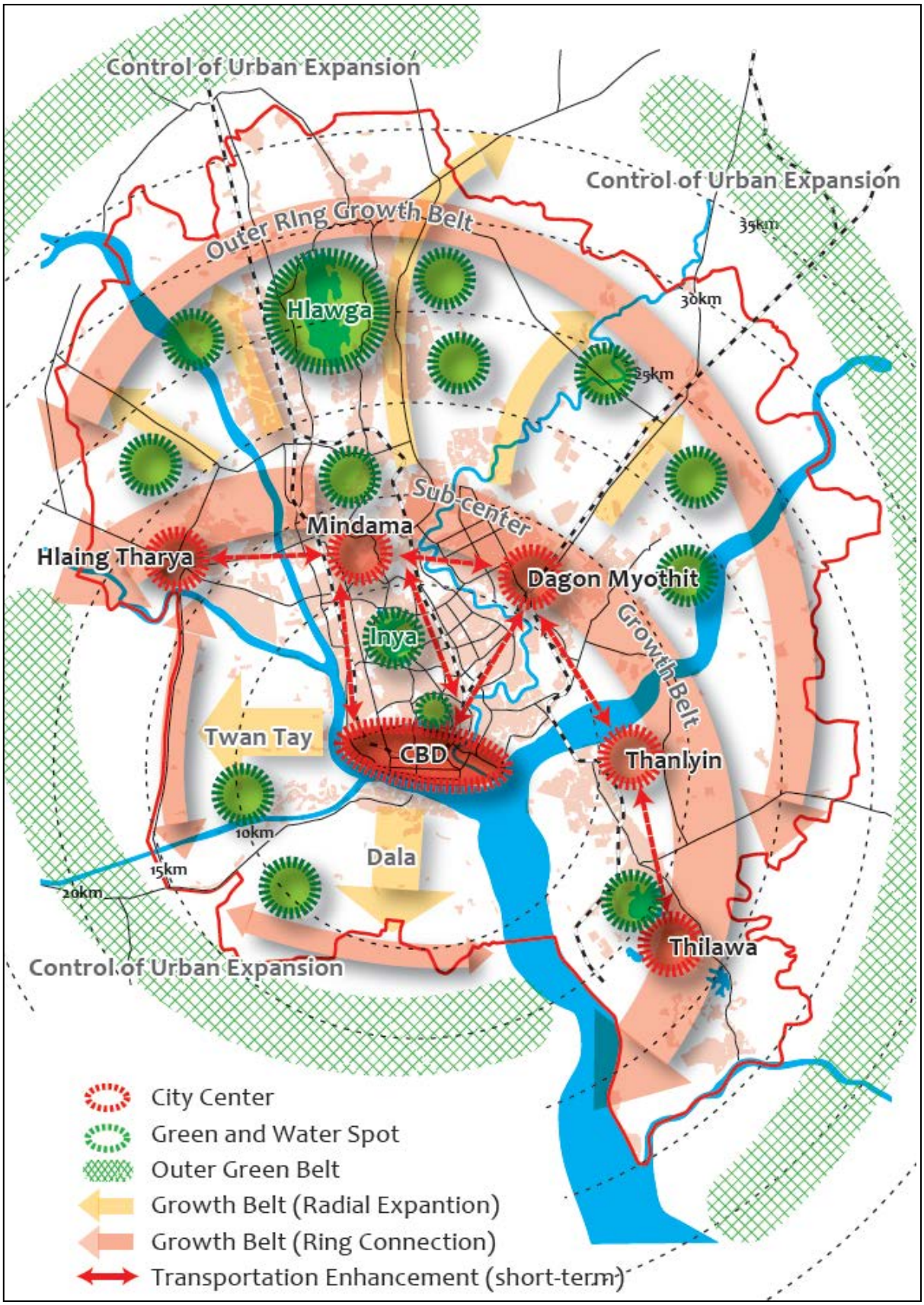
Based on these, the JICA Study Team examined the urban structure in detail, focusing on mainly "sub-center with green isle system", additionally "sub-center system", through the discussion with YCDC, MOC and other relevant organizations after the 2nd Steering Committee. In the examination and discussion, the following points were additionally paid attention to:

- Although the sub-center systems aim to avoid over-concentration in the CBD, it is likely that the CBD will need to accommodate more or less urban functions, especially commercial and business use with high-rise buildings, because the creation and function of sub-centers located at areas within the 10-15 km distance from the CBD will take time. Moreover, the urbanization pressure also increases rapidly.
- To accommodate the future labor population which is expected to increase by 3.3 million, it will be necessary to create not only sub-centers, but also new town core areas located farther than the sub-centers. Development of Mindama will be the first priority among the sub-centers, and therefore, its name is changed to "Mindama Secondary CBD".
- In the sub-center systems, development in Dala and Twantay areas was not emphasized due to the constraints that these areas have. Considering the large potentials of these areas for development, Dala and Twantay areas will be positioned to an important rank in the future urban structure.



Source: JICA Study Team

Figure 3.4.6: Process to Select the Alternatives



Source: JICA Study Team

Figure 3.4.7: The Selected Urban Structure of Greater Yangon, "Sub-center with Green Isle System"

3.4.5 Concept and Layout of Urban Functions and Infrastructures

(1) Population Distribution

1) Population and Housing Supply

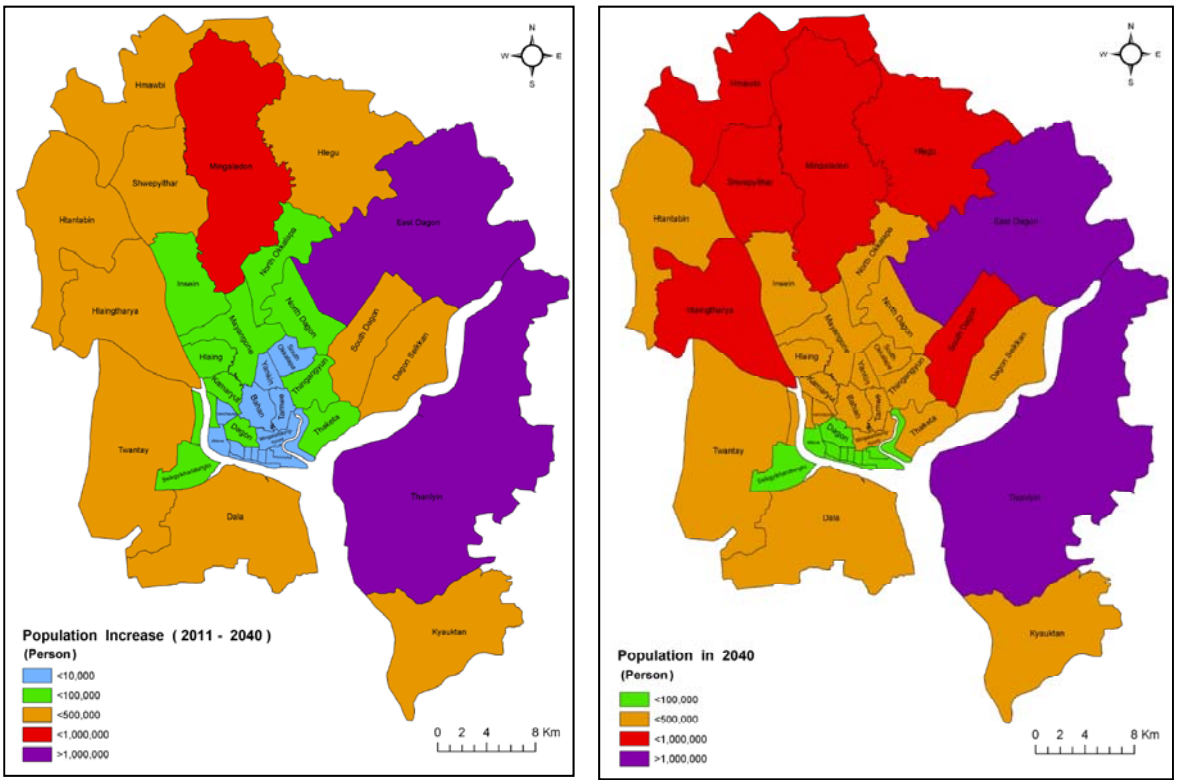
According to the projection in the previous section, the population of Greater Yangon will increase by 6.16 million in 29 years, i.e., from 5.57 million in 2011 to 11.73 million in 2040 in the 'middle scenario' which is the recommendable scenario. It means that a lot of houses must be supplied to accommodate the additional 6.16 million people in 2040. Therefore, the JICA Study Team reallocated the future population increase volume into each township based on the areas to be developed, which consist of developing areas and agricultural areas by township.

As shown in Figure 3.4.8, East Dagon and Thanlyin Townships will accommodate more than 1 million people each due to the vast available areas for development that these townships still have. On the other hand, the population of townships in the CBD, such as the inner urban ring, outer ring zone, and old suburbs are not likely to increase much anymore due to having little space for development.

Table 3.4.6: Population Projection of Greater Yangon

	Past Record	Projection
	2011	2040
Yangon City	5,142,128	8,519,527
Periphery Area	430,114	3,210,619
Total	5,572,242	11,730,146

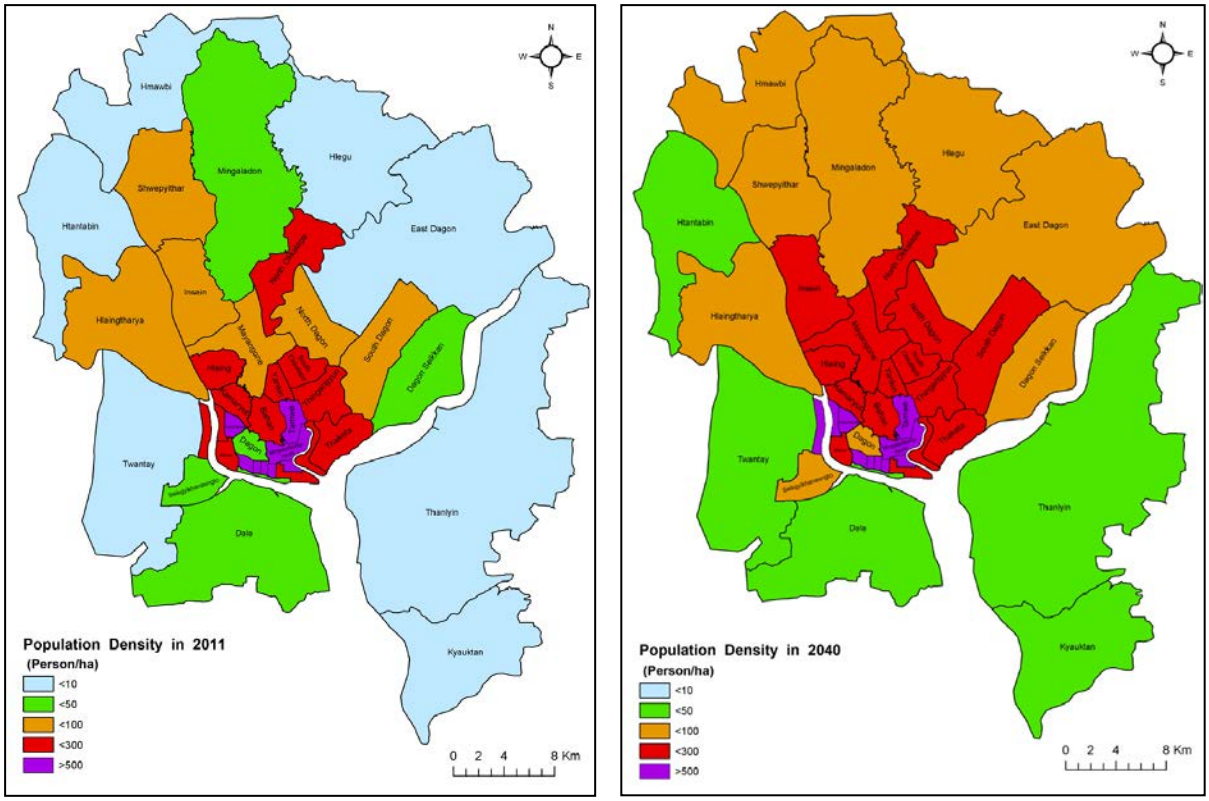
Source: JICA Study Team



Source: JICA Study Team

Figure 3.4.8: Population in 2040 (Left: Population Increase, Right: Total Population)

Although East Dagon Township and Thanlyin Township will accommodate a population of more than 1 million respectively as mentioned above, the future population density seems to be appropriate and the population densities of the CBD townships are still the highest as shown in Figure 3.4.9.



Source: JICA Study Team

Figure 3.4.9: Population Density (Left: 2011, Right: 2040)

2) Labor Population and Work Places Supply

According to the labor force projection in the previous section, it is assumed that the labor participation rate would increase gradually from 50.8% in 2011 to 55.0% in 2040 in the middle scenario. As a result, the labor force is expected to be 6.45 million persons in total.

Table 3.4.7: Labor Force Allocation by Industrial Structure

	Labor Force in 2011 by Industrial Category				Labor Force in 2040 by Industrial Category			
	Total	Primary	Secondary	Tertiary	Total	Primary	Secondary	Tertiary
Total	2,845,557	54,419	207,928	2,583,209	6,451,581	239,005	762,018	5,450,558
Structural Ratio	100.0%	1.9%	7.3%	90.8%	100.0%	3.7%	11.8%	84.5%

Source: JICA Study Team's estimates based on labor force data from the General Administration Department of Yangon Region Parliament

As shown in Table 3.4.7, around 762,000 laborers shall engage in the secondary sector in 2040. Currently, the existing industrial zones in Greater Yangon have a total area of approximately 5100 ha with an estimated 40% occupancy rate. Assuming the average labor density of the existing industrial zones (140/ha) based on the current situation in Yangon City, the existing industrial zones will be able to accommodate the additional 238,000 laborers. Development of a new industrial zone is necessary including the advanced industrial zone on Thilawa SEZ, which is estimated to accommodate 218,000 laborers in the future. To accommodate another 98,000 laborers of the secondary sector, it is proposed that three new industrial zones with an

area of about 250 ha each, 700 ha in total, shall be developed along the outer ring road with consideration of aiming for more efficient logistics.

Table 3.4.8: Existing Industrial Zones in Yangon

Name of Industrial Zone	Developer	Gross Land Area (ha)	Estimated Occupancy Rate (%)
Hlaing Tharyar (1-7)	DHSHD	780	90
Shwe Thann Lyin	Shwe Thann Lyin Co.	168	10
Mya Sein Yaung	War War Win Co.	118	0
Anaw Yah Tar + Shwe Taung	Mahar Shwe Taung Co.	315	0
Shwe Lin Ban	DHSHD	445	50
Shwe Pyi Thar (1)	DHSHD	136	70
Shwe Pyi Thar (2,3,4)	DHSHD	400	50
War Ta Yar	DHSHD	445	10
Thardu Kan	TOSTA High Rise	195	10
Mingaladon	Mingaladon Industrial Park Co.	89	90
Yangon	Zaykabar Co.	400	90
Shwe Paukkan	DHSHD	38	80
North Okkalapa	DHSHD	45	90
South Okkalapa	DHSHD	15	90
North Dagon	YCDC	10	100
East Dagon	DHSHD	202	40
East Dagon (extension)	DHSHD	115	40
South Dagon (1)	DHSHD	192	70
South Dagon (2)	DHSHD	87	100
South Dagon (3)	DHSHD	22	100
December	December Co.	142	0
Dagon Seikkan	DHSHD	490	70
Tharketa	DHSHD	81	90
Thilawa Industrial Zone	DHSHD	175	30
Total		5,105	

Source: JICA Study Team

It should be noted that all laborers in the secondary sector will not work in the industrial zones, but some will work in small factories outside of the industrial zones. In this section, rough approximation of the required land area for industrial use is estimated to accommodate the future urban structure.

On the other hand, laborers in the tertiary sector will be more dispersed in the whole urban area than in the secondary sector. Thus, it is rather difficult to estimate the required land area for the tertiary sector. As shown in Table 3.4.7, 5.45 million laborers shall engage in this sector in 2040.

In the urban structure mentioned in the next section, “CBD”, “Secondary CBD”, “Sub-centers”, and “New Town Core Areas” will be the main work places for a lot of laborers in the tertiary sector. In case that estimation of the labor population follows the way it was mentioned in Table 3.4.9, 1.24 million laborers shall be accommodated in the new city center, which corresponds roughly to 25% of the total labor force in the tertiary sector in 2040.

Table 3.4.9: Estimated Labor Population in the New City Centers

Name	Estimated Net Area	Estimated Stories of Building	Estimated Net Floor Area	Estimated Number of Labor Population
Mindama (Secondary CBD)	80 ha (200 acre)	25 stories	500 ha	100,000
Bago Riverside (Sub-center)	120 ha (300 acre)	25 stories	750 ha	150,000
Thilawa SEZ (Sub-center)	50 ha (125 acre)	25 stories	300 ha	60,000
Dagon Myothit (Sub-center)	120 ha (300 acre)	25 stories	750 ha	150,000
Hlaing Tharyar (Sub-center)	120 ha (300 acre)	25 stories	750 ha	150,000
Hlegu (New Town Core)	200 ha (500 acre)	8-10 stories	450 ha	90,000
Hmawbi (New Town Core)	200 ha (500 acre)	8-10 stories	450 ha	90,000
East Dagon (New Town Core)	200 ha (500 acre)	8-10 stories	450 ha	90,000
Thanlyin (New Town Core)	200 ha (500 acre)	8-10 stories	450 ha	90,000
Dala (New Town Core)	200 ha (500 acre)	8-10 stories	450 ha	90,000
Twantay (New Town Core)	200 ha (500 acre)	8-10 stories	450 ha	90,000
Htantabin (New Town Core)	200 ha (500 acre)	8-10 stories	450 ha	90,000
Total				1,240,000

Note: *1 Commercial and business building lots shall be 25% (building coverage) of the whole site.
*2: 200 persons/ha for commercial and business use.
Source: JICA Study Team

(2) Urban Functions

1) City Center Function (Figure 3.4.11)

Not only the CBD, but also the other new area centers will play their roles as city centers in the future to accommodate a larger population. It is proposed that the new city centers should be divided into different types, namely as “CBD”, “Secondary CBD”, “Sub-centers”, and “New Town Core Areas”, depending on their distance from the CBD, development schedules, etc., as shown in Figure 3.4.10.

Type	Distance	No.	Height	Schedule
CBD	Center	1	Mid and High-rise	Short-term
Secondary CBD	10-15 km	1	High-rise	Short-term
Sub-centers	10-15 km	4	High-rise	Short and Mid-term
New Town Core Areas	10-30 km	7	Mid-rise	Mid and Long-term

Source: JICA Study Team

Figure 3.4.10: Proposal for the Type of City Centers

(1) Secondary CBD and Sub-centers

As mentioned above, the creation of sub-centers is more recommendable according to the past discussions in this Study. At areas around 10-15 km radius from the city center, some suitable lands to create the sub-centers were found in the course of the discussions with YCDC. Those areas are basically owned by either public sectors, such as Ministry of Construction, YCDC and other organizations, or farmers. Distances between the neighboring sub-centers are set at about 10 km from each other. Although a deep and extensive study as well as surveys and negotiation with land owner(s) are necessary, the list of candidate sites was already made as shown in Table 3.4.10. Among the five candidate sites, Mindama, which is also called the “Secondary CBD”, is likely to have the first priority for development due to its location, maturity of discussion in Myanmar’s side.

Table 3.4.10: Candidate Sites of Secondary CBD and Sub-centers

Name	Township Location	Land Ownership	Estimated Net Area for Commercial and Business Use	Schedule		
				Short	Mid	Long
Mindama Secondary CBD	Insein	YCDC, Military, Ministry of Agriculture, Defense Ministry	80 ha (200 acre)			
Thilawa SEZ Sub-center	Thanlyin and Kyauktan	Ministry of Construction	50 ha (125 acre)			
Bago Riverside Sub-center	Thanlyin	Farm Lands	120 ha (300 acre)			
Dagon Myothit Sub-center	Dagon Myothit (North)	Ministry of Sports	120 ha (300 acre)			
Hlaing Tharya Sub-center	Hlaing Tharya	Farm Lands	120 ha (300 acre)			

Source: JICA Study Team

(2) New Town Core Areas

New towns with large-scale residential areas will be necessary to accommodate the rapidly growing population of Greater Yangon. It is recommended that each new town shall have its own core area to make the distances between the living and working places short so that the travel time of people could be reduced as much as possible. The core areas will mainly have commercial and business functions, but some may have an industrial function. The following three conditions were contemplated, namely 1) to be along the inner side of the outer ring road, 2) to be along the railways, and 3) to be able to acquire large-scale land. Consequently, seven core areas of new towns are proposed. Each core area shall be dispersed around the railway stations so that these shall not be concentrated in one place.

Table 3.4.11: Candidate Sites for New Town Cores

Name	Township Location	Land Ownership	Estimated Net Area for Commercial and Business Use	Schedule		
				Short	Mid	Long
Hlegu	Hlegu	Farm Lands	200 ha (500 acre)			
Hmawbi	Hmawbi	Farm Lands	200 ha (500 acre)			
East Dagon	East Dagon	Farm Lands	200 ha (500 acre)			
Thanlyin	Thanlyin	Farm Lands	200 ha (500 acre)			
Dala	Dala	Farm Lands	200 ha (500 acre)			
Twantay	Twantay	Farm Lands	200 ha (500 acre)			
Htantabin	Htantabin	Farm Lands	200 ha (500 acre)			

Source: JICA Study Team

2) Industrial Function (Figure 3.4.12)

In Yangon City, 24 industrial zones are currently under operation with a total area of 5,105 ha, which include some unused lands inside them, as shown in the following table.

As mentioned in the previous section, the labor population of the secondary sector is estimated to increase by 554,000 from the present to 2040. Based on the current situation in Yangon City and the neighboring countries, labor population density per unit area is in the range of 150-200 labors/ha. The total industrial zone necessary for Greater Yangon, in addition to the unused area in the existing industrial zones and Thilawa SEZ, is estimated to be approximately 700 ha. It is recommended that new industrial zones should be allocated along the outer ring

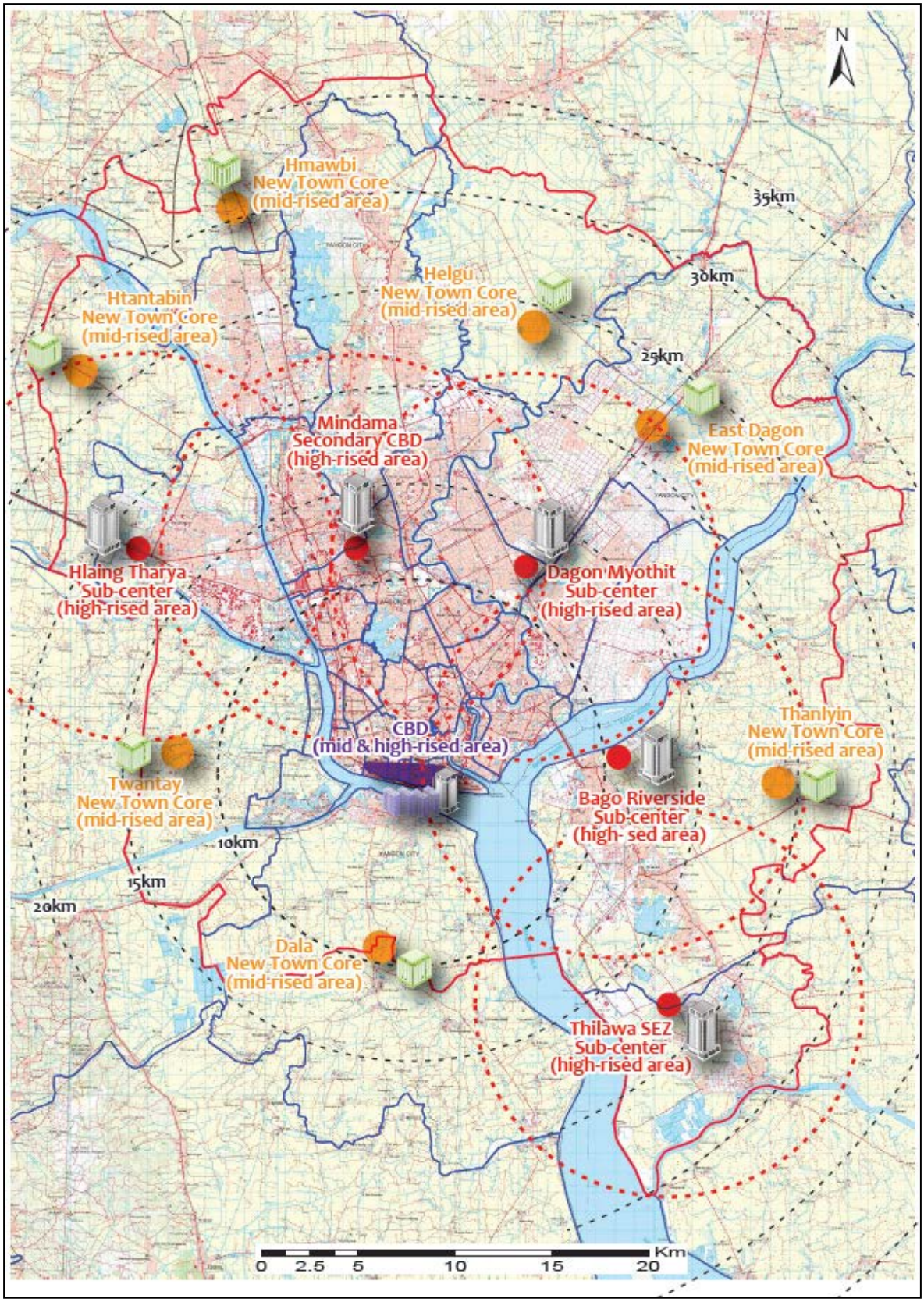
road because of its efficient logistics, and existing industrial lands for factories located within the 15-km distance from the CBD should be transferred outwards in the future.

3) Green and Water Functions (Figure 3.4.13)

According to the Yangon Regional Office of the Ministry of Agriculture and Irrigation, there are basically no agricultural areas that must be preserved in the future in Greater Yangon. Accordingly, urbanization could expand outwards gradually converting some of the agricultural lands, while some agricultural areas shall remain in the outskirts in 2040.

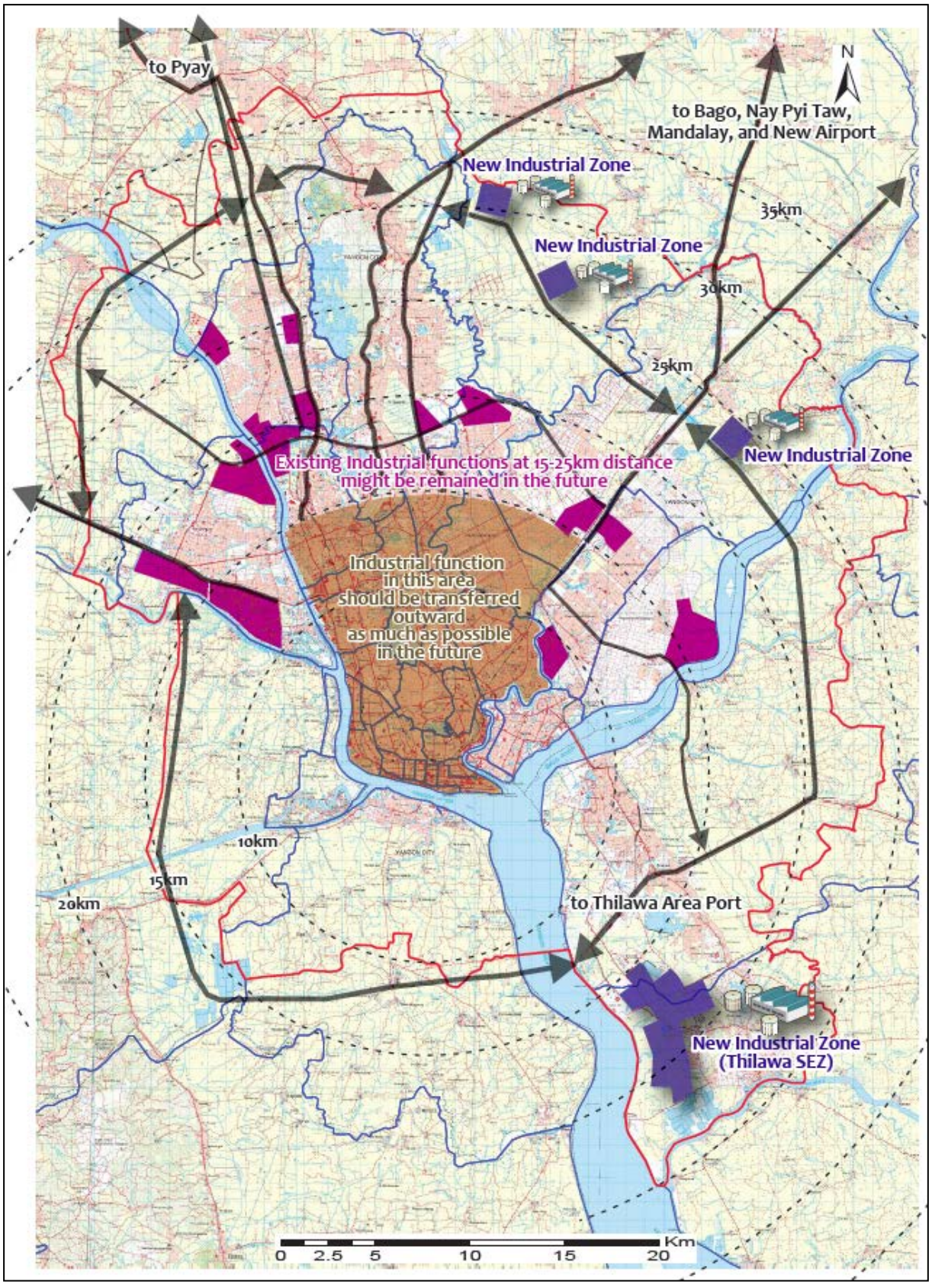
Green areas should be conserved mainly on the low hills which are a long and narrow spur in the central area, so as to make a so-called "Yangon North-South Green Axis". In parallel with the urbanization in progress, new large-scale parks should be created to keep a good living environment and to conserve green and water areas, especially along the outer ring growth belt where there are wide areas of unused land for urbanization. Hlawga nature protected areas must play the most important role of being one of the keystones of the green functions on Greater Yangon's future, especially as a wildlife habitat and water reservoir.

On the other hand, the riverside spaces, which are used extensively for logistics such as the sea port and area for containers handling, are generally not in good condition in terms of support facilities and working environment. In addition, the riverside spaces along the Yangon River, where the port facilities are currently located, are intended to allow a wide open space along the strand road from historical viewpoint. It is thus recommended to make better use of the riverside spaces for the support facilities and favorable working environment, especially along the Yangon River and Bago River, by means of creating waterfront spots. This could be achieved by either shifting the port and logistics functional areas to the Thilawa SEZ area, or raising the land use efficiency in these areas.



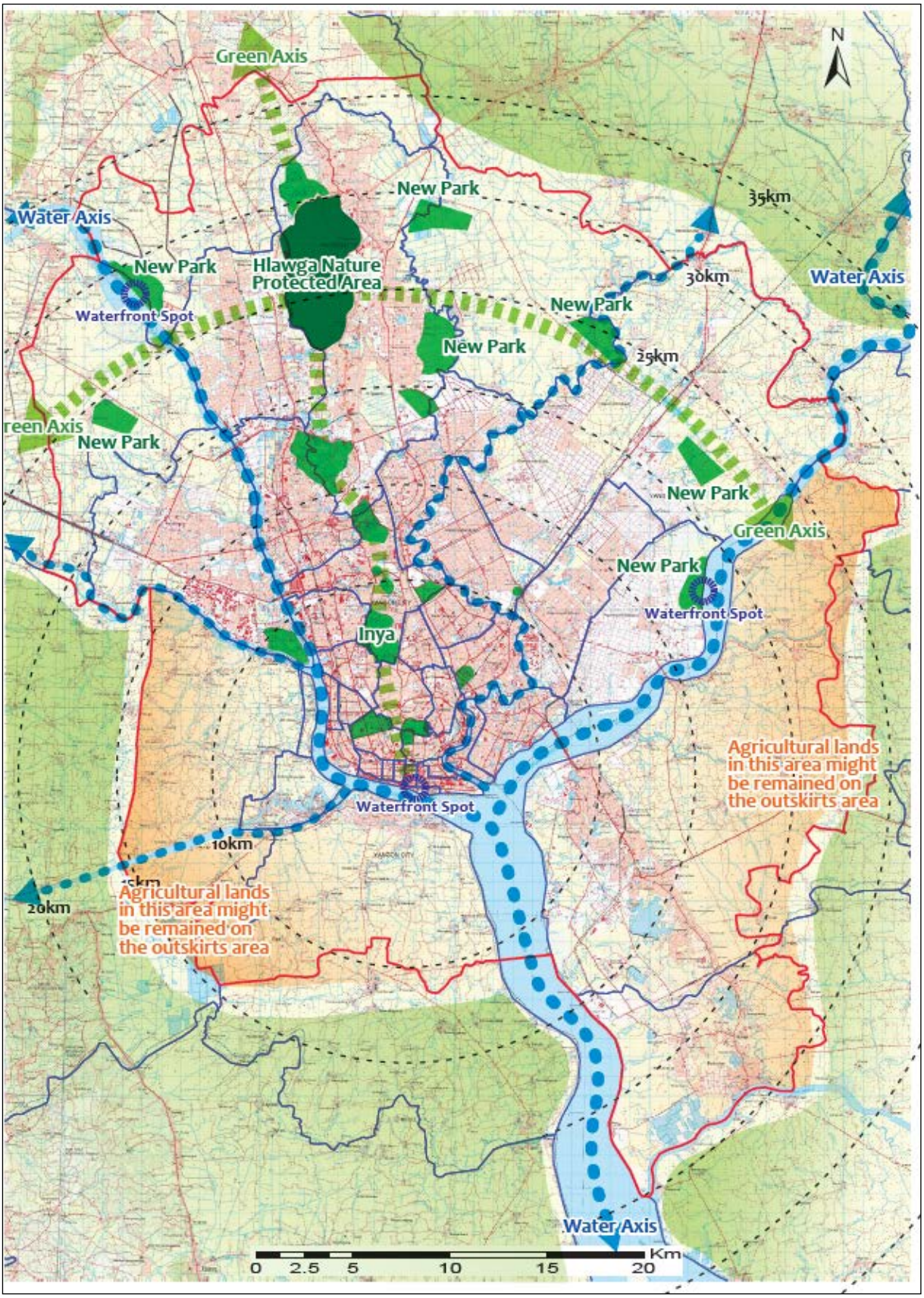
Source: JICA Study Team

Figure 3.4.11: Proposed Conceptual Plan of City Center Function



Source: JICA Study Team

Figure 3.4.12: Proposed Conceptual Plan of Industrial Function



Source: JICA Study Team

Figure 3.4.13: Proposed Conceptual Plan of Green and Water Function

(3) Urban Infrastructures

Regarding urban infrastructures, the details of concepts and plans are mentioned in Chapter 5, while the outline is written in this section for the road and transportation sectors, which relates more to the urban structure than the other sectors.

1) Road Network (Figure 3.4.14)

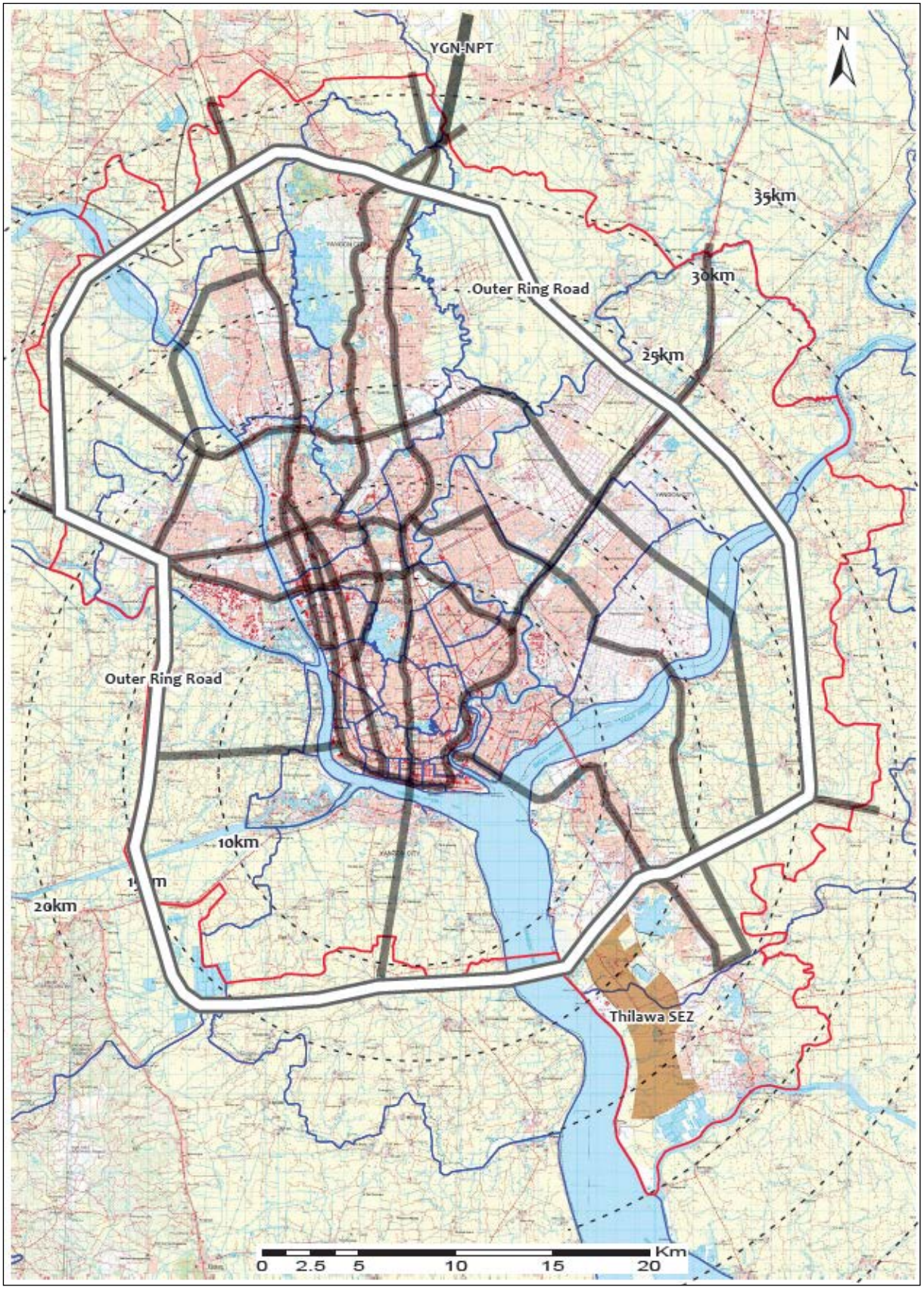
The future road network configuration and its capacities shall be determined by the future urban structure and land use plan. The results of the preliminary traffic demand forecast showed that quite large traffic demands will emerge not only from the north-south directions, but also from the east-west directions in the future when the proposed urban structure is realized. The existing road network cannot handle such large magnitude of traffic which will be generated from more than 10 million of population. Therefore, formation of a high capacity road network sufficient to accommodate future traffic demands will be needed to support and guide the targeted future urban development, in addition to public transport systems. Corresponding to the urban structure above, a new road network is proposed, characterized by the construction of an outer ring road, which is a circular highway passing at areas around 15-30 km radius from the CBD, and some other radial and ring roads.

2) Railway Network (Figure 3.4.15)

It is estimated that railway transport in Greater Yangon will operate with 6 million trips in 2040. According to the analyses mentioned in Chapter 5, the required railway network length for Greater Yangon in 2040 will be 350 km with 150 km tolerance. In case that the 350 km railway network is established in the future, not only the modernization of the three existing lines (122 km) but also construction of five new UMRT lines (232 km) will be required. The railway network covers all the future urban function areas appropriately and fits with the future urban structure, although the layout plan of new lines in Figure 3.4.15 is just tentative idea in this study. The network can also provide all the citizens with good access to any station within 5 km.

3) Logistics Network (Figure 3.4.16)

Considering logistics, it is expected that traffic and logistic volume will rapidly increase because of vast amount of urban expansion. In this context, it is necessary to relocate and strengthen urban logistics functions and facilities. Even in the future, Greater Yangon must be responsible for the commercial, business, trade and logistics center in Myanmar as current. Therefore it is necessary to carry cargos from overseas to nationwide smoothly, passing through Yangon without traffic congestion in urban area of Greater Yangon. It is obvious that Thilawa Area (Port and SEZ) will play a more important role in the future than at present. As earlier mentioned above, the main logistics function will gradually shift from Yangon Main Port to Thilawa Area Port in the future. Additionally, the Myanmar Government has a plan to construct a new international airport at the place called Hanthawaddy, located at 65km distance from Yangon, near Bago City. It means that the logistics network between the south-east area (direction to Thilawa) and north-east area (direction to the new international airport, Nay Pyi Taw, Mandalay and Bago) will be more important in the future than at present. In line of this context, logistic functions and facilities should be relocated outside of current urban center, such as along outer ring road to establish and strengthen efficient logistics, connecting to other large cities in Myanmar and ne international airport to be constructed.

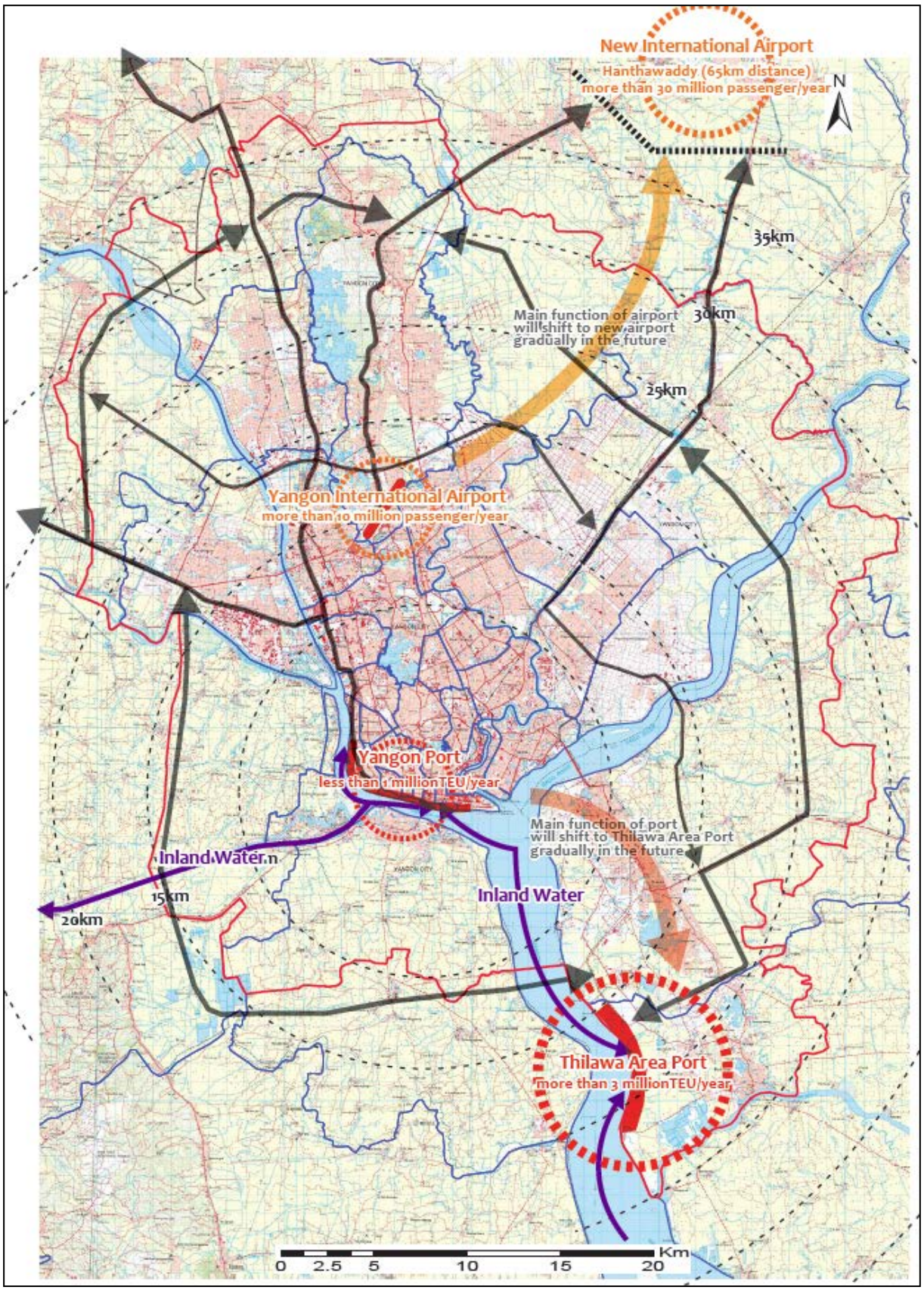


Source: JICA Study Team

Figure 3.4.14: Proposed Conceptual Plan of Road Network

Source: JICA Study Team

Figure 3.4.15: Proposed Conceptual Plan of Railway Network



Source: JICA Study Team

Figure 3.4.16: Proposed Conceptual Plan of Logistics Network

Source: JICA Study Team

Figure 3.4.17: Conceptual Layout Plan of Urban Functions and Infrastructure (An Integrated Conceptual Plan)

CHAPTER 4

An Urban Development Master Plan

< Part-II: The Master Plan >

CHAPTER 4: AN URBAN DEVELOPMENT MASTER PLAN

An urban development master plan of this chapter is composed of three sections, namely "4.1 Urban Development Strategy", "4.2 A Land Use Plan" and "4.3 Outline of Proposed Land Use Zoning Scheme" based on the development visions and structure plan of Chapter 3. The outline of proposed land use zoning scheme will be examined further through the discussion with Myanmar side in Phase II in line with this proposal. The urban development master plan is closely related to an urban infrastructure development strategy of Chapter 5 and a capacity development plan of Chapter 6.1.

4.1 An Urban Development Strategy

4.1.1 Urban Development and Management

(1) Development Policy

Sector Vision	**Realization of Sustainable Urban Development and Management in Consideration of Comfortable, Efficient and Environmental Friendly**
Basic Policy	1) Realization of a Peaceful and Beloved City with Vitalization and Renewal of CBD and Enhancement of Rich Green and Water *(see the next sections, 4.1.2, 4.1.3, 4.1.4, and 4.1.5)* 2) Realization of a City for Comfortable Living and Effective Working for All Citizens as an Advanced Model for Myanmar (TOD and Smart-City Policy) 3) Decentralization of Urban Center's Functions by Creation of New "Secondary CBD" and "Sub-centers" to Avoid Over-concentration at the Existing CBD 4) Consolidating the Urban Structure for Promoting Economic Growth with Intensive Land Use and Efficient Logistics System to be an International HUB City 5) Mitigation of Disaster Risks base on Disaster Risk Analysis, Assessment and Management 6) Realization of Good Governance with Improvement of Management System in the Field of Urban Development and Management

The detailed explanations and background of each basic policy are given as below:

1) Realization of a Peaceful and Beloved City with Vitalization and Renewal of CBD, and Enhancement of Rich Green and Water.

As Greater Yangon is an international gateway of Myanmar because of its geographical location in GMS, the number of foreign tourists and investors has rapidly increased drastically after shifting to the civilian rule in 2011. As the current situation seems insufficient in light of huge demands and needs to be an international HUB city in the future, it is necessary to develop commercial and business functions, well-managed infrastructures, housing and accommodation facilities, a variety of services, and human capacities based on international

standard. Development of tourism sector is also expected in order to emphasize identities of Yangon and to contribute in improving the living standards including those for urban poverties, as well as economic growth. Valuable cultural heritages which are located mainly in CBD should be preserved and utilized more to make Yangon more attractive. On the other hand, CBD seems to have more serious urban problems of transportation gradually due to over-concentration of population and economic activities. In this context, vitalization and renewal of CBD is necessary, avoiding further over-concentration.

In order to realize the development vision, peaceful and beloved city, to provide healthy and cultured living environment and proper social services for all citizens and to cherish and emphasize identities of Yangon and Myanmar are very important viewpoints.

To improve happiness of all citizens, provision of proper housing and equal and inclusive social services for all citizens will be required. Improvement of living environment of Greater Yangon must contribute to be peaceful and beloved Yangon (see the details in "4.1.2 Living Environment" and "4.1.3 Social Service").

Placing a high value on the historical and cultural aspects of urban development and management shall contribute to establishing a stronger international competiveness in not only the tourism sector but also in business and commercial sectors in the long-term (see the details in "4.1.4 Urban Landscape and Heritage").

Rich green and water which are forming Yangon's charm should also be emphasized more through urban development in the future. To realize it, creation of amenity spaces by construction of public parks and improvement of greenery will be necessary (see the details in "4.1.5 Urban Landscape and Heritage").

2) Realization of a City for Comfortable Living and Effective Working for all Citizens as an Advanced Model for Myanmar (TOD and Smart-City Policy)

The Greater Yangon is the largest city in Myanmar, whose population will increase by 6.16 million in 29 years, namely from 5.57 million in 2011 to 11.73 million in 2040. To ensure satisfaction of the citizens of Greater Yangon, it is essential to realize a city for comfortable living and effective working community.

For realization of comfortable living and working environment, it is recommendable to promote the TOD (Transit Oriented Development) policy for the new urban development area. The TOD policy will contribute to optimize the effectiveness and efficiency of public transportation system which is expected to shorten travel time between living and working areas.

For appropriate land use with more comfortable way of living, it is recommended that new large scale industrial zones are allocated along the outer ring road. Moreover, existing large scale industrial and logistic facilities located near residential lands in inner urban should be transferred and replaced outwards, and controlled in terms of emission of environmental pollutions for less negative impacts on living conditions. Relocation of public facilities and function should be also considered. More attention needs to be paid to the urban poor and minority people from the viewpoint inclusive of urban development and management.

As mentioned below, creation of proposed sub-centers and new town cores shall also contribute to decreasing the distance between working and living places, in order shorten their travel time, and to mitigate traffic jams, traffic pollution, and other relevant urban problems.

3) Decentralization of Urban Center Functions by Creation of New "Secondary CBD" and "Sub-centers" to Avoid Over-concentration in the Existing CBD

Currently, urban center functions including administration, finance, business and commerce are located mainly in the CBD. The current CBD will be subject to over-concentration in terms both of urban functions and population in the near future, based on the past trend. Hence, this would cause serious urban problems such as perennial traffic jams, environmental pollutions, skyrocketing of prices of lands and others.

Although some urban functions, such as shopping centers, are transferring outside the CBD, it is essential to further promote decentralization of the urban center functions as compared to the past. To realize this, a "Secondary CBD" and several "Sub-centers" should be created for new businesses, commercial, industrial and/or residential centers in areas around 10-15 km radius from the current CBD.

It is recommended that the five or more sub-centers including a secondary CBD will be developed as new urban centers by the year 2040 in line with the objectives mentioned above. Construction of each center should be promoted not only by the public sector but also with a private initiative based on its characteristics. To promote these developments, it is necessary to allow special incentives for development activities of the secondary CBD and the sub-centers.

4) Consolidating the Urban Structure for Promoting Economic Growth with Intensive Land Use and Efficient Logistics System to be an International HUB City

The Greater Yangon is the largest city and an international gateway of Myanmar because the geographical location of Yangon is in the focal node of the Greater Mekong Sub-region (GMS) economic corridors, namely East-West Economic Corridor, Western Economic Corridor, and Southern Economic Corridor. Under this status, the Greater Yangon is required to establish a new and stable urban structure which contributes to the future economic growth as one of the most important players for economic development among domestic as well as international counterparts.

Promotion of more intensive land use by means of providing special incentives might be also necessary for strong economic growth, despite height of buildings should be somewhat restricted in consideration of continuity from the current regulation. Additionally, current CBD is required to be redeveloped as a more efficient and more attractive urban center in cooperation with secondary CBD and sub-centers to be developed.

A new port and a new airport in progress, namely Thilawa Area Port and Hanthawaddy International Airport, which will have larger capacities than existing ones, are necessary in the future to cope with rapidly increasing demands. These new hubs will contribute to more effective logistics and passenger traffic domestically and internationally.

5) Mitigation of Disaster Risks base on Disaster Risk Analysis, Assessment and Management

Human life comprises disaster risk on their usual activities because discontinuous and unstable conditions are among the aspects of nature. As described in "Section 2.1.5 Disaster" of this report, the Greater Yangon has potential risks of disasters. Such disaster risks should be managed by following three processes to protect human lives and properties, and to ensure efficient urban development.

a) Process-1: Disaster Risk Analysis

In the disaster risk analysis, disaster risk factors are extracted and specified, by using available data/information, i.e. aspects analyzed include i) what kinds of events would be possible, ii) where would be the affected area, iii) what are the degree of their impacts, iv) what are their occurrence probability, v) who would be affected and vi) what are their damage scales.

b) Process-2: Disaster Risk Assessment

In the disaster risk assessment, extracted disaster risks are evaluated in terms of acceptability for the society. Based on the assessment, disaster measure should be studied if the disaster risks are evaluated as unacceptable.

c) Process-3: Disaster Risk Management

In disaster risk management, mitigation activities must correspond against disaster risks. Disaster risk communication, which involves exchanging and sharing of disaster risk information to build mutual agreement on management among stakeholders, is one of the most important procedures in disaster risk management. Study on disasters and their present measures in Chapter 2 of this report may be determined as one of the preliminary level disaster risk analysis.

6) Realization of Good Governance with Improvement of Management System in the Field of Urban Development and Management

Urban development and management shall be strengthened by the use of statistics that accurately illustrate current socio-economic conditions and level of urban services. To acquire such information, statistical data based on ward level are indispensable. Additionally, people's opinion shall be concisely reflected more in an urban planning process. To make urban development and management system more efficient, "e-government" shall provide an efficient administration and an easy access to information for residents through computerization of administrative procedures. The administration procedure relating to a household such as household registration, payment to urban services and taxes, and so on should be computerized.

(2) Goals and Target Effect Indicators

For the purpose of evaluation of future urban development and management, and to confirm its outcomes, the following development goals and effect indicators are prepared:

Table 4.1.1: Development Goals and Effect Indicators (Urban Development and Management)

Development Goal	Effect Indicators (Qualitative)
a) Vitalization and Renewal of CBD	Improvement of business, commercial and tourism activities
b) New Urban Development	Increase of urban areas with TOD and smart-city policy
c) Relocation and Replacement of Facilities	Less large-scale industrial and logistic facilities in inner urban area
d) New Urban Center Functions	Creation of new secondary CBD and sub-centers
e) Disaster Risk	Less damages by disasters
f) Efficient administration	Computerized household registration system

Source: JICA Study Team

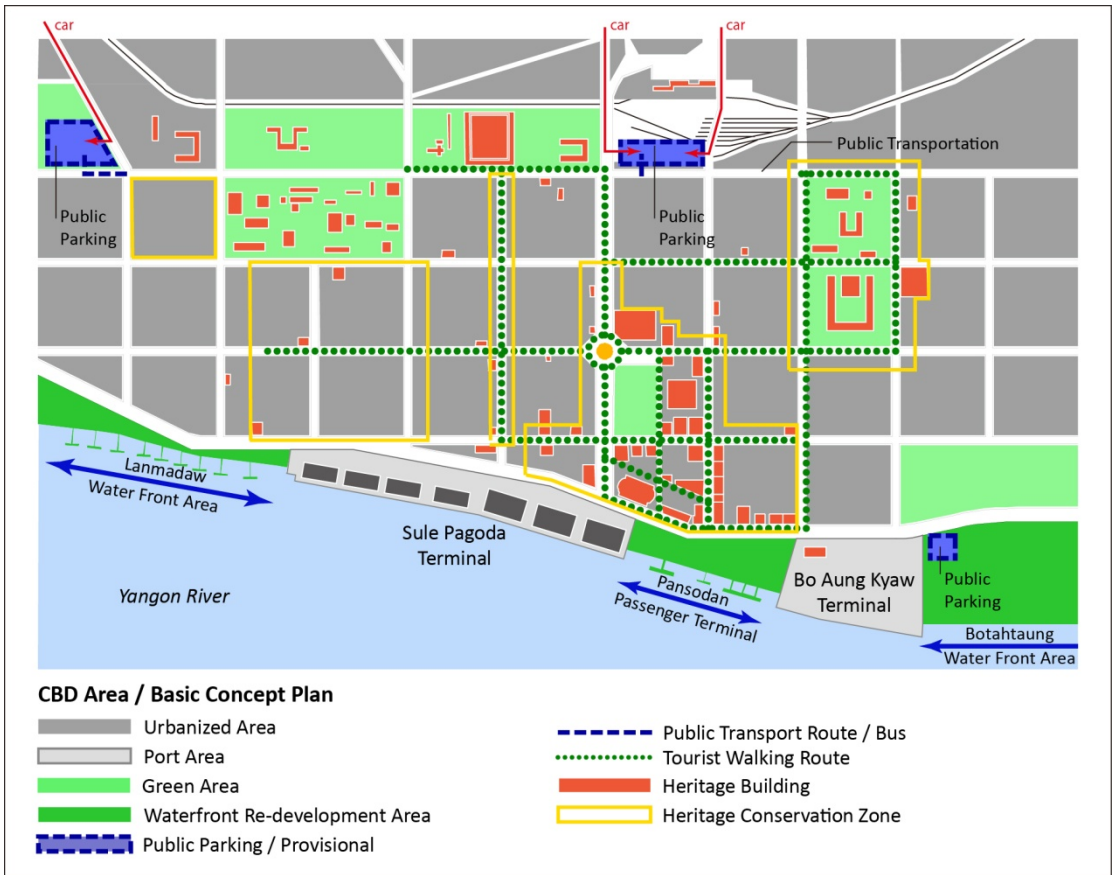
(3) Strategy for Urban Development & Management

1) Vitalization and Renewal of CBD

In the Greater Yangon that continues to expand with population growth, while the decentralization of urban function is aimed at, current CBD area where urban activities through residences, commercials and business are concentrated will be also the future CBD as a core of the city of Yangon. In order to renew and revive the efficient CBD area with a vitality, disaster-resistant, functional and attractive urban space had to be realized.

In order to realize the CBD that citizens live at ease, realization of developments of urban facilities in consideration for disaster prevention is essential. Also in order to archive smooth urban activities, it is necessary to eliminate the traffic congestions in the CBD and to give efficient transport system In addition, for further value improvement of the CBD, while preserving the historic buildings and other various religious buildings, to utilize them as tourism resources and new urban functions is effective.

Through these comprehensive promotions, not only forming comfortable and attractive urban environment, but also forming the city with high international competitiveness in each sector such as tourism, commerce and business are expected. For vitalization and renewal of CBD, measures to be taken are proposed as follows:



Source: JICA Study Team

Figure 4.1.1: Basic Concept Plan of the CBD

(1) Development of disaster-resistant CBD

The Greater Yangon has encountered a number of natural disasters in the past, such as large earthquakes in 1930's, the cyclone in2008, and repeated floods, etc. Once a large-scale disaster occurs in the city where population and assets are concentrated, the city suffers tremendous losses and requires significant effort to normalize it. To develop a disaster-resistant CBD while foresee natural disaster, it is essential in order to increase the value of the city as well as to give assurance to civilian life.

a) The city strong to earthquakes / promotion of earthquake resistant building

YCDC has instructions of disable buildings in dangerous conditions by structural defects as "danger building". These buildings are required to measure either carry out seismic enforcement or rebuild. In order to form an urban environment where citizens live at ease, promotions of the implementation of seismic evaluation of existing facilities is needed as well as the earthquake-resistance for public buildings as a disaster prevention center.

b) The city strong to fires / promotion of

In the high density built-up area of CBD, once fire occurs, there is a high risk of fire spread to the neighboring area. For the new structure, incombustible is required, and the existing structure, it is recommended to eliminate combustibles as much as possible. In addition, in order to perform firefighting effectively, proper installation of fire fighting water conservancy, such as fire hydrant or fire protection water tank, and also the installation of fire-fighting equipment in the building are required. Promotion of the facility development in consideration for disaster prevention is essential.

c) The city strong to floods / promotion of flood control measures

The center part of Yangon city that is surrounded by rivers and the sea level is low, has vulnerable to water damage. For flood control measures, for flood control measures, inland water measures and watershed measures are needed with consideration to the natural environment. For the prevention of flood damage in urban areas, implementations of the development of rainwater drainage facilities such as public sewerage system are required.

(2) Functional Traffic System in CBD

In order to ensure the efficiently urban activities, promoting traffic transport policies for implementing smooth traffic is required. Measures to resolve the traffic congestion and introduction of the new urban transport system within the CBD in conjunction with the metropolitan area are effective. On the other hand, in the construction of new public facilities such as stations and parking area, promoting the barrier-free for elderly and disabled is required as urban environment where every civilian can live comfortably. Following are strategies to achieve functional traffic system in CBD.

a) Improvement of the Parking Lot

In the urban area of Yangon, the number of cars is increasing day by day, and chronic traffic congestion is an urgent issue to be solved. There are different causes of congestion in the CBD such as lack of parking lots and heavy on-street parking and open-air stalls and vendors along the streets. Sufficient spaces for parking lots are necessary for the new construction as well as for existing buildings.

For the area with high population density, it is effective to develop a large parking area at the outer periphery of the CBD, either underground of a public square or beneath streets.

b) Limitation of Car Traffic in the CBD

Together with the installation of parking lot, regulation to limit car traffic in the CBD is efficient. It is effective to reduce the entrance of vehicles by regulating the time constrains in order to implement measures to realize smooth traffic. Through the regulation to limit car traffic, implementation of urban space for people such as priority road for pedestrian that is not occupied by cars is expected in the historic conservation area or the shopping area in the CBD. Such restriction will be coupled with the enhancement of public transport, as mentioned below.

c) Development of the New Public Transport System

As urban transportation in a low-carbon society, new transport systems, such as Light Rail Transit (LRT), is generally recommended in order to facilitate the movement of people. Through the installation of park-and-ride system cooperation with local bus and installation of car parks, smooth traffic will be realized within the CBD area. Together with the traffic network of the entire metropolitan area, there is a need for a comprehensive review of the urban transportation systems.

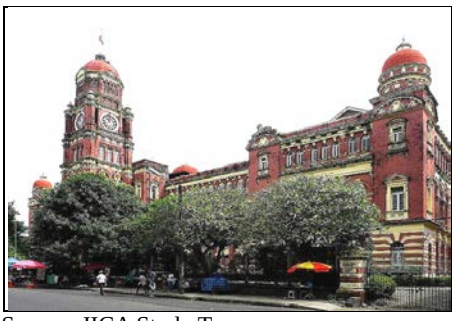
(3) Formation of Attractive Urban Space

The attractiveness of the city of Yangon is in the specific urban landscape in each district through historic buildings in colonial era and various religious buildings left in CBD area. In order to develop this CBD area as the multicultural city, and to attract people at home and abroad, promoting the development plan utilizing these cultural resources which have high values as tourism resources is effective. In this CBD with cultural diversity, some potential resources of this city have to be discovered through tangible and intangible elements. Following are different aspects to improve attractiveness of the city of Yangon, mainly focusing on the tangible elements.

a) Conservation and Re-use of Heritage Building

One of the attractiveness of the city of Yangon is the diverse aspects of the urban spaces where different religious monuments and historic buildings of different ages are gathered in one place in the CBD. These buildings, which are also properties of the city, are facing different types of damages due to aging, natural disaster and arbitrary modification by the new owners. The conservation of the heritage buildings is inevitable, and the formulation of a comprehensive guideline such as a rule on height limitations and/or form-design is required.

In the CBD area, there are some heritage public buildings that were not fully utilized by the relocation of the capital. These former governmental facilities, which were built in the British colonial era, have great potentials to be reborn into a classic urban facility. For the improvement of the city, together with the conservation of the buildings, it is effective to convert their usages into another new context that will be utilized by the citizens.



Source: JICA Study Team

Figure 4.1.2: Historic Buildings Which Are Required Conservation and Re-utilization

b) Promotion of the Tourism

In the CBD area, there are a number of precious tourism resources such as historic district around Sule Pagoda, China town with many shopping centers, etc. In order for tourists or citizens to enjoy these attractive urban spaces, it is recommended to develop attractive and comfortable urban spaces with high quality design. To create open spaces and pedestrian streets together with street trees, well designed street furniture and lighting, etc. is important to attract people to move within the urban space.

In addition, activities such as night markets or light-up historic buildings shall attract more people to visit the urban space at night. For the same purpose, it is effective to form attractive urban spaces in both day and night. Together with intangible activities such as cultural policy, invitation for the attractive events, development of tourist routes, etc, multilateral measures will be required for the development of tourism.


Source: JICA Study Team

Figure 4.1.3: Nightscape in Asian City

c) Development of the Waterfront

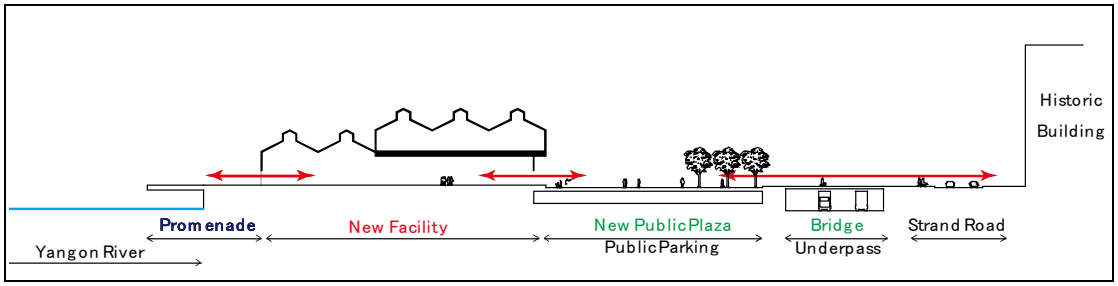
The growth of the city of Yangon cannot be separated from the Yangon River. Currently, this city, which has been developed as a mercantile city by the marine transport, does not have accessible waterfront for the people, as most of the area along the river is occupied by the port facilities such as container yards, etc. “The City of Water” is one of the original landscapes of this city. In order to revive the identical landscape along the riverside, it is desirable to open part of the waterfront area as public spaces through the installation of new urban facilities.


Source: JICA Study Team

Figure 4.1.4: Historic Urban Landscape along Yangon River

At the Sule Pagoda Wharf next to the historic district in the downtown area, together with the Seikkantha Park where there are some ferry terminals, it is effective to increase the attractiveness of the urban space through the installation of a new field for ivic activities. That is, some developments, such as reuse of old stone-made warehouses to serve as new commercial or cultural facilities with the installation of promenade along the river, and

development of underground utility and infrastructure below the Strand Street to facilitate access from the downtown area , are expected.



Source: JICA Study Team

Figure 4.1.5: Proposal Idea for Existing Warehouse along Yangon River

(4) Implementation Method for the Urban Regeneration

To achieve above strategies, it is necessary to advance the planning with consideration for various rights. The following are necessary methods for the implementation of the redevelopment through the district planning for city induction, urban regeneration fund and right transfer.

a) Implementation of Urban Redevelopment

For redevelopment project of a huge-scale old building or a district, implementation of the project by cooperation of public-private will be effective. Through this method, new urban facilities, which could not be located in the CBD area, such as convention center and general hospitals can be located there. For the implementation of the project, 1) selection of the cooperated company, 2) definition of the public function in the objected development area, and 3) plan and implementation of the integrated plan with complement function for the public use such as hotel accommodation or office spaces, is needed for the additional new facilities in the CBD area. And also it is effective to provide benefits the same to those described above.

b) District Planning for City Induction

In the CBD area, there are a lot of buildings over fifty years. Therefore it can be considered that reconstruction will proceed in the near future. In order to maintain the good urban landscape in the CBD area, to set integrated rules will be effective. Through certain rules, public spaces such as sidewalks, parking lots and green space, and better skylines through height limitation can be ensured in the CBD area. In addition, while assuming the designation of this district plan, it is effective to provide benefits such as mitigation of the height restriction of the whole district, tax reduction measures and acceleration of the development approval etc.

c) Urban Regeneration Fund

The CBD is the area with high potential for the development in the future because of its high density population and concentrated locations of various facilities such as commercial, business and public-use buildings. In order to ensure funds for the redevelopment in the CBD area, to construct and use REIT (Real Estate Investment Trust) system as a method to gather the fund widely is effective.

d) Right Transfer

For implementation of the redevelopment project in the CBD area, an agreement between the land owner and floor owners of existing building is needed. For the fluent achievement of the

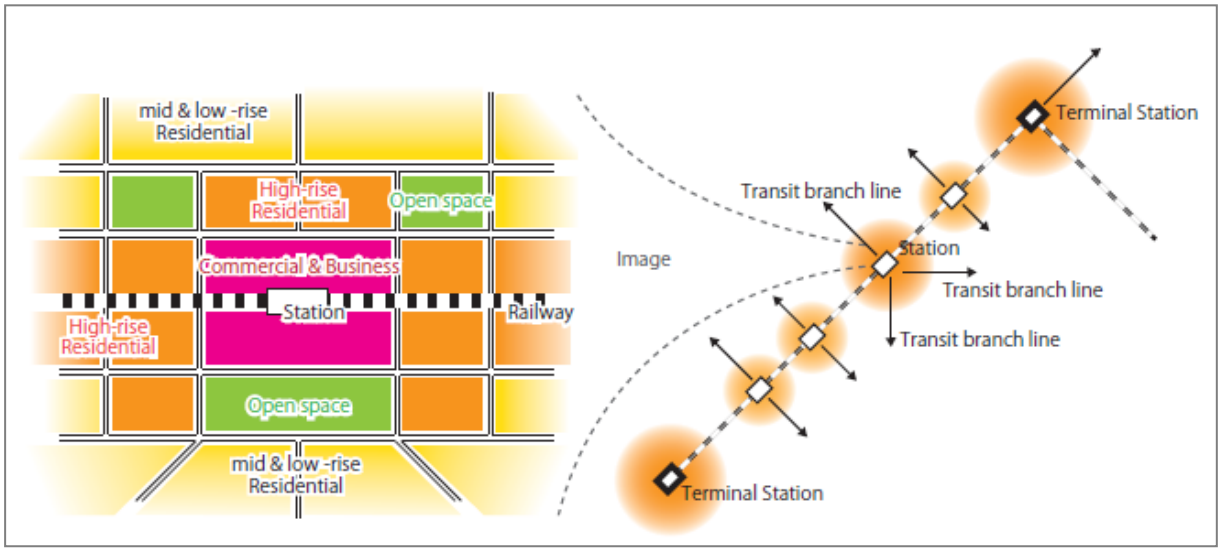
agreement process, it is effective to study various ways not only by providing the right as compensation payment as normal way but also by exchanging right such as providing housing in outside of the CBD.

2) Promotion of TOD (Transit Oriented Development) Policy

In light of the basic policy-2, promotion of TOD policy is recommendable in order to aims to optimize the effectiveness and efficiency of the public transportation system (railways, buses, bicycles, and so on). TOD refers to residential and commercial centers designed to maximize access by transit and non-motorized transportation, and with other features to encourage transit ridership.

Development of five (5) new UMRT lines is proposed to meet demand forecast of the future in the master plan. A typical TOD has a rail or bus station at its center, surrounded by relatively high-density development, with progressively lower density spreading outwards 0.5-2.0 km representing pedestrian scale distances. In light of the concept, the railway stations of UMRT lines will be the main centers of new urban development areas, namely "New Town Cores".

Around the railway station, lead business, commercial and high-rise residential areas to form a dense urban area around the railway station. At the station, arterial roads will be connected with transit branch lines such as feeder buses. An idea of new urban development areas with TOD policy is summarized in Figure 4.1.6;



Source: JICA Study Team

Figure 4.1.6: An Image of New Urban Development with TOD Policy

3) Promotion of Smart-City Policy

In light of the basic policy-2, Yangon still has problem of inadequate infrastructure supply. Aiming to development visions, namely an international HUB city, a comfortable city, and a well-managed infrastructure city, it is necessary to strengthen fundamental infrastructure services. In the context, it is recommendable to promote smart-city policy that can cope with both infrastructure development and environmental consideration. Greater Yangon, the largest commercial and business city in Myanmar, should be Myanmar's leading model city of smart-city policy. Development activities with advanced smart technologies, such as energy recycle (ex: photovoltaic power), next generation transportation system (ex: electric bus),

energy management system (ex: CEMS, HEMS, BEMS) should be promoted by means of giving incentive to the developers.

4) Replacement and Relocation for Appropriate Land Use

In light of the basic policy-2, replacement and relocation of industrial and logistic facilities, and public facilities and functions is proposed for appropriate land use as follows.

(1) Appropriate Replacement of Industrial and Logistic Facilities

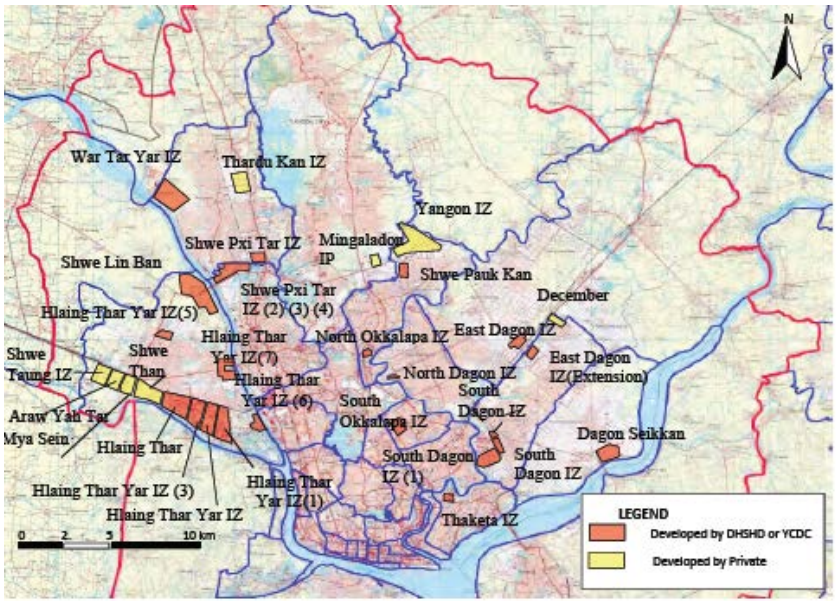
To realize both effective industrial promotion and proper living conditions of the citizens, it is essential to promote gradual relocation of industrial and logistic facilities, which are located near residential lands in the inner urban area up and its outskirts, in the long-term.

In Yangon, 24 industrial zones are currently under operation with a total area of 5,105 ha, which cover some unused lands as shown in Table 4.1.2 and Figure 4.1.7. The JICA Study Team proposed that new construction or expansion of large scale factories exceeding a certain threshold size, which are not located in these industrial zones, shall not be allowed in general urbanization area.

Table 4.1.2: Existing Industrial Zones

Name of Industrial Zone		Developer	Status of Development	Land Area (ha)
1	Hlaing Thar Yar IZ (1-7)	DHSHD	Completed in 1994-1997	780
2	Shwe Thann Lyin IZ	Shwe Thann Lyin Co.	Under Development	168
3	Mya Sein Yaung IZ	War War Win Co.	Under Development	118
4	Anaw Yah Tar IZ and Shwe Taung IZ	Mahar Shwe Taung Co.	Under Development	315
5	Shwe Lin Ban IZ	DHSHD	Completed in 2002	445
6	Shwe Pyi Thar IZ (1)	DHSHD	Completed in 1989	136
7	Shwe Pyi Thar IZ (2,3,4)	DHSHD	Completed in 1998-2000	400
8	War Ta Yar IZ	DHSHD	Completed in 2004	445
9	Thardu Kan IZ	TOSTA High Rise	Completed in 2002	195
10	Mingaladon IP	Mingaladon Industrial Park Co.	Completed in 1998	89
11	Yangon IP	Zaykabar Co.	Completed in 2000	400
12	Shwe Paukkan IZ	DHSHD	Completed in 1992-1993	38
13	North Okkalapa IZ	DHSHD	Completed in 1998	45
14	South Okkalapa IZ	DHSHD	Completed in 2001	15
15	North Dagon	YCDC	Completed	10
16	East Dagon IZ	DHSHD	Completed in 2000	202
17	East Dagon IZ (extension)	DHSHD	Completed	115
18	South Dagon IZ (1)	DHSHD	Completed in 1992	192
19	South Dagon IZ (2)	DHSHD	Completed in 1992	87
20	South Dagon IZ (3)	DHSHD	Completed in 1992	22
21	December IZ	December Co.	Under Development	142
22	Dagon Seikkan IZ	DHSHD	Completed in 1998-1999	490
23	Tharketa IZ	DHSHD	Completed in 1999	81
24	Thilawa IZ	DHSHD	Completed	175
Total				5,105

Note: DHSHD: Department of Human Settlement & Housing Development in the Ministry of Construction
Source: JICA Study Team based on data obtained from DHSHD and others



Source: JICA Study Team based on the data from YCDC map

Figure 4.1.7: Location of Existing Industrial Zones

(2) Relocation of Public Facilities and Functions

To lead and accelerate decentralization movement, public facilities which are currently located in CBD shall be relocated while public functions such as local administration and others shall be transferred to the secondary CBD or sub-centers. Through the relocation, it is also expected to provide a more effective public service compared to the current situations of isolated public facilities. Additionally, the sites where these public facilities moved out from CBD can be utilized for commercial or business use, which will lead to promotion of economic growth.

5) Creation of new "Secondary CBD" and "Sub-centers"

(1) Development Policy

In light of the basic policy-3, the main objective of development of a secondary CBD and sub-centers is to ease the load of concentration at the existing CBD, and to promote decentralization of urban center functions in the future. To accelerate this, effective measures of urbanization promotion targeting the areas of the secondary CBD and the sub-centers should provide some form of special incentives.

Although the present land use regulation is based on the building height control relative to the width of the frontage road (normally, up to two times the width), an incentive which allows intensive land use with high-rise buildings should be adopted in the secondary CBD and the sub-centers than that in general areas. On the other hand, as it is required to consider accommodating a large number of workers and residents in those areas, a comprehensive development plan covering the entire area of the secondary CBD and sub-centers must be submitted by the developer at the initial stage.

Table 4.1.3 shows a list of candidate sites of the secondary CBD and the sub-centers around 10-15 km radius away from the city center. These suitable lands for sub-centers were found in the course of discussions with YCDC. It must be noted that deeper and more extensive discussions, examination and surveys, and negotiation with land owner(s) are necessary to realize them.

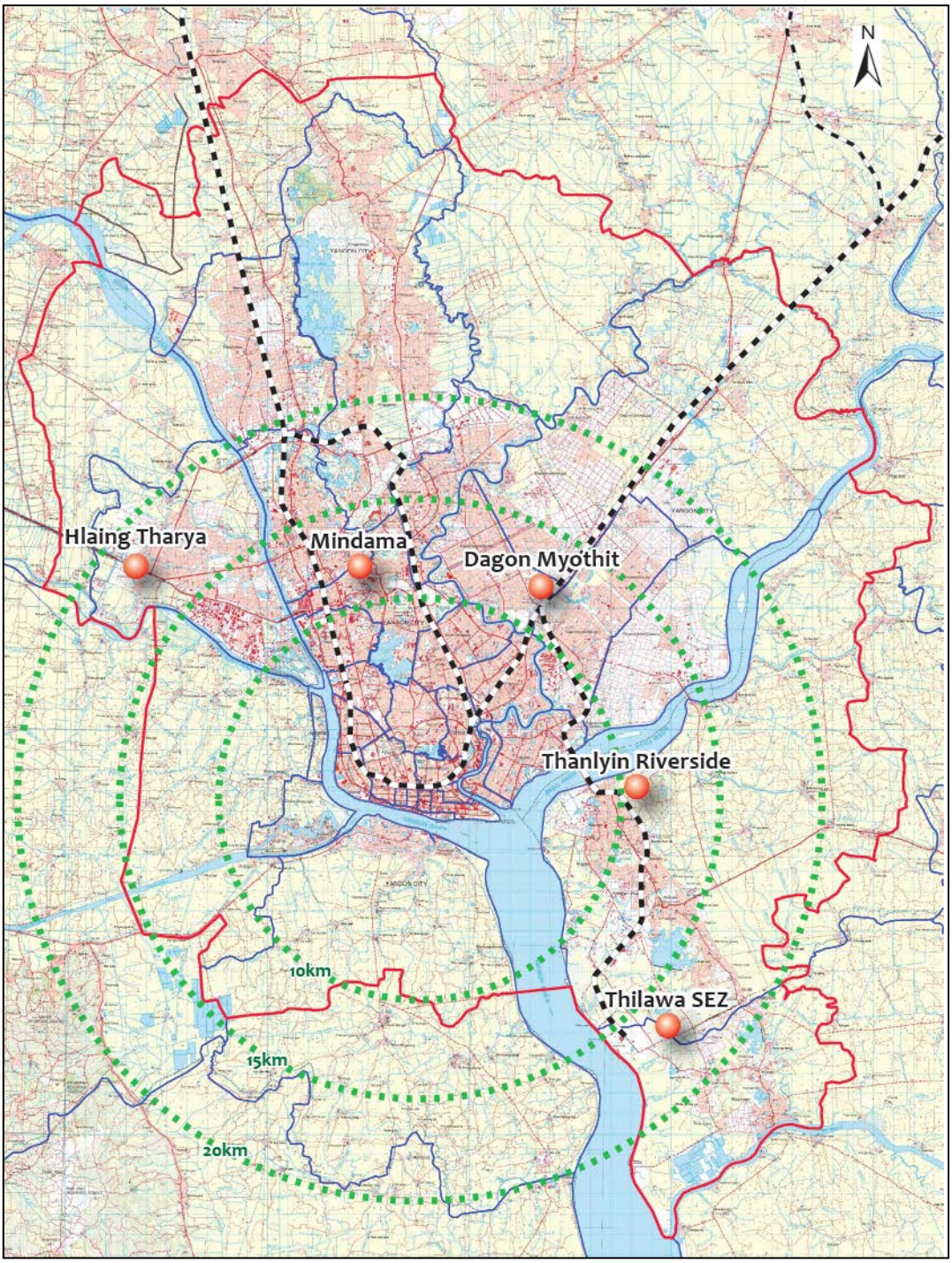
Table 4.1.3: Candidate Sites of Secondary CBD & Sub-centers

Name	Location Township	Land Ownership	Estimated Net Area for Commercial and Business Use	Schedule		
				Short	Mid	Long
Mindama Secondary CBD	Insein	YCDC, Military, Ministry of Agricuture, Defence Ministry	80 ha (200acre)			
Thilawa SEZ Sub-center	Thanlyin and Kyauktan	Ministry of Construction	50ha (125acre)			
Bago Riverside Sub-center	Thanlyin	Farm Lands	120ha (300acre)			
Dagon Myothit Sub-center	Dagon Myothit (North)	Ministry of Sports	120ha (300acre)			
Hlaing Tharya Sub-center	Hlaing Tharya	Farm Lands	120ha (300acre)			

Source: JICA Study Team

(2) Profiles of Candidate Sites

Profiles of candidate sites of the secondary CBD and sub-centers are as shown in the next pages.



Source: JICA Study Team

Figure 4.1.8: Location of Candidate Sites of the Secondary CBD and Sub-centers

Table 4.1.4: Profile of Mindama Secondary CBD (1/2)

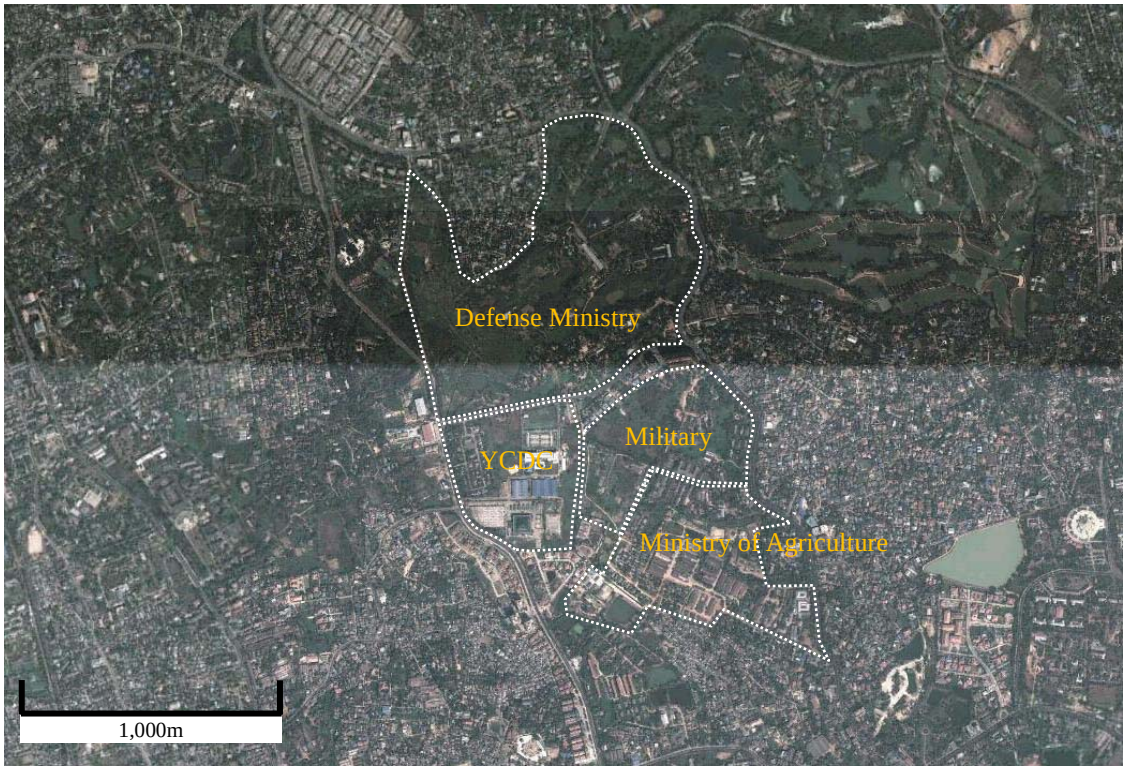
Name		Mindama Secondary CBD
Basic Information	Location Township	Insein Township
	Distance and direction from CBD	12 km northward (direct distance from Sule Pagoda)
	Land Ownership	YCDC, Military, Ministry of Agriculture, Defense Ministry
	Estimated Net Area	80ha (200acre)
Current Conditions	Land Use of the Site and its Surrounding Areas	Mindama Secondary CBD is located in Insein Township, northern suburban area of Yangon City. The area is relatively flat land with 12 to 13 m height. Midama Secondary CBD is currently utilized mainly as cultivated land, grass land, and open space (vacant lot). The surrounding areas are covered mainly with residential land. The area will have a development potential to be the new center of the Greater Yangon, which will serve not only commercial and business service functions but also administrative and trade functions based on its suitable location between the airport and current CBD.
	Transportation	- Pyay Road

Development Framework	Main Land Use	New CBD (Commercial, Business, Trade, Banking, etc.)
	Development Schedule	Short-term (-2018)
	Estimated Volume of Development	100,000 (Labor population) 500ha (Net floor area)
Development Concept	Function and Role	- Secondary CBD to decentralize urban functions in CBD - International trade, gateway, and business function - New administrative function
	Main Facilities	- Banking, financial, business, and commercial complex area - Trade and gateway area - Administration area - Medical and healthcare area - Mindama Railway Station (New lines, UMRT1 & UMRT2)
	Expected Arterial Transport Network	- Pyay Road - UMRT1 (new railway line) - UMRT2 (new railway line)

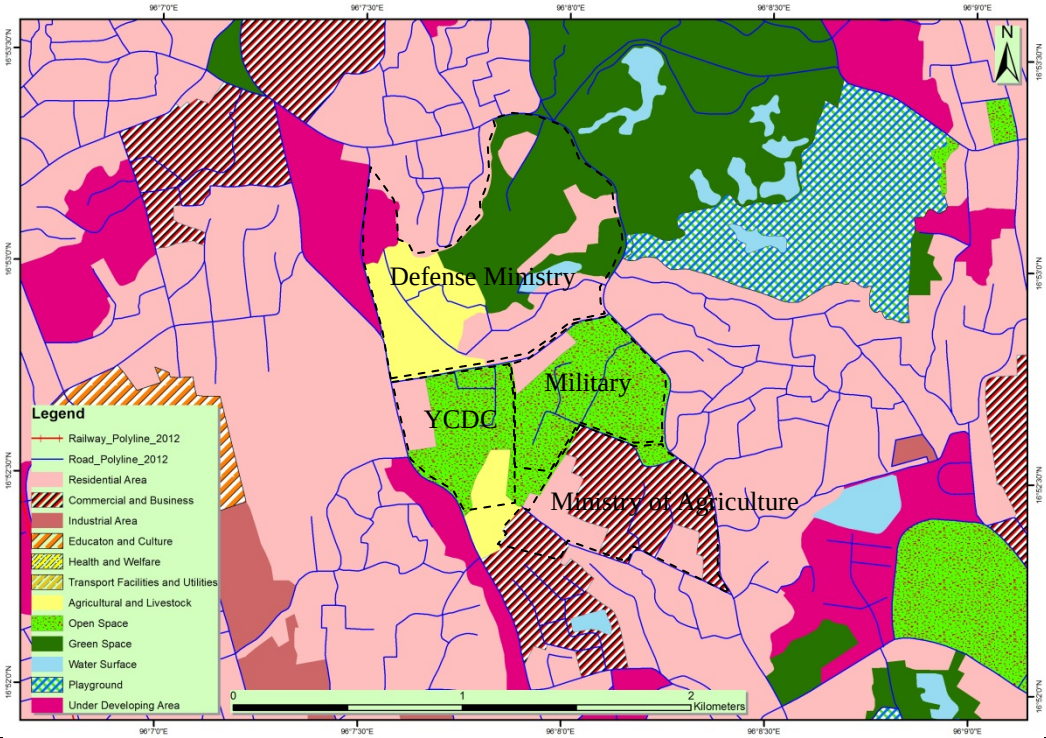
Current Pictures	
	

Table 4.1.5: Profile of Mindama Secondary CBD (2/2)

Current Satellite Image



Current Land Use Map



Source: JICA Study Team based on Geo Eye Satellite Image of 2012

Table 4.1.6: Profile of Thilawa SEZ Sub-center (1/2)

Name		Thilawa SEZ Sub-center
Basic Information	Location Township	Thanlyin Township & Kyauktan Township
	Distance and direction from CBD	17 km southeastward (direct distance from Sule Pagoda)
	Land Ownership	Ministry of Construction
	Estimated Net Area	50 ha (125acre)
Current Conditions	Land Use of Surrounding Area	Thilawa SEZ sub-center is located in Thanlyin and Kyauktan Township, southeastern suburb area of the Greater Yangon. The area is relatively flat land with 4 to 5 m height. Lower flat land spread over at southern part of Thilawa area, where the area faces Yangon River. Thilawa is well known as one of the SEZs in Myanmar with Thilawa Area Port. Thilawa SEZ is currently utilized mainly as cultivated land, grass land, open space (vacant lot), and under developed land. Lower flat land is well cultivated as paddy field currently. Paddy field also serve as retention. The area is currently a sort of fringe area mixing urbanized area with agricultural area, as it consists of suburban residences and traditional village landscape. Villages are scattered at terrace or highland areas to avoid inundation in the rainy season.
	Transportation	- Thilawa Access Road - Thilawa Branch Line (existing railway line)

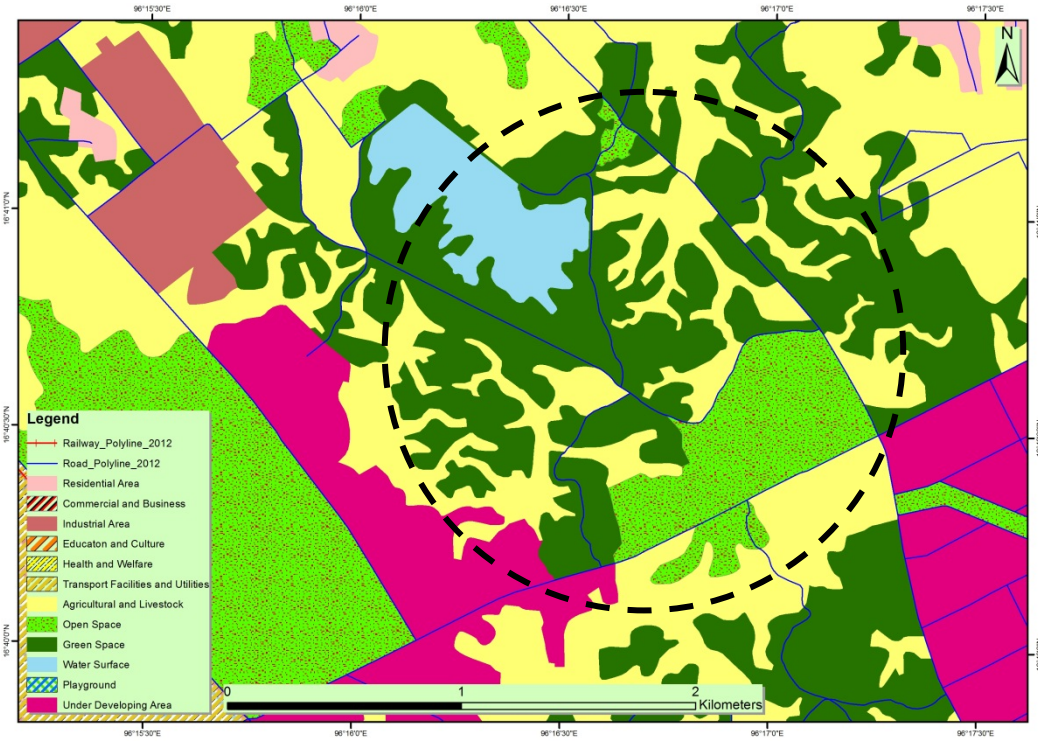
Development Framework	Main Land Use	Industry, Commercial, Business and Academic & Research
	Development Schedule	Short-term (-2018) & Mid-term (-2025)
	Estimated Volume of Development	60,000 (Labor population) 300ha (Net floor area)
Development Concept	Function and Role	- Sub-center to decentralize urban functions in CBD - Advanced industrial and manufacturing function - Academic and research function
	Main Facilities	- Thilawa Special Economic Zone - Thilawa Area Port and container yards - Public research institutes area - R & D and IT software area - Thilawa Terminal Station (Existing line)
	Expected Transportation	- Thilawa Access Road - Thilawa Branch Line (existing railway line) - UMRT4 (new railway line)

Current Pictures	
	

Table 4.1.7: Profile of Thilawa SEZ Sub-center (2/2)

Current Satellite Image

Current Land Use Map



Source: JICA Study Team based on Geo Eye Satellite Image of 2012

Table 4.1.8: Profile of Bago Riverside Sub-center (1/2)

Name		Bago Riverside Sub-center
Basic Information	Location Township	Thanlyin Township
	Distance and direction from CBD	13km eastward (direct distance from Sule Pagoda)
	Land Ownership	Farm Lands
	Estimated Net Area	120ha (300acre)
Current Conditions	Land Use of Surrounding Area	Bago Riverside sub-center is located in Thanlyin Township, eastern suburbs area of the Greater Yangon. The area is flat land with 2 to 3 m height, along the riverbank of Bago River. Bago Riverside is currently connected to Yangon City with Thanlyin Bridge and Railway. Bago Riverside sub-center is currently utilized mainly as cultivated land and underdeveloped land. The surrounding areas consist mainly of residential land, cultivated land, and underdeveloped land.
	Transportation	- Thilawa Access Road - Thilawa Branch Line (existing railway line)

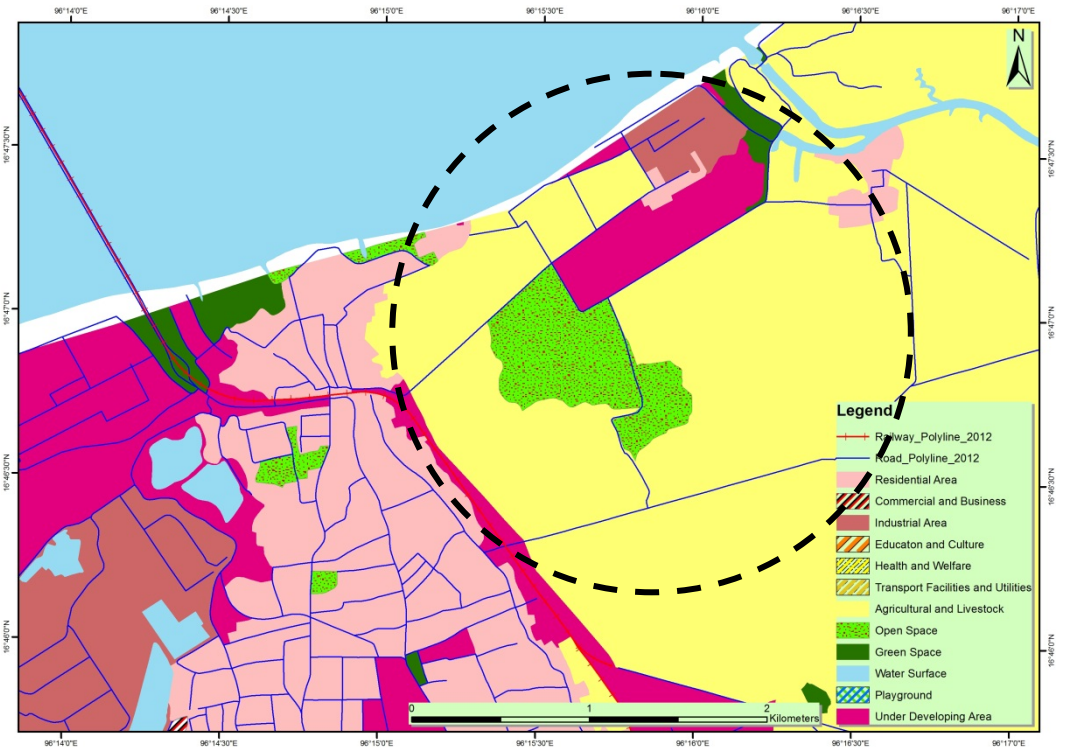
Development Framework	Main Land Use	Commercial, Business, Residential and Recreation
	Development Schedule	Short-term (-2018)
	Estimated Volume of Development	150,000 (Labor population) 750ha (Net floor area)
Development Concept	Function and Role	- Sub-center to decentralize urban functions in CBD - Inland water logistics function - Waterfront amusement function - Business and commercial function - Residential function
	Main Facilities	- Waterfront amusement and hotel area - Business and commercial complex area for suburbs - Residential Area - Inland port area - Bago Riverside Station (Existing line)
	Expected Transportation	- Thilawa Access Road - Thilawa Branch Line (existing railway line) - UMRT1 (new railway line) - Bago River (inland waterway)

Current Pictures	
	

Table 4.1.9: Profile of Bago Riverside Sub-center (2/2)

Current Satellite Image

Current Land Use Map



Source: JICA Study Team based on Geo Eye Satellite Image of 2012

Table 4.1.10: Profile of Dagon Myothit Sub-center (1/2)

Name		Dagon Myothit Sub-center
Basic Information	Location Township	Dagon Myothit (North) Township
	Distance and direction from CBD	13km northeastward (direct distance from Sule Pagoda)
	Land Ownership	Ministry of Sports
	Estimated Net Area	120ha (300acre)
Current Conditions	Land Use of Surrounding Area	Dagon Myothit sub-center is located in Dagon Myothit (north) Township, northeastern suburban area of the Yangon City. The area is relatively flat land with 3 to 4 m height. Dagon Myothit sub-center is currently utilized mainly as sports field, cultivated land and underdeveloped land. The surrounding areas consist mainly of residential lands, and underdeveloped land.
	Transportation	- No.(2) Main Road - Yangon-Mandaley Main Line (existing railway line) - Thilawa Branch Line (existing railway line)

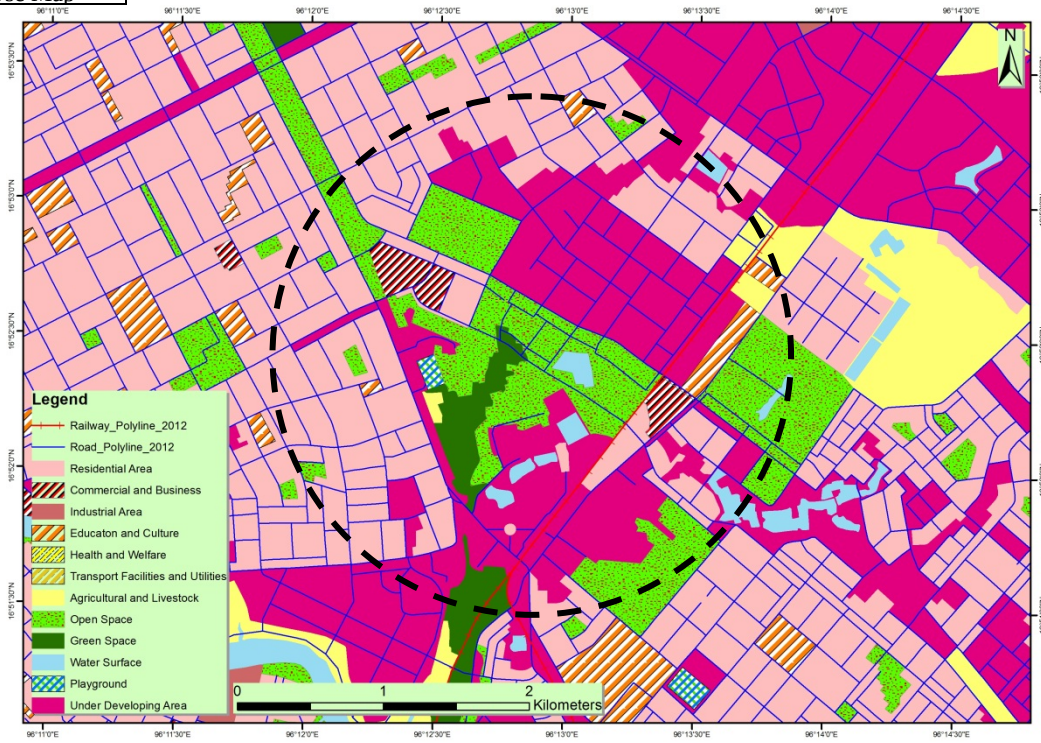
Development Framework	Main Land Use	Commercial, Business and Recreation
	Development Schedule	Middle-term (-2025)
	Estimated Labors	150,000 (Labor population) 750ha (Net floor area)
Development Concept	Function and Role	- Sub-center to decentralize urban functions in CBD - Logistics center for eastward and northward - Hotel & Sports function
	Main Facilities	- Hotel complex area - Sports and leisure area - Logistics center area - Dagon Myothit Station (Existing line and new line, UMRT1 & 3)
	Expected Transportation	- No.(2) Main Road (improved) - New Ring Road - Yangon-Mandaley Main Line (existing railway line) - Thilawa Branch Line (existing railway line) - UMRT1 (new railway line) - UMRT3 (new railway line)

Current Pictures	
	

Table 4.1.11: Profile of Dagon Myothit Sub-center (2/2)

Current Satellite Image

Current Land Use Map



Source: JICA Study Team based on Geo Eye Satellite Image of 2012

Table 4.1.12: Profile of Hlaing Tharya Sub-center (1/2)

Name		Hlaing Tharya Sub-center
Basic Information	Location Township	Hlaing Tharya Township
	Distance and direction from CBD	19km northwestward (direct distance from Sule Pagoda)
	Land Ownership	Farm Lands
	Estimated Net Area	120ha (300acre)
Current Conditions	Land Use of Surrounding Area	Tharya sub-center is located in Hlaing Tharya Township, northwestern suburb area of the Greater Yangon. The area is relatively flat land with 2 to 3 m height. Hlaing Tharya sub-center is currently utilized mainly as under developed land. The area is traditionally covered with paddy field however, the area is currently quickly urbanizing. The area is currently a sort of fringe area mixing urbanized area with agricultural area, so that the area has suburban residences and traditional village landscape. The surrounding areas consists mainly of residential land, cultivated land, and underdeveloped land.
	Transportation	- No.(5) Main Road

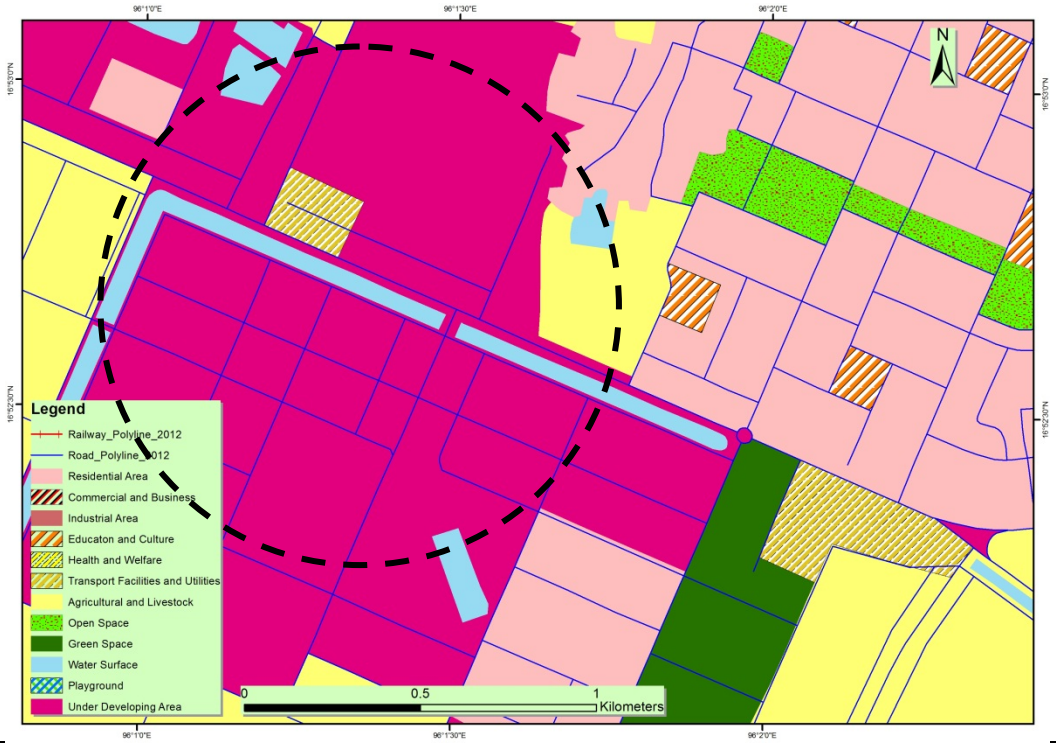
Development Framework	Main Land Use	Commercial, Business and Residential
	Development Schedule	Middle-term (-2025)
	Estimated Labors	150,000 (Labor population) 750ha (Net floor area)
Development Concept	Function and Role	- Sub-center to decentralize urban functions in CBD - Logistics center for westward and southward - Business and commercial functions - Residential function
	Main Facilities	- Business and commercial complex areas for suburbs - Logistics center area - Residential area - Hlaing Thayar Station (New line, UMRT1)
	Expected Transportation	- No.(5) Main Road (improved) - New Ring Road - UMRT1 (new railway line)

Current Pictures

Table 4.1.13: Profile of Hlaing Tharya Sub-center (2/2)

Current Satellite Image

Current Land Use Map



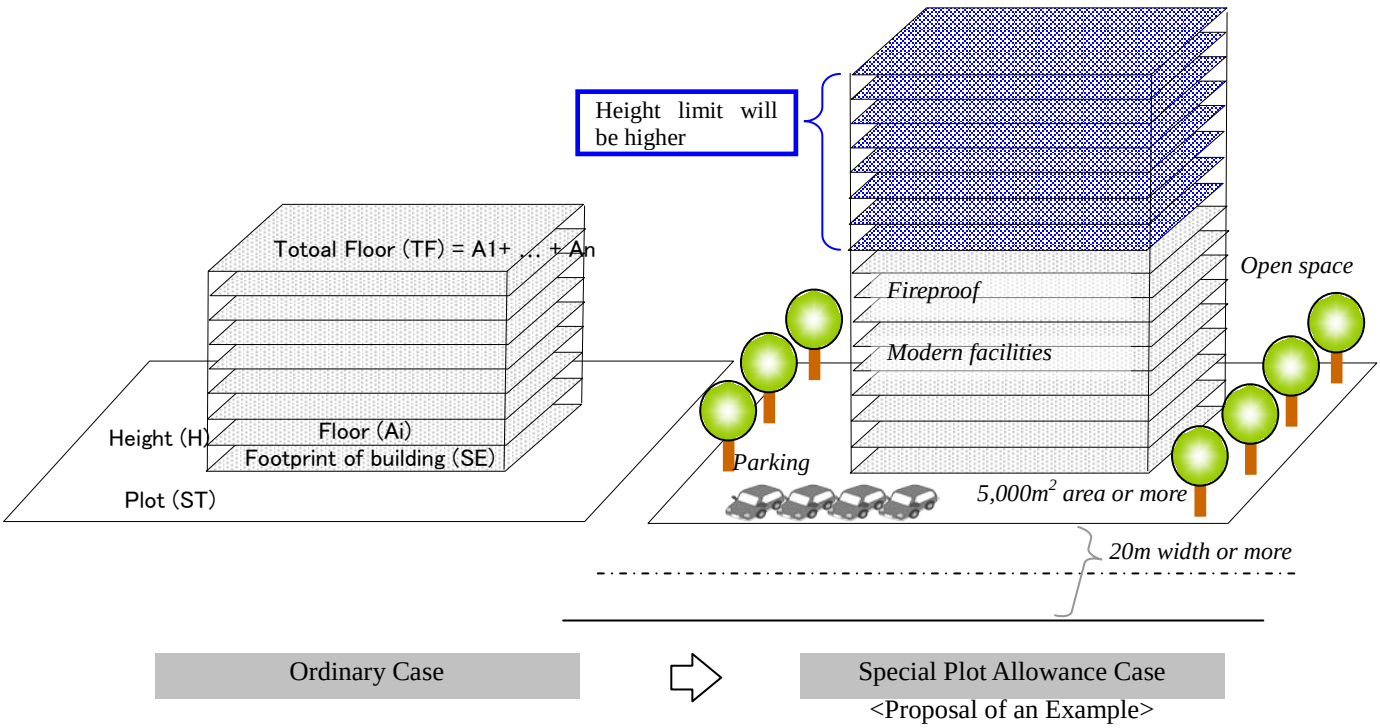
Source: JICA Study Team based on Geo Eye Satellite Image of 2012

6) Promotion of Intensive Land Use (Spatial Plot Allowance)

In light of the basic policy-4, to promote economic growth from viewpoint of effective land use, it is recommended to allow a special incentive land use, namely more building height limitations, rather than in general, only when a development activity satisfies all required conditions under the building application/permission procedure by the Engineering Department (Building) of YCDC. The present land use regulation is based on the building height control relative to the width of the frontage road (normally, up to 2 times of the width). This general control shall be eased up and given special incentive only in case that the development activity satisfies the required conditions.

The JICA Study Team proposed the required conditions as follows:

- Plot has minimum area requirement (for example, 5,000 m^2),
- Plot faces arterial road (for example, with minimum width 20 m) and provision of access road,
- Plot has enough parking spaces for tenants (Parking space requirement must be specified for type of development),
- Plot has open space with green and water (for example, 20% of plot area),
- Plot has provision for water supply and sewerage treatment plant, and Plot has fireproof facilities.



Source: JICA Study Team

Figure 4.1.9: Proposal for Cases of Allowing Special Plots

7) Mitigation of Disaster Risks

In light of the basic policy-5, disaster risks in the Greater Yangon can be extracted using the available data /information as described in Table 4.1.14, however, detailed study on such disaster risks has been lacking.

Table 4.1.14: Disasters in Greater Yangon

Category	Disaster
Infrequent Disaster with Large Damage	Earthquake
	Cyclone
Frequent Disaster with Small Damage	Drainage Congestion
	Tidal Flood including Storm Surge
	Fire
	Thunder
Potential Disasters in Future	Flood Inundation in and around newly Developed Areas
	Ultra Rapid/ Heavy Rainfall and Drought due to Climate Change
	Abnormal High Temperature due to Heat Island Phenomenon

Source: JICA Study Team

Based on the disasters above, initial ideas or recommendations on disaster measures in Greater Yangon are proposed as follows:

(1) Implementation of Detailed Analysis and Assessment of Disaster Risk

Some parts of detailed disaster risk of earthquake were analyzed by MES such as location of active fault and seismic scale with occurrence probability. However, impacts on both human life and property values are not analyzed e.g. simulation of fire spread during and after earthquake in urban area in Greater Yangon is not yet examined.

Disaster risk potential of river floods is unknown, and inland inundation condition with 100 year probable rainfall is also unknown. Such multi disaster risk should be analyzed during the next process of disaster management.

Based on the detailed analysis results, the acceptance of such events should be assessed thoroughly during discussions among stakeholders.

(2) Legal and Institutional Improvements

Disaster Prevention Plan of the Greater Yangon and Business Continuous Plan (BCP) of every organization should be prepared based on the detailed analysis and assessment of disaster risks. Besides, technical cooperation including technology transfer on inspection of seismic resilience of buildings from Japan can be one of the effective assistance. Establishment of a department for disaster public awareness in YCDC is desirable because they may be the closest public service authority in Yangon City.

Above mentioned initial ideas for disaster management highly require capacity developments of YCDC and related authorities.

(3) Structural Advices

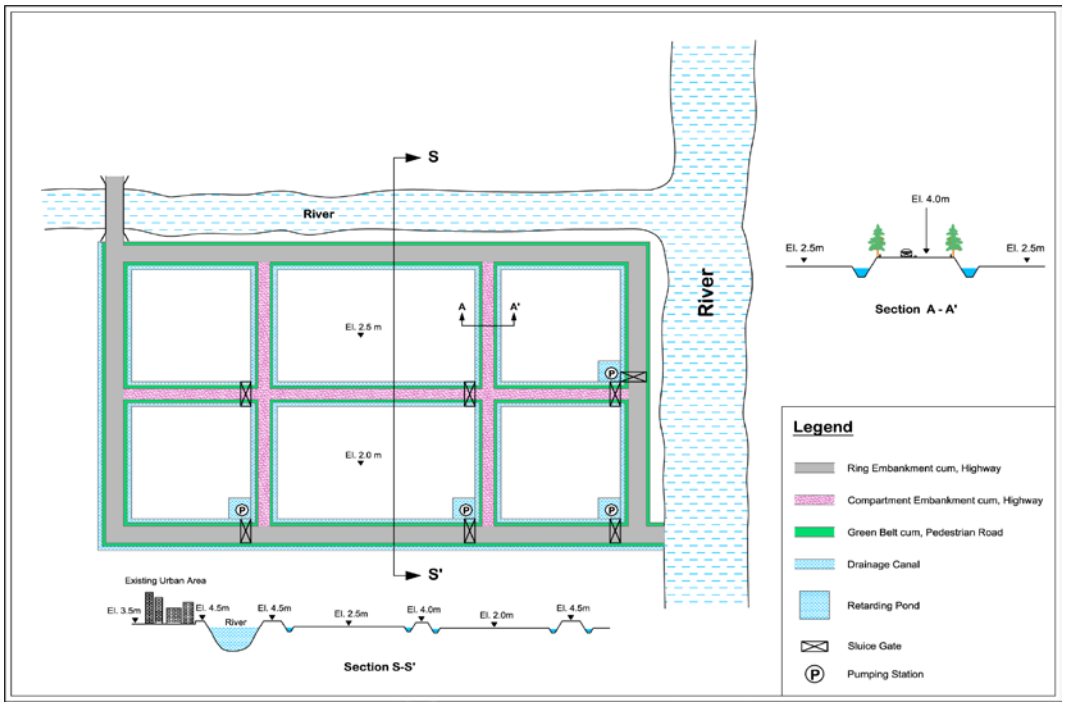
The hereafter describes initial ideas of disaster management measures. These initial ideas may require further studies and discussion.

a) Compartmentalization of Low-lying Deltatic Areas:

Because of their locations and close proximity to CBD, some part of low-lying deltatic areas are expected to be developed. For example, Dala Township is located between CBD Yangon and Thilawa SEZ. If the area is connected by bridges to both CBD and Thilawa SEZ, it is

obvious that the area will be prioritized for development. However, as described in Chapter 2, the low-lying areas often have tidal flood inundations. Hence, moderate infrastructure arrangement for land development is indispensable. Construction of ring embankment and compartment embankments shown in Figure 4.1.10 is suggested for such development of low-lying areas. The compartmentalization has been implemented in low-lying deltatic or estuary areas in Netherlands, Bangladesh and so on.

If ring embankment area is large, the inside area of the embankment has elevation differences within the area which causes inland inundation around lower elevation area within the embankment. Compartmentalization divides flood protection area: inside area of ring embankment, through installation of compartment embankments. Rainwater in each compartment is drained individually through drainage canal, retarding pond and pumping station. Ring and compartment embankments can be utilized as transportation network such as flood-proofing access because of their high crest elevation.



Source: JICA Study Team

Figure 4.1.10: Concept of Compartmentalization of Low-lying Deltatic Areas

b) Rainwater Drainage System

The JICA study project entitled "The Project for the Improvement of Water Supply, Sewerage and Drainage System in Yangon City" includes preparation of a master plan for drainage system in Yangon City. Based on the master plan, drainage system such as open channel for drainage in Yangon City should be improved. Drainage pipeline network especially in CBD, sluice gates on some drainage channels, and pumping systems also should be constructed in the near future. Almost all capital cities in other countries have drainage pumping system. Probably, Yangon City also cannot avoid investing on this to develop an inundation water free environment.

c) Reduction of Run-off Water in Urban Area

Beside the improvement of rainwater drainage system in Yangon City, efforts on reduction of run-off water in urban area are also important. Approach on the reduction of run-off in urban area can be categorized as i) hard-measure: introduction of rainwater storage facilities and ii)

soft-measure: conservation of water body[1] and forest areas, regulation of wetlands development. In Japan, some large scale public buildings comprise rainwater collection and reuse system[2] e.g. the rainwater storage capacity of Edo-Tokyo museum and Sky-tree complex building is 2,635 m^3 and 2,500 m^3, respectively.

d) Crest Elevation of Highway and Railway

For catastrophic flood disasters, fundamental road network such as circumferential road should have a crest with enough elevation to maintain its function during and after the floods because the road network will be utilized for evacuation, rescue and food/water supply routes. In Bangladesh, crest elevations of national highway network are set higher than 50-year probable flood water level based on experienced difficulties of rescue/needs supply activities during and after the floods.

e) Regulation of Underground Development

Based on the JICA study survey results, it was concluded that there is no need for a traffic underpass system. This conclusion is reasonable since underpass structures require drainage system such as pumps. In Jakarta,and Indonesia, there were reported victims caused by drainage congestion in the underpass system. Pumping systems on the underpass in Jakarta malfunctioned during the flood occurrence, and rainfall ponds have developed in the underpass at the time of the accident. It is reasonable to mention that underground structures including underpass and underground parking lots on low elevation areas should be strictly regulated or prohibited for safety.

8) Improvement of Management System

In light of the basic policy-6, improvement of data management system is proposed to be a city of good governance as follows.

(1) Accurate Statistics of Wards

An urban development planning shall be strengthened by statistics that illustrate current socio-economic conditions and level of urban services accurately. To acquire that information, a statistic based on ward level is indispensable. However, current statistics reported by ward and township are not consistent. This is caused by a manually-calculated statistics and paper-based reports by ward officers. These systems should be elaborated through training of ward officers in terms of developing expertise in statistics, unification of statistics form, preparation of statistics manual, etc.

- Training of ward officers as a statistic expert,
- Unification of statistic form
- Preparation of statistic manual
- Computerization of statistic reports
- Periodically submission of the report to Township office
- Appropriate Aggregate Calculation by Township Office and YCDC

[1] Hanoi City, Vietnam is enlarging flood storage function of existing lakes through JICA cooperation, and Phnom Penh City, Cambodia backfilled a large lake to develop new real estate with foreign developer. Both capital city has opposite direction of urban development.

[2] Collected rainwater is used as water provision on garden, toilet, temperature conditioning system of building etc.

(2) Updating and management of household information

People's opinion shall be concisely reflected in the urban planning process. There are several measures to grasp people's opinions, such as stakeholder meeting, household interview survey, mail survey, and so on. However, these activities should be repeated periodically to compare the change of people's opinions and their current socio-economic conditions and urban issues. Therefore, data collected from those activities should be organized in a database, periodically updated and managed properly.

- Establishment of household database, which includes people's opinion acquired from workshops and sampling surveys
- Periodical conduct of sampling surveys
- Updating and analysis of changes
- Utilization of the results to urban planning

(3) Establishment of E-government

E-government provides an efficient administration and an easy access to information for residents through computerization of administrative procedures. The administration procedure relating to a household such as household registration, payment to urban services and taxes, and so on should be computerized. The system will manage the information regarding household members, occupation, date of birth, connectivity to urban services, etc. Based on this system, obtaining statistics for ward shall become easy and accurate, and can be effectively utilized for urban planning. In addition, provision of administrative information through internet will help people access information easily, relieve the burden of government officers, and achieve efficient works.

- Clarification of administrative works to be computerized
- Computerization of household registration
- Computerization of payment for urban services and taxes
- Computerization of clarified works
- Establishment of website to provide administrative information
- Provision of payment system through internet