Bangkok Metropolitan Administration
Government of Thailand

No.

THE STUDY
ON
IMPLEMENTATION OF
THE BMA SUBCENTERS PROGRAM
IN
THE KINGDOM OF THAILAND
(CASE OF LAT KRABANG)

Final Report

Summary

August 2006

Japan International Cooperation Agency (JICA)

Nippon Koei Co., Ltd.

SD
JR
06-057

PREFACE

In response to a request from the Royal Thai Government, the Government of Japan decided to conduct a “The Study on Implementation of the BMA subcenters Program in the Kingdom of Thailand (Case of Lat Krabang)” and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA selected and dispatched a study team headed by Mr. Koji Yamada of Nippon Koei Co., Ltd. to Thailand from September 2004 to August 2006.

The team held discussions with the officials concerned of the Thailand and conducted field surveys at the study area. Upon returning to Japan, the team conducted further studies and prepared this final report.

I hope that this report will contribute to the promotion of this project and to the enhancement of friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of Thailand for their close cooperation extended to the study.

August 2006

Kazuhisa Matsuoka
Vice President
Japan International Cooperation Agency

Mr.Kazuhisa Matsuoka
Vice President
Japan International Cooperation Agency
Tokyo, Japan

Subject: Letter of Transmittal

Dear Madam,

We are pleased to submit herewith the Final Report of "The Study on Implementation of the BMA subcenters Program in the Kingdom of Thailand(Case of Lat Krabang)". This study was conducted by Nippon Koei Co., Ltd., under a contract to JICA, during the period from September 2004 to August 2006. The report consists of Summary and Main Report.

The report presents recommendations for the policy to develop the subcenter in Bangkok Metropolitan Administration territory, which reflects the results of master plan for subcenter's program.

We would like to take this opportunity to express our sincere gratitude to your Agency and the Ministry of Foreign Affairs. We are also most grateful for the cooperation and assistance from the officials concerned in Thailand, the JICA Bangkok Office, and the Embassy of Japan in Thailand. The Final Report is a fruit of excellent collaboration of all participants in this study.

Yours Faithfully,

Koji Yamada
Team Leader, JICA Study Team
The Study on Implementation of the BMA subcenters Program in the Kingdom of Thailand(Case of Lat Krabang)

Bangkok Metropolitan Administration
Government of Thailand

THE STUDY
ON
IMPLEMENTATION OF
THE BMA SUBCENTERS PROGRAM
IN
THE KINGDOM OF THAILAND
(CASE OF LAT KRABANG)

Final Report

Summary

August 2006

Japan International Cooperation Agency (JICA)

Nippon Koei Co., Ltd.

Monetary Exchange Rate

（As of March 2006）

US$ =　38.947 Baht

THE STUDY
ON
IMPLEMENTATION OF
THE BMA SUBCENTERS PROGRAM
IN
THE KINGDOM OF THAILAND
(CASE OF LAT KRABANG)

Final Report

VOLUME II: SUMMARY

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

ADB	Asian Development Bank
AFTA	ASEAN Free Trade Area
ASEAN	Association of Southeast Asian Nations
B/C	Benefit / Cost Ratio
BCH	Bangkok - Chonburi Highway
BCP	Bangkok Comprehensive Plan
BCR	Building Coverage Ratio
BECM	Bangkok Extended City Model
BIRR	Bangkok Inter-Bank Offered Rate
BOD	Biochemical Oxygen Demand
BMA	Bangkok Metropolitan Administration
BMR	Bangkok Metropolitan Region
BRT	Bus Rapid Transit
BTS	Bangkok Mass Transit System
CAT	Communication Authority of Thailand
CBD	Central Business District
DOH	Department of Highways
DOL	Department of Land
DPT	Department of Public Works and Town & Country Planning
EGAT	Electricity Generation Authority of Thailand
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
ETA	Expressway and Rapid Transit Authority
FAR	Floor Area Ratio
FDI	Foreign Direct Investment
F/S	Feasibility Study
FY	Fiscal Year
GDP	Gross Domestic Product
GIS	Geographic Information System
GPP	Gross Provincial Product
HWL	High Water Level
ICAO	International Civil Aviation Organization
ICD	Inland Container Depot
ICT	Information Communication Technology
IEAT	Industrial Estate Authority of Thailand
IEE	Initial Environmental Examination
IO	Input Output
ITF	Inter-modal Transit Facilities
JBIC	Japan Bank of International Cooperation
JICA	Japan International Cooperation Agency
LKSD	Lat Krabang Subcenter Development
LR	Land Readjustment
LRT	Light Rail Transit
M/M	Minutes of Meeting
M/P	Master Plan
MEA	Metropolitan Electricity Authority
MAP	Million Annual Passengers
MIT	Massachusetts Institute of Technology
MOI	Ministry of Interior
MOT	Ministry of Transport
MRTA	Mass Rapid Transit Authority
MSL	Mean Sea Level
MSU	Main Switching Unit
MWA	Metropolitan Waterworks Authority
NBIA	New Bangkok International Airport
NEF	Noise Exposure Forecast
NESDB	National Economic and Social Development Board
NGO	Non-Governmental Organization
NHA	National Housing Authority
NLR	Noise Level Reduction
NPV	Net Present Value
O(B)RR	Outer (Bangkok) Ring Road
ODA	Official Development Aid
O&M	Operation and Maintenance

ABBREVIATIONS

ONEP	Office of Natural Resources and Environmental Policy and Planning
OTP	Office of Transport and Traffic Policy and Planning
PCD	Pollution Control Department under ONEP
PCM	Public Consultation Meeting
PMC	Project Management Consultant
PPP	Public Private Partnership
PS	Pumping Station
PVD	Perforated Vertical Drain
RDD	Research, Development & Design
REIT	Real Estate Investment Trust
RSU	Remote Switching Unit
ROW	Right-of-Way
SBIA	Second Bangkok International Airport
SADP	Suvarnabhumi Aerotropolis Development Plan
SEA	Strategic Environmental Assessment
SPC(V)	Special Purpose Company (Vehicle)
SRT	State Railway of Thailand
TOR	Terms of Reference
TOT	Telecommunication Organization of Thailand
WECPNL	Weighted Equivalent Continuous Perceived Noise Level

MEASUREMENT UNITS

Extent

cm^2 = Square-centimeters
m^2 = Square-meters
km^2 = Square-kilometers
ha. = Hectares (10,000 m^2)
rai = 0.16 Hectares

Volume

cm^3 = Cubic-centimeters
m^3 = cu.m = Cubic-meters
l = Liter

Length

mm = Millimeters
cm = Centimeters (cm = 10 mm)
m = Meters (m = 100 cm)
km = Kilometers (km = 1,000 m)
wah = 2 Meter

Weight

g = Grams
kg = Kilograms
ton, t = Metric tonne

Energy

kcal = Kilocalories
W = Watt
kW = Kilowatt
V = Volt
kV = Kilovolt
MJ = Megajoule

Time

sec, s = Seconds
min = Minutes
h, hr = Hour
d = Day

Others

% = Percent
^0C = Degree Celsius
K = Kelvin
lx = Lux
KP = Kilopascal
MP = Megapascal

1. INTRODUCTION

1.01 Background

Thailand has a national population of about 61.8 million with a land area of about 514,000 km^2. In the Bangkok Metropolitan Authority (BMA) jurisdiction an estimated population of 5.78 million resides, or nearly 10% of the national total, which alone indicates the heavy concentration of the population in the capital area. The Bangkok Metropolis has grown to be one of the most populated cities in the world, and one of the most active economic centers in South East Asia.

The growth of the Bangkok Metropolis has generally been driven by urbanization by the actions of individuals and by ad-hoc land development. As the public sector played a light and small role in urban development in the city, the urbanizing land developments are initiated primarily by the private sector for commercial purposes. This is thought to be one of the reasons why the road network in Bangkok is poorly devised in built-up areas, which, in conjunction with the over concentration of population in the city center area, causes great traffic congestion in the city center area. Unplanned urban sprawl outwards is in progress that causes not only traffic jams, but various problems relating to the urban living environment, including mixing of conflicting functions such as residential and industrial which is potentially hazardous to residents, lack or insufficient provision of public services and resultant deteriorating living environment.

In order to counter this issue, BMA has long been advocating a policy for shifting the urban structure from the present mono-centric to multi-centric one by introducing subcenters around the fringe of the existing city center. Lat Krabang is located in the vicinity of the new international Bangkok airport which is under construction now, and is considered to be one of the most attractive locations and the one with the highest priority for development. The Lat Karabang subcenter plan has been recognized in the comprehensive plan of MBA as well as in the regional development plans for the area around the new airport.

1.02 Objective of the study

The objective of the study on implementation of the BMA subcenters program in the Kingdom of Thailand (hereinafter referred as to “the Study”) consists of the following three subjects;

1) To formulate a strategic development plan for the Lat Krabang area (hereinafter referred as to “the Subcenter Area”) to develop a well-ordered and sound new urban area,
2) To formulate a basic plan for the pilot project area (hereinafter referred as to “the Pilot Area”) which will be selected in the Subcenter Area for the pre-feasibility study of the land readjustment method, and
3) To implement capacity building for the counterparts and Thai officials who take charge of the city planning, transportation planning, land readjustment, and environment and social assessment.

1.03 Study Area

The study for the master plan will be carried out in the Subcenter Area. In the master plan, a pilot area will be selected to formulate the basic plan of the land readjustment method in the pre-feasibility study level. An outline of the study areas are presented in the following table.

Table 1.01: Outline of the Study Areas

Study Area	Land Area	Programs
BMA area	1,565 km2	• to recognize the urban structure and analyze issues to be solved for the urbanization of the BMA area and • to define the roles and functions of the subcenter area.
Subcenter area	App. 2,000ha	• to formulate a strategic development plan, • to specify urban functions to be introduced into the subcenter area and formulate a planning framework, • to formulate a land use plan and public facilities and utilities plans, • to formulate an implementation plan, and to select the pilot area.
Pilot area	area to be selected in the strategic development plan	• to formulate a basic plan for the land readjustment and • to examine the validity of the land readjustment in the pre-F/S level.

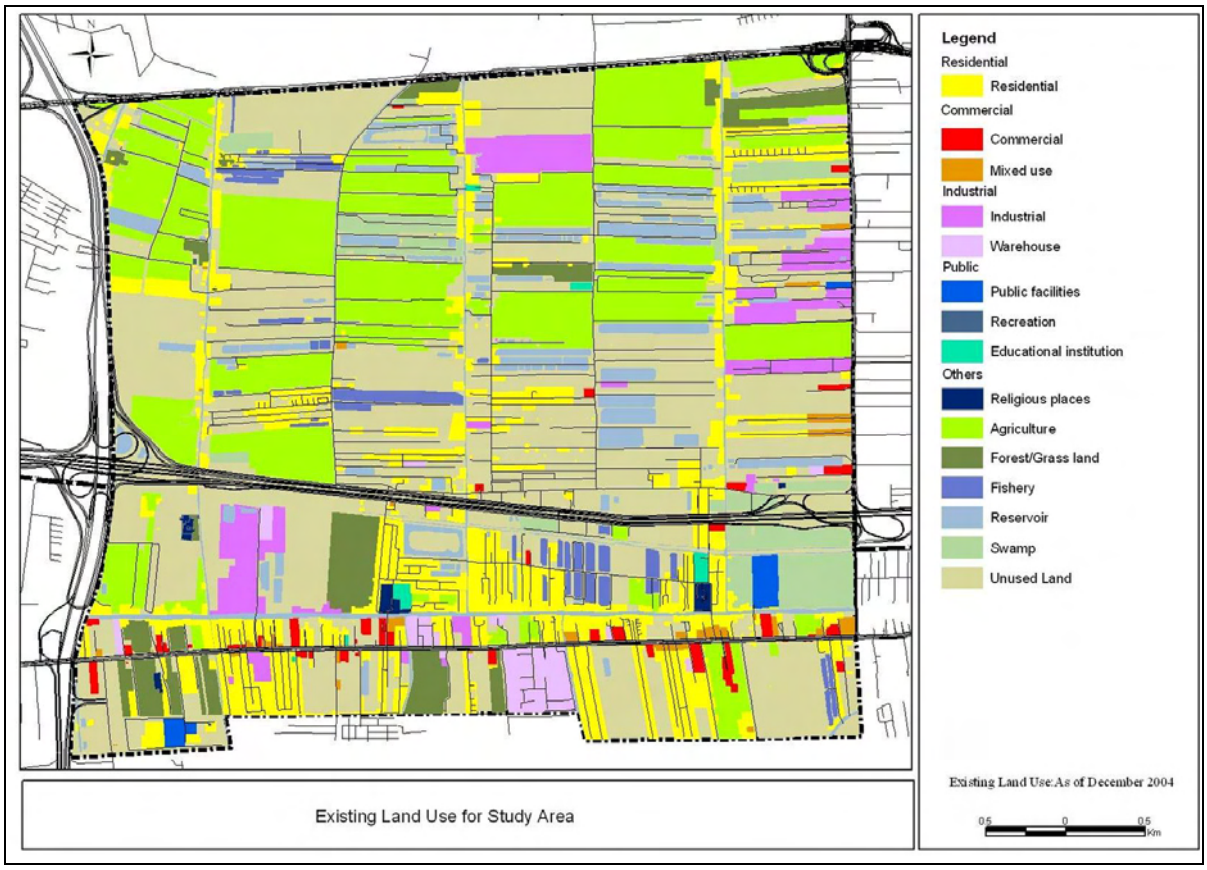


Figure 1.01: Existing Land Use in the Subcenter Area

1.04 Outline of the Work Plan

The study was started in September 2004 and is scheduled to complete in July 2006 with a study period of 23 months. The major work items and the schedule are shown in the following work flow.

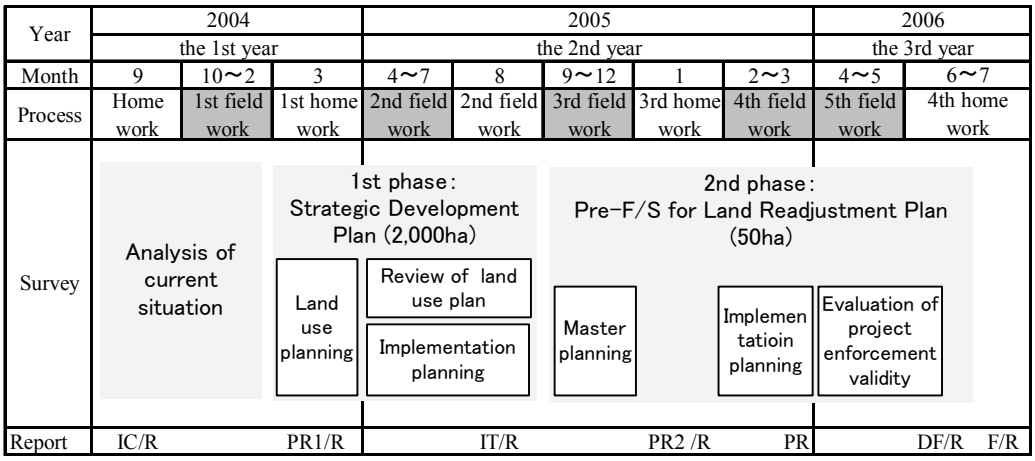


Figure 1.02: Outline of the Study

2. ANALYSIS AND CONDITIONS OF THE STUDY AREA

2.01 Bangkok Metropolitan Region Forming a Mega City

Bangkok Metropolitan Administration (BMA) is a part of the Bangkok Metropolitan Region (BMR), which consists of BMA and 5 surrounding provinces in the Central area of Thailand. The population in BMA in 2002 was 5.78 million[1] and was growing at an average annual growth rate of 0.6%. The total population of BMR in 2002 was 9.67 million and was increasing at a higher annual growth rate of 1.2% in the last 5 years. The population of BMA accounts for about 9% of the total national population of 62.80 million.

Table 2.01: Changes in Population in and around Bangkok (1997-2002)

Area	Year						Growth Rate 1998-02
	1997	1998	1999	2000	2001	2002	
BMA	5,604,772	5,647,799	5,662,499	5,680,380	5,726,203	5,782,159	0.6%
Samut Prakan	956,266	969,321	977,388	995,838	1,011,692	1,027,719	1.5%
Nonthaburi	800,741	826,464	839,029	859,607	884,077	905,197	2.5%
Nakorn Pathom	753,599	765,425	774,276	781,138	791,914	801,956	1.3%
Phathumthani	592,328	616,636	633,994	654,701	679,417	708,909	3.7%
Samut Sakon	407,146	416,393	421,738	428,814	435,588	442,914	1.7%
Total - BMR	9,114,852	9,242,038	9,308,924	9,400,478	9,528,891	9,668,854	1.2%
Thailand	60,818,227	61,466,178	61,661,701	61,878,746	62,308,887	62,799,872	0.6%

A city with an extremely large population of about 10 million in a continuous urban area such as Bangkok is called a megacity. There are about 20 megacities in various parts of the world[2]. A megacity causes various urban problems arising from the size of the city; including traffic congestion in the city center area; environmental problems such as air and water pollution; high property prices; high costs for building infrastructure; and long hours of commuting.

2.02 Bangkok in the Future

The economic forecast for provinces in Thailand, including BMA and its vicinity, are published by NESDB as part of its national economic projection.

(1) Population

The population of BMA and its surroundings are forecast by NESDB. The population of the greater area of Bangkok denoted by BMR will reach 17 million in 2035, of which 7.8 million will reside in BMA area. The increase in population accrues more on the outskirts of Bangkok, showing a high increase rate in Nonthaburi, Phathumthani and Samut Prakan.

[1] It is known that the population statistics of BMA excludes unregistered population that may account for about 50% of the registered population. As all other statistical data, including the GPP and employment, are based on the registered population for the most part, this report shall have the statistical data based on the registered population.

[2] Thomas Brinkhoff, City Population (http: //www. citypopulation. de/)

Table 2.02: Population Forecast in and around Bangkok (2005-2035)

Area	Year				Growth Rate		
	2005	2015	2025	2035	2005-15	2015-25	2025-35
BMA	6,796,000	7,298,000	7,592,000	7,777,000	0.7%	0.4%	0.2%
Samut Prakan	1,231,000	1,665,000	2,115,000	2,581,000	3.1%	2.4%	2.0%
Nonthaburi	1,157,000	1,696,000	2,337,000	3,092,000	5.0%	5.0%	4.0%
Nakorn Pathom	946,000	1,088,000	1,175,000	1,221,000	1.4%	0.8%	0.4%
Phathumthani	731,000	998,000	1,280,000	1,579,000	3.2%	2.5%	2.1%
Samut Sakon	510,000	629,000	730,000	814,000	2.1%	1.5%	1.1%
Total - BMR	11,371,000	13,374,000	15,229,000	17,064,000	1.6%	1.3%	1.1%
Thailand	64,763,000	69,060,000	72,286,000	74,421,000	0.6%	0.5%	0.3%

Source: Suvnabhumi Aerotropolis Development Plan, Final Report, NESDB, Dec. 2003.

(2) Employment and Economic Activities

The GPP, or Gross Provincial Product, for BMA area has been projected by NESDB for three decades starting from 2005 up to 2035. According to the projections, the GPP of BMA area will grow at an average annual rate of 5.9% in the ten year period from 2005 to 2015, 5.5% from 2015 to 2025, and 4.7% from 2025 to 2035.

The sum of regional GPPs is the Gross National Product shown by Provincial administrative area. Because the GPP is a product of the number of employees and the gross product per worker, the source of growth of GPP will accrue from an increase in either of these two factors. The Study Team projected the annual growth rates of employment and gross product per worker as in the following Table

Table 2.03: Projection of GPP and Employment of BMA

Item	Economic Parameters					Growth rate		
	Unit	2005	2015	2025	2035	05-15	15-25	25-35
Gross Provincial Product	Million Bt	2,130,000	3,788,000	6,469,000	10,233,000	5.9%	5.5%	4.7%
Employment	Persons	3,586,476	3,915,663	4,105,249	4,387,043	0.9%	0.5%	0.7%
Gross Product/Worker	Bt/worker	593,898	967,397	1,575,788	2,332,551	5.0%	5.0%	4.0%
Population	Persons	6,796,000	7,298,000	7,592,000	7,777,000	0.7%	0.4%	0.2%
Emp/Pop ratio	%	52.8%	53.7%	54.1%	56.4%	-	-	-

Source: Suvnabhumi Aerotropolis Development Plan, Final Report, NESDB, Dec. 2003 & Statistics Profile of BMA, 2003.

As the increase in the employment is capped by the limited population growth (and thereby limited increase in work age population), the main part of the PGG growth will have to accrue from the increasing gross product per worker. The increase in GPP/worker was projected to be 5.0% for the decades from 2005 to 2015 and from 2015 to 2025, and 4% from 2025 to 2035. The growth in employment was thus estimated to be 0. 9% for the decade from 2005 to 2015, 0. 5% from 2015 to 2025, and 0. 7% from 2025 to 2035.

According to this projection, the total employment in BMA will increase from 3. 59 million in 2005 to 4. 29 million in 2035, which means that about 800,000 new jobs will have to be created anew in BMA area.

With regard to the sector-wise projection of GPP, the following is available in the Study for the Suvanabhumi Aerotropolis Development Plan. Although the projection seems to be based on a uniform growth rate, and may not point to the growth potential of specific sectors, it is shown that the future increase in GPP will be borne by the expansion of the Manufacturing, Wholesale & Retail, Hotel and restaurants, transport and other services.

Table 2.04: Forecast of GPP Structure of BMA

GPP	Year				Growth 2005-35	
	2005	2015	2025	2035	Value	Share
Agriculture	14.2	25.2	43.0	68.0	53.8	0.7%
Manufacturing	668.7	1,189.2	2,031.2	3,212.9	2,544.2	31.4%
Wholesale & retail	451.5	803.0	1,371.5	2,169.4	1,717.9	21.2%
Hotel & restaurants	371.3	660.3	1,127.8	1,784.0	1,412.7	17.4%
Transport	296.0	526.4	899.1	1,422.2	1,126.2	13.9%
Other services	328.2	583.6	996.8	1,576.7	1,248.5	15.4%
Total	2,129.9	3,787.7	6,469.4	10,233.2	8,103.3	100.0%

Source: Suvnabhumi Aerotropolis Development Plan, Final Report, NESDB, Dec. 2003.

2.03 BMA Urban Planning Policy Context

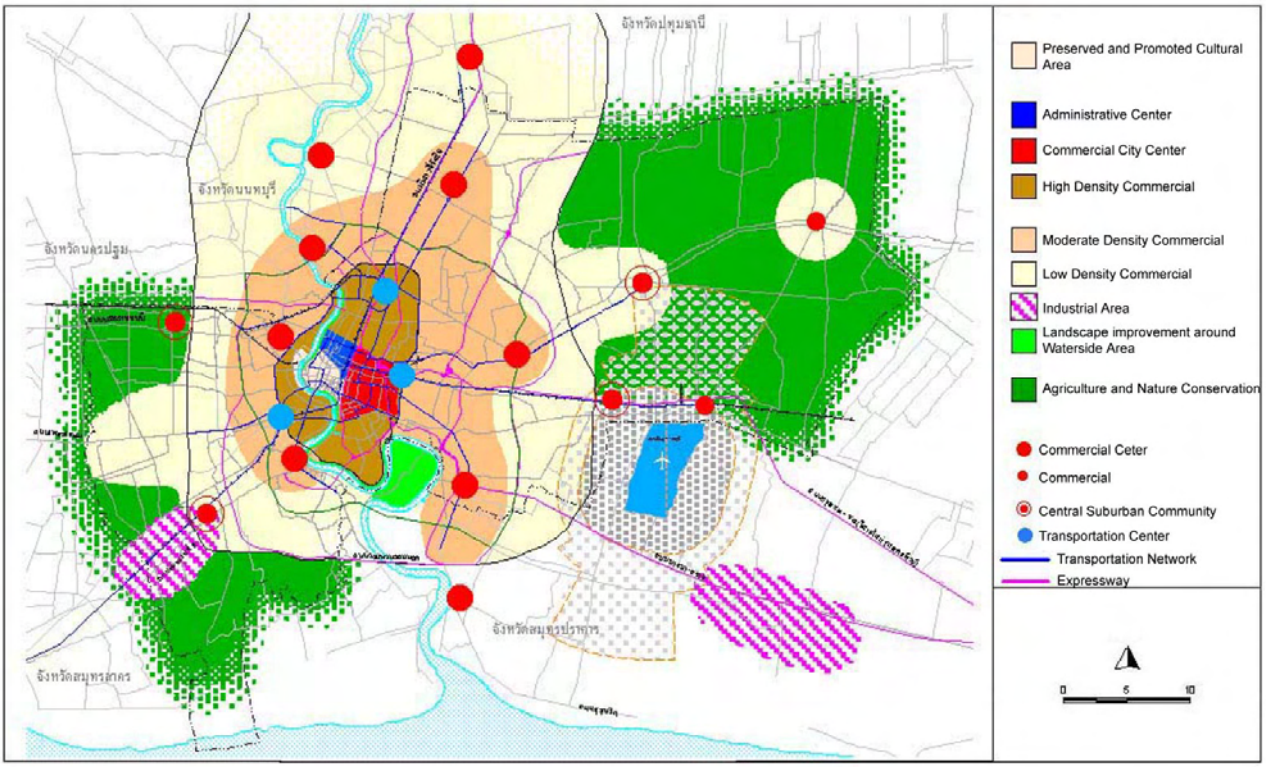
(1) Suburban expansion of urban areas

Looking at the urban structure of BMA、the changes in the urban population are characterized by high population growth on the fringe of the city center, while stable or slowly decreasing population in city center zones. The population growth is going outwards to peri-urban to suburban areas away from the city center in the recent years.

This indicates a somewhat saturated urban development potential in the city center area with lack of land plots suitable for urban development, while ample urban development is in progress on the fringe of the urban area where lands suitable for urban development are ample and less costly. Suburban expansion of the city needs to be looked after cautiously, as quick and unplanned expansions in the form of urban sprawl shall pose future urban environmental and services problems.

(2) Restructuring of Urban Structure in BMA Area

BMA has consistently seen the problem of excessive accumulation of urban and economic activities in the inner city area as an obstacle against sound growth of the Bangkok Metropolis. The first outspoken proposal for a mono-centric to a multi-centric, or poly-centric, urban structure was made in the Bangkok Plan undertaken jointly with the planners of MIT and BMA in 1995. This planning issue of changing the basic urban structure has been a focus of endeavors to restrain the further growth of the inner city, while intending to introduce suburban urban areas of a relatively low density residential character with abundant greenery and open space.



Source: Bangkok Comprehensive Plan

Figure 2.01: Bangkok Future Plan

(3) Comprehensive Plan

BMA formulated the Comprehensive Plan of Bangkok Update No. 2 in May, 2003. The focus of the plan was concentrated in the following six visions.

Table 2.05: Matrix of Visions, Policies and Targets of the Comprehensive Plan Update 2

Vision	Target	Policy	Principal Measures
1. Metropolis predominating in art and culture, with a national uniqueness	To maintain and rehabilitate sites with value in art, architecture, history and archeology	Conservation of Rattana Kosin and Thon Buri with tradition and culture	Conserve historic sites and ruins
			Improve communities at historic sites
			Improve landscape
			Promote control measures
			Promote economic activities
2. Metropolis with Quality of life of people with environmental conservation and natural resources	To erase congestion by extending development with quality of life and public infrastructure	Development of residential area in the inner city and adjoining areas	Improve the slums
			Rehabilitate rivers, moats, canals, agricultural land and coasts
			Develop infrastructure
			Prescribe control measures on land utilization
			Control development to cope with infrastructure development
3. Metropolis that is the Center of economic activities and technology of the nation and Southeast Asia	Develop a business area that can compete with other metropolitan areas in Southeast Asia	Develop commercial areas in the city center, and Subcenters in the suburbs	Create commercial centers at various levels
			Promote infrastructure development
			Prescribe control measures on land utilization
			Improve landscape
4. Metropolis that is	Add elegance to the	Develop a center	Develop and improve the governmental

Vision	Target	Policy	Principal Measures
the center of administration, institutions and international organizations	area of social institutions and administration of the county and BMA	of public administration of the country and BMA	institutions
			Prescribe control measures on land utilization and architectural design
			Improve landscape
5. Metropolis that is flexible and convenient with a communication and transport network	Promote mass transit systems and integrate communications network	Increase connections to mass transit in the city and to/from SBIA	Balance distribution of population and employment to reduce trips
			Connect mass transit and car transport and public transport
			Develop connections to SBIA
			Control traffic by car in the inner city and historic district
			Extend sufficient social services to suburban residents

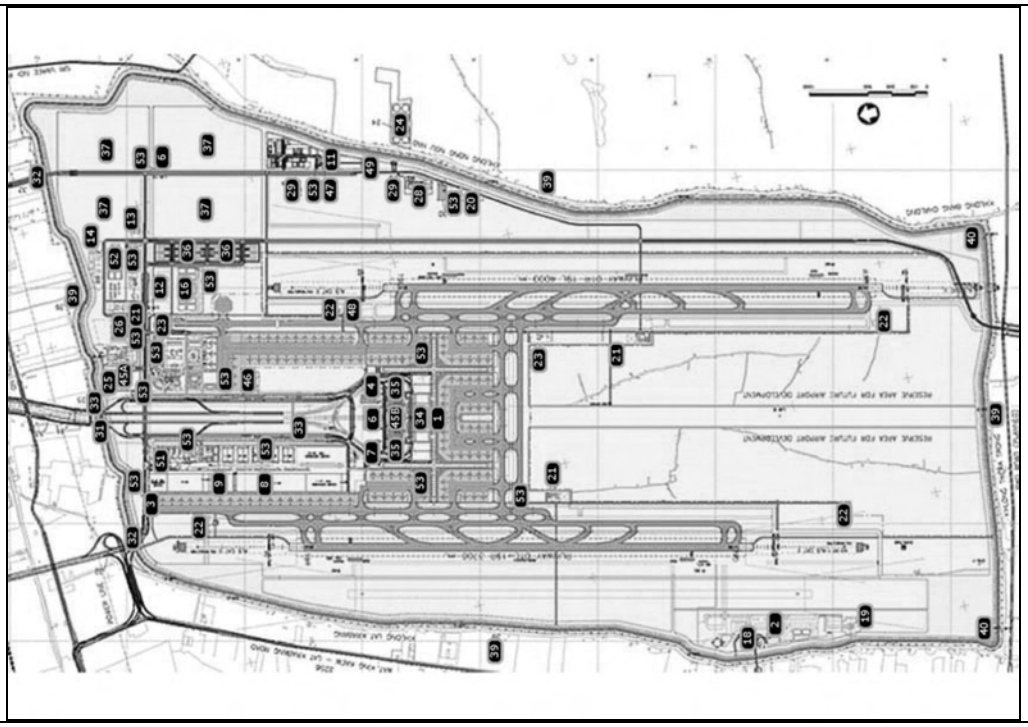
Source: Comprehensive Plan Update 2 Chapter 6

The current Comprehensive Plan focuses on the desired characteristics of the Bangkok metropolis as hosting the national capital, flexible and convenient with modern advanced technology and high quality of life for the urban residents, while paying due attention to the historical heritage and natural environment. It is noteworthy that the BMA vision focuses on Vision3: a Metropolis that is the Center of economic activities and technology of the nation and Southeast Asia, in which the creation of the subcenters in the suburbs is envisioned as the target, and Vision 5: a Metropolis that is flexible and convenient with a communication and transport network, emphasizing the increased connections by mass transit in the city and to/from SBIA.

The structure of urban development is indicated in the overall structure of the comprehensive plan. The inner city, which has been and will be serving the metropolis as the primary city center, will be rehabilitated and improved with public transport and telecommunications networks, while the peri-urban areas (adjoining to the city center) will accommodate the increasing population. In the suburbs, more attention is paid to conservation of natural landscape and agricultural land, while some selected locations, such as the Lat Krabang, Subcenter development, will be implemented to ease the congestion in the inner city. The areas outside of this will be reserved as the Buffer Zones, as newly stipulated in Update 2, to avoid outward urbanization expansion without control. The Update 2 took effect in May 2006.

2.04 Development of the New International Airport of Bangkok

The new international airport of Bangkok, called the Suvarnabhumi Airport, is now under construction 25 km west of the center of Bangkok Metropolis. The site is adjacent to the Lat Krabang Subcenter area. The new airport site has an area of about 3,000 ha (20,000 rai), on which two runways, one 4,000 m and the other 3,700 m, and the estimated number of annual passengers in the initial capacity is 45 million. This new airport will be one of the largest airports in Southeast Asia, and aims to establish itself as Southeast Asia's aviation and tourism hub. The ultimate development plan is for projected annual 100 million passengers, although the target year has not been defined yet.



1. Passenger Terminal Facilities	19. Heliport	38. Airport related Business Development Center
2. Royal Terminal (on hold)	20. Fire Fighting Training Ground	39. Perimeter Polder Dike, - Fence and - Road
3. Airmail Facilities	21. Rescue and Fire Fighting Facilities	40. Polder Pumping Station and Ponding Area
4. AOT Facilities and AIMS Building	22. Airfield Lighting Building	45A. Cogeneration Plant
5. Security Facilities	23. Intoplane Fuel Services	45B. Central Plant/District Cooling Plant
6. Airport Hotel	24. Aviation Fuel Depot Facilities (external)	46. Domestic Cargo
7. Control Tower and ATC Facilities	25. Main Transformer Station	47. Transmitter Station
8. Cargo Facilities (free zone)	26. Water Supply Station	48. Aircraft Sewage Disposal Building
9. Express Freight Facilities (free zone)	27. Water Treatment Plant	49. Central Solid Waste Transfer Building
10. Catering Facilities	28. Waste Water Treatment Facilities	50. Thai City (TG operation)
11. Airport Maintenance Facilities	29. Radar Facilities	51. CFZ Common Facilities
12. Ground Service Equipment Maintenance Facilities	30. Meteorological Facilities	52. Bus Transit Terminal
13. Medical Facilities	31. Main Access Route	53. Utilities Distribution System
14. Social and Staff Facilities	32. Secondary Access Road	
15. Car Rental Facilities	33. Rail Access Route	
16. Aircraft Maintenance Facilities	34. Railway Station	
17. Petrol and Car Care Services	35. Public Car Parking	
18. General Aviation Facilities	36. Long-Term Car Parking Area	
	37. Area Reserved for the Development of other Facilities	

Note: The numbers correspond to those on the plan in the next page.

Figure 2.02: Plan for Suvarnabhumi International Airport