PART I

MASTERPLAN FOR LAT KRABANG

SUB-CENTER DEVELOPMENT

CHAPTER 1:
INTRODUCTION

1.1 Background

Thailand has a national population of approximately 61.8 million and a land area of approximately 514,000 km^2. An estimated population of 5.78 million reside in the Bangkok Metropolitan Administration (BMA) jurisdiction. This is nearly 10% of the national population, which alone indicates the heavy concentration of 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 through individual and ad-hoc land development. The public sector has played a light role in the urban development of the city and the urbanization has been initiated primarily by the private sector seeking to develop sites 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 significant traffic congestion in the city center area. Unplanned urban sprawl is a process that causes not only traffic jams, but various problems relating to urban living environments. This includes the mixture of conflicting land use categories, such as residential and industrial, which can be potentially hazardous to residents, and the lack or insufficient provision of public services with the resulting deterioration in living environments.

In order to counter this issue, the BMA has long been advocating a policy for shifting the urban structure from the present mono-centric one to a multi-centric one through the introduction of sub-centers around the fringe of the existing city center. Lat Krabang is located in the vicinity of the new Bangkok international airport, which is currently under construction, and is considered to be one of the most attractive and highest priority sub-centers for development. The Lat Krabang sub-center plan has been recognized in the comprehensive plan for the BMA as well as in the regional development planning for the area around the new airport.

1.2 Outline of the Study

(1) Objectives of the Study

The three objectives of the study, on implementation of the BMA sub-centers program in the Kingdom of Thailand (hereinafter referred as to "the Study"), are summarized below:

1) To formulate a strategic development plan for the Lat Krabang area (hereinafter referred as to "the Sub-center Area") in order 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 within the Sub-center Area for the pre-feasibility study using the land readjustment method;

3) To undertake capacity building for the counterparts and Thai officials who are in charge of city planning, transportation planning, land readjustment, and environmental and social assessments.

(2) Study Area

The strategic development plan will encompass the Sub-center Area, as shown in figure1.1.1, which is located in the south-eastern part of the Lat Krabang district. In the strategic plan, a pilot area will be selected to formulate a basic plan for the land readjustment method on a pre-feasibility study level. An outline of the study areas is presented in the following table.

Table 1.1: Outline of the Study Areas

Study Area	Land Area	Programs
BMA area	1,568.737km2	● 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 sub-center area.
Sub-center area	App. 2,000ha (12,500rai)	● to formulate a strategic development plan, ● to specify functions introduced into the sub-center area based on the demand analysis and to formulate a planning framework, ● to formulate a land use plan and public facilities plans, ● to formulate an implementation plan, and to select the pilot area.
Pilot area	Definite area will 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 1.1: Location Map of the Study Area

(3) Executing Agency

The executing body for this Study is the Bangkok Metropolitan Administration (BMA). The division in charge of this Study is the Department of City Planning.

(4) Outline of Work Plan

The Study commenced in September 2004 and is scheduled for completion in July 2006 with a study period of 23 months. The major work items and schedule are shown in the following work flow diagram.

Table 1.2: Outline of the Study Area

Year	2004			2005					2006	
	the 1st year			the 2nd year					the 3rd year	
Month	9	10～2	3	4～7	8	9～12	1	2～3	4～5	6～7
Process	Home work	1st field work	1st home work	2nd field work	2nd field work	3rd field work	3rd home work	4th field work	5th field work	4th home work
Survey	Analysis of current situation	1st phase: Strategic Development Plan (2,000ha) Land use planning; Review of land use plan; Implementation planning		2nd phase: Pre-F/S for Land Readjustment Plan (50ha) Masrter planning; Implemen tatioin planning; Evaluation of project enforcement validity						
Report	IC/R	PR1/R		IT/R		PR2 /R		PR	DF/R	F/R

CHAPTER 2:
ANALYSIS OF PRESENT CONDITIONS IN THE STUDY AREA

2.1 General Condition of the Bangkok Metropolitan Area

2.1.1 Natural Setting and Environment

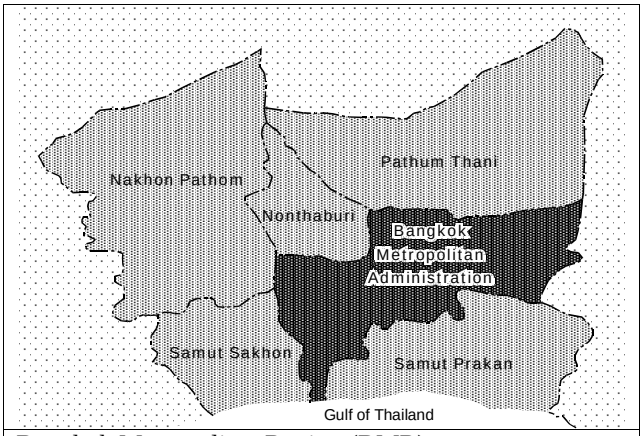
The Bangkok Metropolitan Administration (BMA) area is located on the lower central plain of Thailand along the Chao Phraya River. The plain is characterized by low, flat and broad terrain.

The lower central plain is categorized into three major depositional types; the alluvial plain, the fluvial plain, and deltaic marine deposit. The sedimentation history of the lower central plain is related to past sea level fluctuations. When the sea level decreased during the past glacial periods, coarse material derived from the river course was deposited. The different deposition characteristics, due to the fluctuations in sea level, affect the sediment profile in the lower central plain. The typical subsoil profile, at a depth of 30 meters in the Bangkok Metropolitan Administration Area, consists of alternating layers of coarse terrestrial sand and clay derived from marine deposits. Due to an increase in sea level in the recent geological period, soft and medium clay derived from sea bottom sediment has been deposited with a thickness varying between 6 meters and 27 meters, and an average thickness of 15 meters. This soft layer is the underlying reason for the land subsidence in the BMA area.

Continuous land subsidence has been taking place in the whole BMA area including the Study Area. Pumping of groundwater is the main factor causing land subsidence. According to research carried out by the Department of Groundwater Resource, the Study Area has subsided approximately 1 cm to 3 cm per year between 1997 and 2003.

2.1.2 Outline of Bangkok and Surrounding Areas

Bangkok is the capital city of the Kingdom of Thailand and is located 36 km upstream of the mouth of the Chao Phraya River. The areas in the outskirts of Bangkok are strongly interconnected with the capital area, which is called the Bangkok Metropolitan Region (BMR). The BMR consists of the administrative areas of the Bangkok Metropolitan Administration (BMA) area and the surrounding five provinces; Samut Prakan, Nonthaburi, Pathum Thani, Nakhon Pathom, and Samut Sakhon.



Bangkok Metropolitan Region (BMR)

Figure 2.1: Area of BMR and BMA

The BMA area administratively consists of 50 districts, as shown on the following map. The Lat Krabang Sub-center study area is located in the Lat Krabang District in the eastern part of the BMA.

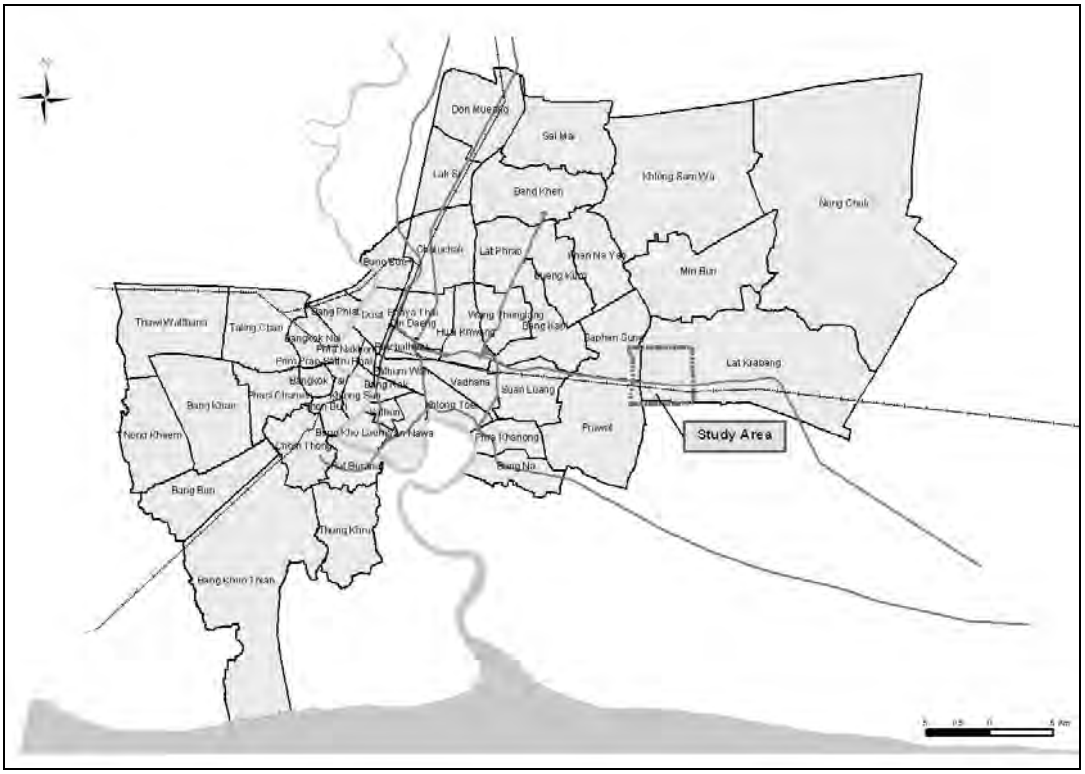


Figure 2.2: District Boundary of BMA and Study Area

The BMA has a new scheme which divides the existing 50 districts into 12 clusters. The existing scheme with 6 zones was revised to introduce a new plan for each cluster in order to make the development policy more relevant. After considering public comments, the proposed zoning plan would be finalized in 2006.

The Study Area is located in Zone10 of the proposed zoning scheme, with the notation of the Suburban Community Center around the Suvarnabhumi Airport. The Study Area covers three districts; Lat Krabang, Min Buri, and Prawet.

Table 2.1: Proposed New Zoning Plan for Bangkok

1	Old Rattanakosin Conservation Cluster
2	Central Business, Service and Tourism Cluster
3	New Economic and Service Center and High Density Population Cluster
4	New Economic Zone along Chao Phraya River Cluster
5	Old Thon Buri Conservation Cluster
6	New Economic Employment and High Density Population Cluster
7	Northeast Bankok Transition Zone
8	Southeast Bankok Residential Area
9	Farm and Quality Residential Area
10	Suburban Community Center around Suvarnabhumi Airport
11	Mixed Farm and Quality Residential Area
12	Farm, Industrial and Agro-tourism Area

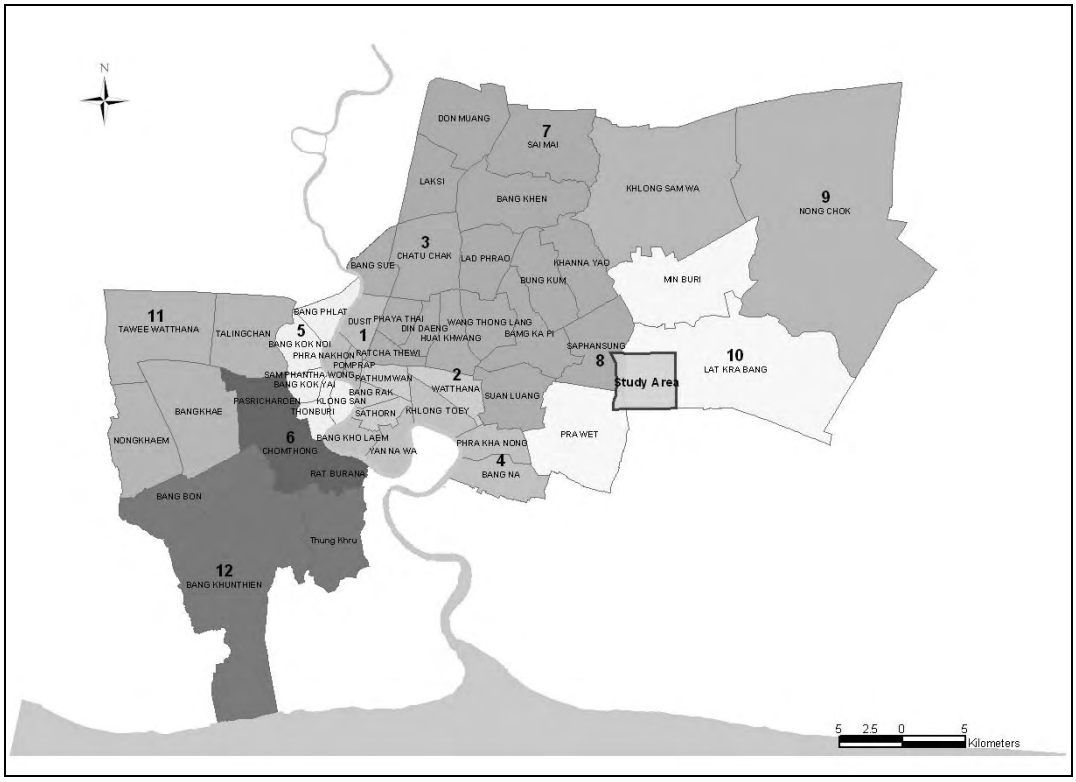


Figure 2.3: Proposed New Zoning Plan for Bangkok

2.1.3 Socio-economy

(1) Past Changes

1) Population

In 2002, the population in the BMA area was 5.78 million and was growing at an average annual growth rate of 0.6%. The total population of the BMR in 2002 was 9.67 million and had increased at a higher annual growth rate of 1.2% over the previous five years. The population of the BMA accounts for about 9% of the national population of 62.80 million.

Table 2.2: 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%

Soure: City Planning Department, BMA

2) Employment

In 2002, the total employment in the BMA area was 3.1 million, and was growing at an annual growth rate of 3.6%. Total employment accounted for about 55% of the total population, although this rate tends to change depending on the general employment conditions.

3) Economic Activity

With regard to economic activity, the National Economic and Social Development Board (NESDB) publish estimates of the Gross Provincial Product (GPP) for each province. The table below shows the GPP estimates for the BMA area, by sector.

It can be seen that various service industries, such as financial, tourism, retail/wholesale and the manufacturing industry have grown significantly in recent years.

Table 2.3: Gross Provincial Product (GPP) at Current Market Prices, BMA

	1997	1998	1999	2000	2001	2002	2003	2004p
Agriculture	1,782	1,892	1,588	1,667	1,877	2,258	2,500	2,416
Agriculture,Hunting and Forestry	1,560	1,591	1,316	1,378	1,517	1,874	2,179	2,090
Fishing	222	302	271	289	360	385	320	326
Non-Agriculture	1,461,912	1,351,587	1,480,932	1,577,630	1,654,236	1,669,031	1,745,074	1,905,724
Mining and quarrying	0	0	0	0	0	0	0	0
Manufacturing	300,877	317,208	329,519	354,578	371,261	345,904	366,351	388,925
Electricity,Gas and Water Supply	28,360	33,263	28,157	34,593	35,872	38,123	37,660	41,896
Construction	104,705	76,448	59,384	47,354	52,679	47,862	47,497	51,707
Wholesale and Retail Trade;Repair of Motor Vehicles,Motorcycles and Personal and Household Goods	270,330	260,368	376,761	402,720	408,455	402,246	414,325	448,576
Hotels and Restaurants	165,074	150,840	163,227	178,285	190,477	196,829	187,481	206,692
Transport, Storage and Communication	214,322	220,540	235,678	250,147	268,826	284,096	288,864	307,761
Financial Intermediation	186,699	94,234	78,306	76,929	81,127	92,842	119,091	138,140
Real Estate,Renting and Business Activities	57,690	54,136	55,178	56,907	57,634	61,667	65,134	69,858
Public Administration and Defence;Compulsory Social	55,186	59,796	59,947	73,798	81,060	89,017	98,177	111,206
Education	22,175	27,769	31,097	33,639	34,848	32,173	31,416	38,582
Health and Social Work	18,675	19,473	21,125	22,426	24,285	24,712	27,730	29,282
Other Community,Social and Personal Services Activities	34,013	33,526	38,603	42,248	43,557	49,326	56,912	68,442
Private Households with Employed Persons	3,807	3,987	3,950	4,007	4,156	4,233	4,435	4,657
Gross Provincial Product (GPP)	**1,463,694**	**1,353,479**	**1,482,520**	**1,579,297**	**1,656,113**	**1,671,289**	**1,747,573**	**1,908,140**
Per Capita GPP (Baht)	**227,580**	**209,647**	**228,745**	**243,418**	**253,306**	**253,456**	**262,556**	**283,780**
Population(1,000 persons)	**6,432**	**6,456**	**6,481**	**6,488**	**6,538**	**6,594**	**6,656**	**6,724**

Soure: NESDB

The following table shows the changes in GPP and employment in the BMA area over the last six years. The employment level was relatively unstable, affected by ups and downs in economic conditions. It could be observed that the growth in GPP is mainly caused by the growing output per worker, and not by an increase in the level of employment.

Table 2.4: Changes in GPP and Employment in the BMA

Item	Economic Parameters							Growth rate 98-02
	Unit	1997	1998	1999	2000	2001	2002	
GPP	Million Bt	1,579,336	1,468,575	1,484,003	1,577,010	1,651,181	1,653,510	3.0%
Employment	Persons	3,304,173	3,165,070	3,379,297	3,135,349	3,185,806	3,094,835	-0.6%
Gross Product/Worker	Bt/worker	477,982	463,994	439,145	502,977	518,293	534,281	3.6%
Population	Persons	5,604,772	5,647,799	5,662,499	5,680,380	5,726,203	5,782,159	0.6%
Emp/Pop ratio	%	59.0%	56.0%	59.7%	55.2%	55.6%	53.5%	-

Source: City Planning Department, BMA

2.1.4 Urbanization Trend

(1) Existing Land Use in the BMA territory

The urban area of the BMA increased in size from 347.39 km^2 in 1986 to 672.33 km^2 in 2000. The urbanization took place mostly in the areas adjoining the inner city as well as outside areas within the Outer Bangkok Ring road. The developed areas tend to expand to the urban fringe or to the edge of the suburban areas.

In the East Suburban Area, which includes the Study Area, the developed area increased 40 km^2 in size between 1986 and 1995, and 18 km^2 between 1995 and 2000. The growth in development has continued over the past 15 years even though the degree of growth has somewhat slowed down in recent years.

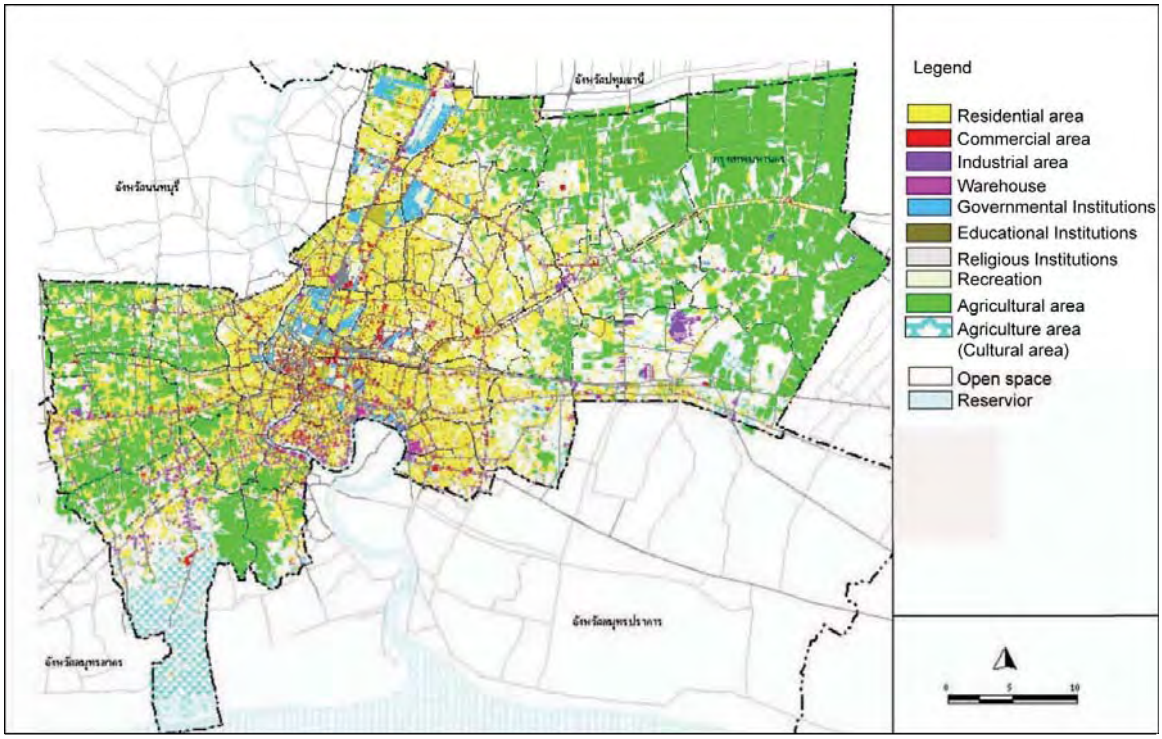
Table 2.5: Change in Land Use in the Bangkok Metropolis between 1986 and 2000

Group Area	Developed Area (sq.Km.)			Change			
				1986-1995		1995-2000	
	1986	1995	2000	sq km	%	sq km	%
East Innner Area	120.41	148.52	154.38	28.11	23.3%	28.11	18.9%
West Inner Area	24.65	32.88	34.85	8.22	33.4%	8.22	25.0%
East Urban Fringe	98.24	196.42	240.00	98.18	99.9%	98.18	50.0%
West Urban Fringe	47.91	91.79	113.00	43.88	91.6%	43.88	47.8%
East Suburban Area	40.72	80.61	98.00	39.90	98.0%	18.00	22.3%
West Suburban Area	15.46	26.90	32.00	11.44	74.0%	11.44	42.5%
Total of East	259.36	425.56	492.00	166.19	64.1%	67.00	15.7%
Total of West	88.02	151.56	180.00	63.54	72.2%	63.54	41.9%
Bangkok	347.39	577.12	672.00	229.73	66.1%	229.73	39.8%

Source: City Planning Department, BMA

The existing land uses in the BMA territory in 2000 are shown on the following map. The inner area of the BMA is the center of employment, commerce, services and governmental institutions. Residential land use accounts for 24 percent of the BMA area or about 57 percent of the built-up areas in the city. The developed areas are being expanded into the outer areas, most of which is currently used for agricultural purposes, without sufficient provision of infrastructure or public utilities.

Between 1995 and 2000 the land use types of the new developments were residential for the largest part, commercial, warehouses and entertainment. It is noted that the area occupied by roads also showed an increase. On the other hand, land use categories that decreased in size for the same period were industrial, government institutions, regional institutions, and rivers and waterways.



Source: Comprehensive Plan of Bangkok metropolis

Figure 2.4: Existing Land uses in the BMA Territory

Table 2.6: Trend in Land Use by Category between 1986 and 2000

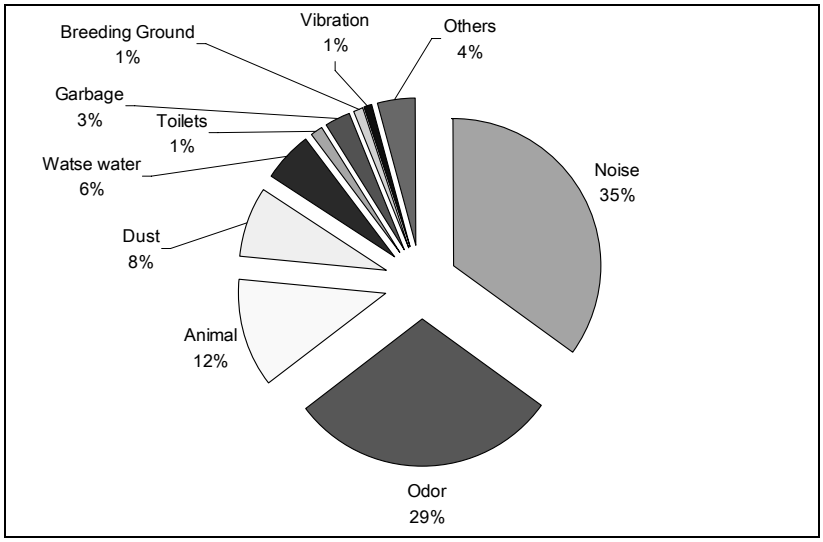
Tpye of land use	Area (sq km)			Change 1986-1995		Change 1995-2000	
	1986	1995	2000	Area (sq km)	%/year	Area (sq km)	%/year
Resident	181.0	331.5	382.5	150.5	5.04%	51.0	2.67%
Commercial	17.8	47.7	57.6	29.8	6.95%	9.9	3.44%
Industrial	22.0	29.4	27.3	7.4	2.79%	-2.0	-1.50%
Warehouse	6.4	9.7	11.6	3.3	3.79%	1.9	3.23%
Government Institution	46.7	37.9	36.7	-8.8	-2.59%	-1.2	-0.65%
Education Institution	13.1	16.2	18.2	3.1	2.10%	2.1	2.27%
Regional Institution	7.1	8.8	8.6	1.7	2.12%	-0.2	-0.35%
Entertainment	4.0	10.3	19.5	6.3	6.80%	9.2	9.42%
Road	38.4	85.7	110.3	47.3	6.13%	24.5	4.45%
Agricultural Area	666.0	588.4	486.7	-77.5	-1.46%	-101.7	-4.18%
Open Space	464.4	300.9	328.0	-163.4	-6.04%	27.1	1.65%
River and waterways	101.8	102.3	81.7	0.5	0.05%	-20.6	-5.03%
Total	1,568.7	1,568.7	1,568.7				

Source: Comprehensive Plan of Bangkok metropolis

2.1.5 Environmental Pollution

(1) Public Nuisance

In 2002, the BMA received 5,840 complaints from the residents of the BMA relating to public nuisances. The types of complaints are shown below. The largest number of complaints related to noise problems. The second most common complaints were offensive odors, which were presumably related to inadequate solid waste disposal and direct discharge of untreated wastewater into open canals. With regard to the complaints on air pollution, dust was the most common problem.



Source : Bangkok State of Environment (2003)

Figure 2.5: Composition of Public Nuisances in the BMA area (2002)

(2) Noise

According to the monitoring results of the Pollution Control Department in 2002, the 24-hour average noise level along trunk roads exceeded the ambient noise standard value of 70 dB(A) at 96% of the noise monitoring stations. The maximum value recorded was 83 dB(A). Even though the monitoring points are more than 50 m away from roads, 50% of the 24-hour average noise levels at each noise monitoring station exceeded the ambient noise standard value. Noise problems are one of the major public nuisances in the BMA area.

(3) Air Quality

In the BMA area, exhaust emission from automobiles is the main source of air pollution. Traffic jams can be observed along main trunk roads in the BMA area, and monitored air quality data also shows that the air quality along roadsides is worse than that in ambient areas. Monitored air quality data in 2002 is shown below. Compared to the Thai and Japanese standard values, the monitored air quality data at a distance of more than 50 m from the roadside satisfied the standard values except for the particle matter (PM10) mainly derived from diesel engine gas emissions. Some of the results for total suspended particles (TSP), PM10, carbon monoxide, and nitrogen dioxide exceeded the Thai standard values. These results show that the level of air pollution in the BMA area is not too serious, although efforts should be made to decrease the air pollution load from automobiles.

Table 2.7: Air Quality Monitoring Results (2002)

Parameter	Unit	Range	Average	Air Quality Standard	
				Thai	Japanese
Total suspended particle (TSP) 24 hours average	mg/m^3	0.01-0.31 0.01-0.50	0.10 0.18	0.33	-
Particle matter (PM10) 24 hour average	mg/m^3	0.016-0.141 0.009-0.269	0.049 0.058	0.12	0.10
Carbon monoxide 8 hours average	ppm	0-5.2 0-9.6	0.90 1.86	9	20
Sulfur dioxide 24 hours average	ppb	0-25.4 0-52.9	5.2 7.7	120	40
Nitrogen dioxide 1 hour average	ppb	0-157 0-171	23.9 36.7	170	-

Note : For each parameter, the upper values are the results monitored at more than 50 m from the roadside. The lower values are the results monitored at the roadside.
Japanese standard value for nitrogen dioxide is only set as 24-hour average. The standard value is 60 ppb.
Source : Bangkok State of Environment (2003)

(4) Water Quality

In 2002, the total amount of wastewater discharge was approximately 2.2 million m^3, 75% of which was domestic wastewater, and 25% was industrial and commercial wastewater. Although four wastewater treatment plants operated in the city center of the BMA area, the ratio of wastewater treated was 14% of the total discharge.

The annual average value of dissolved oxygen (DO) at water quality monitoring points along canals in the BMA area ranged from 0.1 to 1.5 mg/L. The Biochemical Oxygen Demand (BOD), the index for organic pollution, ranged from 20 mg/L to more than 30 mg/L at some monitoring stations. According to the Thai water quality standards, water having this level of quality can be used only for navigation, and can not be used for consumption. Healthy aquatic ecosystems can never be observed under these water quality conditions. To restore the water related environmental conditions associated with "Venice of the East", it is necessary to improve the condition of the existing waterways.

2.2 Future Perspective of Bangkok

2.2.1 Socio-Economic Framework

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

(1) Population

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

Table 2.8: 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 for the BMA area is projected by the NESDB for the three decades from 2005 to 2035. According to the projections, the GPP of the 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.

As the GPP is the product of the number of people employed and the gross product per worker, the source of growth in the GPP will be an increase in either of the two factors. The Study Team projected the annual growth in employment and gross product per worker, as shown in the following Table.

Table 2.9: Projection of GPP and Employment in the 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 possible increase in employment is capped by the limit in population growth (and thereby limited increase in working-age population), the main part of the GPP growth will have to accrue from the increasing gross product per worker. The increase in GPP per worker was projected to be 5.0% for the decade from 2005 to 2015, 5.0% 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 the BMA will increase from 3.59 million in 2005 to 4.29 million in 2035, which means that about 800,000 new job opportunities will need to be created in the BMA area.

With regard to the sector-wise projection of the GPP, the following information was available from the Study for the Suvanabhumi Aerotropolis Development Plan. Although the projection seems to be based on a uniform growth rate scheme, 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 manufacturing, wholesale and retail, hotels and restaurants, transport and other services.

Table 2.10 Forecast of GPP Structure in the 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.

2.2.2 Existing Spatial Development Policies

(1) Bangkok Plan formulated by the BMA – MIT

The Bangkok Plan, formulated by expatriate experts of the MIT (Massachusetts Institute of Technology) and local experts of the BMA in 1996, focused on the then existing and foreseen urban problems in the Bangkok Metropolitan area, including congestion and environmental pollution. The Plan called for a coordinated effort to improve mobility, concentrate urban development, balance the location of jobs and housing, and introduce new controls on development. The efforts focused on creating a greener and healthier city that balances its aspiration to become the center of the knowledge economy in South East Asia.

In order to achieve this goal, the Bangkok Plan introduced a system of metropolitan sub-centers that have areas of planned high density and mixed use development in the rapidly developing fringe areas of Bangkok. The sub-centers were stipulated to have employment, shopping, services, schools, institutions, and housing located within an easy distance of each other.

In all, eleven sub-centers were proposed for implementation on the fringe of the Bangkok metropolis, of which five were within the BMA jurisdiction. The five sub-centers were; Lat Krabangk, Taling Chan, Bang Khun Thian, Min Buri and Lam Lukka. The emphasis was placed on the need for planned development, as opposed to sporadic, unplanned development that was already wide spread. In order for this to happen, the report set the following objectives.

- Consolidate the commercial and service employment growth in outlying areas into new compact mixed use centers,
- Promote a balance between jobs and housing in suburban sectors of the metropolitan area,
- Promote the use of mass transit in suburban areas for commuting,
- Demonstrate improvement to the quality of life in outlying areas,
- Ensure the installation of infrastructure in advance of development,
- Mobilize private development expertise and capital in the building of new centers.

The plan emphasized that the Lat Krabang sub-center is the most promising as a prototype for sub-center development. This took into consideration, amongst other aspects, its close proximity to the Second Bangkok International Airport (SBIA). The team went on to formulate an action plan for the Lat Krabang sub-center with detailed site plans and implementation programs with a vision of commencing the planning and construction immediately with completion of 2010.

With the Asian currency crisis and economic disturbances in the late 1990's, the sub-center plan was suspended and deferred from the immediate implementation list for urban planning, leaving behind half finished land development efforts.

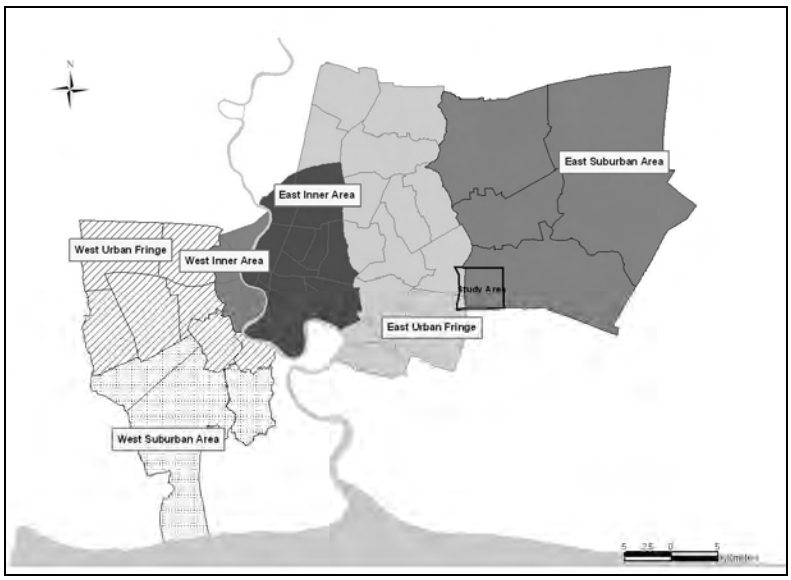
It is nonetheless important to note that the basic concept laid out in the Bangkok Plan, of introducing planned development by creating a system of sub-centers on the fringe of the urban core, is still valid and sound. The basic concept of the Bangkok Plan was adopted in subsequent BMA planning efforts in the shape of a polycentric city.

(2) Comprehensive Bangkok Plan by the BMA

The Comprehensive Plan (Revision No.1) which was prepared and announced on 5 July 1999 as the ministerial regulation No.414 by virtue of the City Planning Act of 1975, was valid for five years and was extended until July 2005. The second revision, which is called the Comprehensive Plan (Revision No.2), has been prepared by the Department of City Planning of the BMA and will be enforced in 2005 to replace the Comprehensive Plan (Revision No.1). Hereinafter, the Comprehensive Plan means the Comprehensive Plan (Revision No.2), unless otherwise denoted.

1) District Boundary of the BMA as classified in the Comprehensive Plan

In the Comprehensive Plan, the BMA territory is divided into six areas namely the East Inner Area, West Inner Area, East Urban Fringe, West Urban Fringe, East Suburban Area, and West Suburban Area. A major part of the Study Area is located in the East Suburban Area.



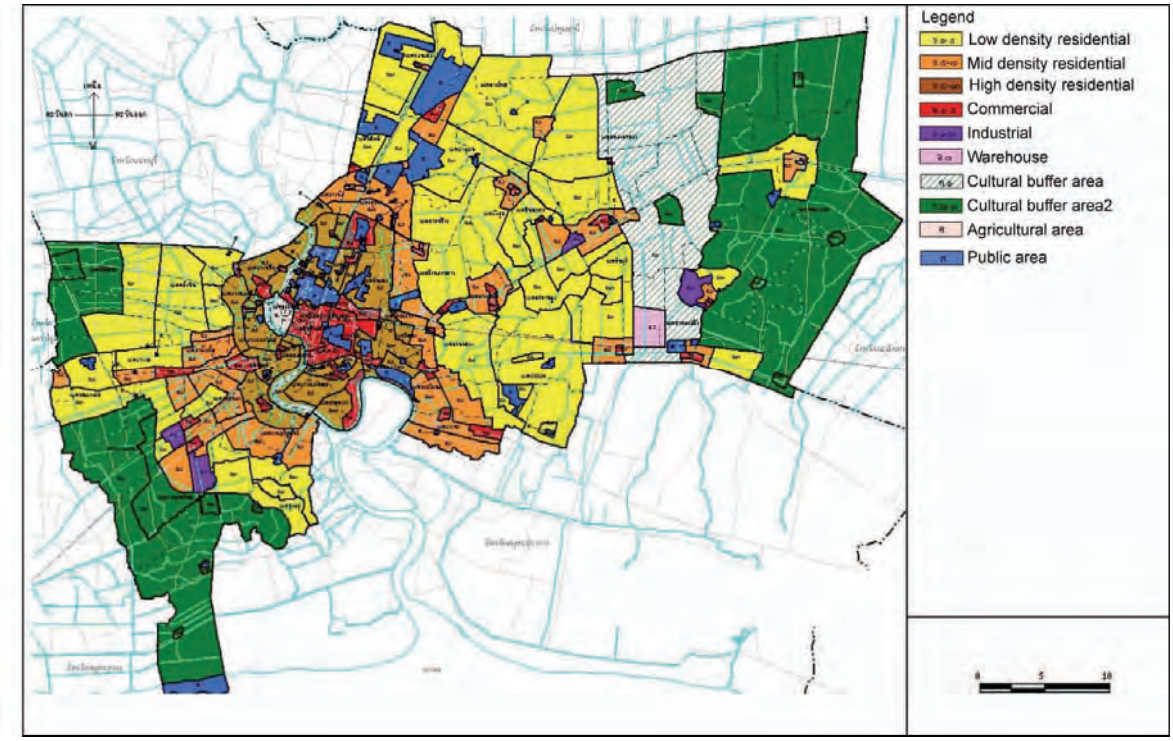
Source: Comprehensive Plan of Bangkok metropolis

Figure 2.6: District Boundary of the BMA in the Comprehensive Plan for the Bangkok metropolis

2) Key concepts in the Comprehensive Plan (Revision No.2) for the Bangkok metropolis

The Comprehensive Plan for the Bangkok metropolis was prepared by the BMA for the future development plan of the BMA territory in the target year of 2035.

The plan covers the BMA's entire administrative area. The Comprehensive Plan was approved by cabinet in November 2004 and is in the process of being authorized by the Royal King, which is required to enact the plan. It is expected to be signed in the early part of 2006.



Source: Comprehensive Plan of Bangkok metropolis

Figure 2.7: Comprehensive Plan of the Bangkok metropolis by the BMA

The key concepts of the plan are as follows.

- Commercial land is designated for economic activities such as trade services, offices and businesses which are prioritized in accordance with a balance of development and economic conditions.
- High density residential land is designated for the development of the mass transit network, infrastructure and pubic utilities in order to support high density population in these areas.
- Medium density residential land is designated for residential areas with convenient access to the transport network and major roads surrounding the areas, as well as for public facilities and utilities.
- Low density residential land is designated to preserve fine and suitable environments for residential areas with low population and low level of economic activity.

- Industrial areas are designated to retain existing industrial uses to certain areas in order to avoid the risk of pollution and disaster, and to separate this from the suburban areas. The existing industrial areas are Lat Krabang and Bang Chan Industrial estates in the eastern part of the BMA, and the southern section of Rama II Road in the west. The designated warehouse area is the Lat Krabang district and north of Suvarnabhumi Airport.

- Rural and Agricultural areas are basically designated for agricultural use with the purpose of preserving the natural environment.

- Governmental institutions, infrastructure and utility areas are designated for governmental uses such as infrastructure and utilities.

- Conservation areas are designated for the preservation of historical places such as the surrounding areas of Rattana Kosin (the old town) and the adjoining areas.

3) Development regulation by sub-zone categories in the Comprehensive Plan

In order to pursue the implementation of the land use plan, eight land use classifications in the Comprehensive Plan were divided into sub-zones. Development regulations, such as the type of buildings that are allowed to be constructed in each area as well as building controls for residential areas are established for each sub-zone. The sub-zones consist of four sub-zones for low density residential, three sub-zones for medium density residential, three sub-zones for high density residential, five sub-zones for commercial areas, three sub-zones for industrial areas and three sub-zones for rural and agricultural areas.

4) District Plan for Lat Krabang District by the BMA

The District Plans for the existing 50 districts are to be proposed by the BMA in accordance with the Comprehensive Plan for the Bangkok metropolis. In the District Plan for the Lat Krabang District, the Lat Krabang community, which is located near the new airport, is defined as one of the sub-centers that will play an important role in future development.

The key concepts which are proposed for the new Lat Krabang District are as follows.

Physical and land use development

- To propose a new commercial area to the north of the motorway to support the Aerotropolis Center, comprising an exhibition area, international conference center, office building, hotel, apartment building, entertainment area, museum and library for technology and trade.

- Building improvements in the Wat Lan Boon Community to improve the layout and for beautification.

Public facility development

- To develop public facilities that are appropriate for the Aerotropolis Center.

- A good standard of road surface and drainage system development.

Transportation development

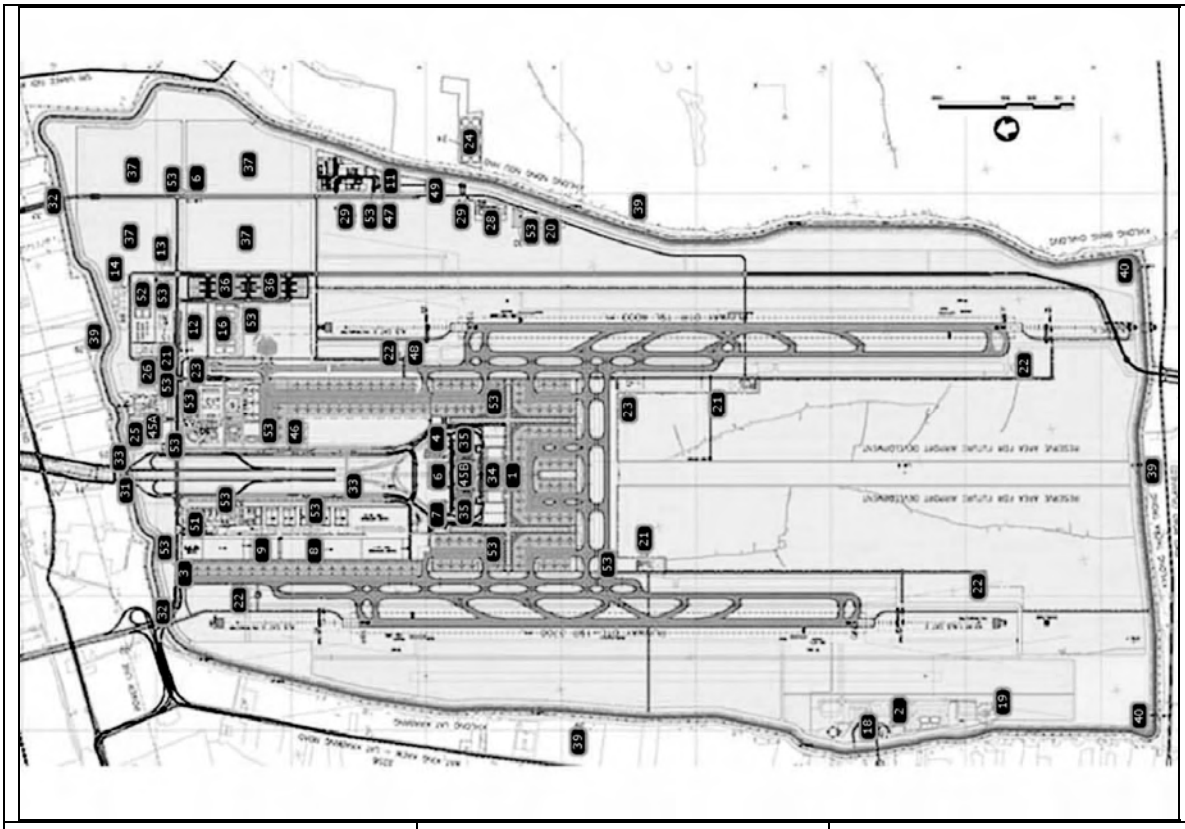
- To improve minor roads which link Rom Khlao Road and the motorway to support traffic volumes in the future.
- To extend the main pedestrian linkage between Wat Lan Boon SRT railway station and the Study Area to support the movement of people from On-nut Road and SRT passengers.
- To develop the gateway from On-nut Road by expanding the road which crosses Prawet Canal, and preparing a parking area.

Development of the landscape and environment

- To improve the aesthetics of the road near to the Prawet Canal and the road which links to the Wat Lan Boon railway station.
- To provide open spaces and public gardens in the proposed new area beside the Aerotropolis Center.
- To improve the environment in the Wat Lan Boon Community in order to make the community a more pleasant place.
- To develop the big lake near to the Wat Lan Boon railway station as a public garden for Lan Boon people and the nearby community.

(3) Regional Planning around the new International Airport

The new international airport of Bangkok, called the Suvarnabhumi Airport, is now under construction in a location 25 km west of the center of the Bangkok Metropolis. The new airport has a site area of about 3,000 ha (20,000 rai), on which two runways will be located, one 4,000 m and the other 3,700 m in length. 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.



1. Passenger Terminal Facilities	19. Hiliport	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. Secuity 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. WasteWater Treatment Facilities	50. Thai City (TG operation)
11. Airport Manintenance 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. Seconday Access Road	
15. Car Rental Facilities	33. Rail Access Route	
16. Aircraft Maintenance Facilities	34. Railway Statioin	
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 next page.

Figure 2.8: Plan for Suvarnabhumi International Airport

2.2.3 Existing Major Transport System Development Projects

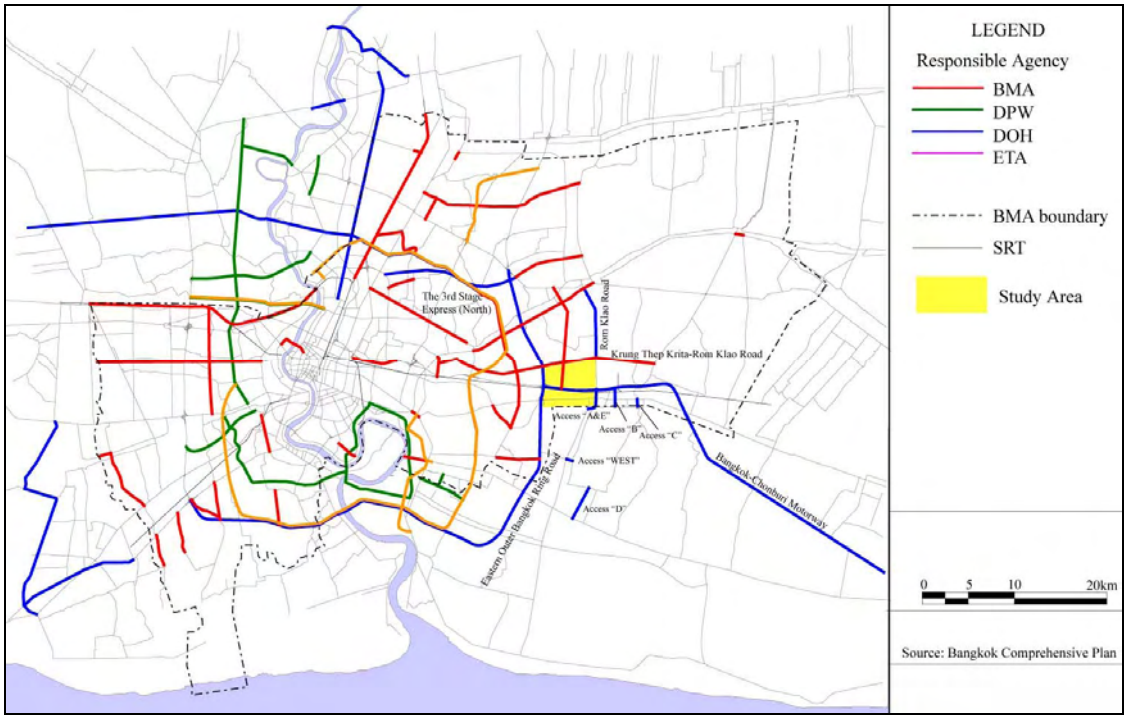
(1) Road Sector

There are four agencies responsible for road network development in Bangkok, namely DOH, DPW, ETA and BMA. The Bangkok Comprehensive Plan combined the plans of these agencies and compiled an integrated transport development plan. Figure 2.9 shows the planned roading projects up to 2016. The projects relevant to the Lat Krabang Sub-center are:

1) Southern Outer Bangkok Ring Road (DOH),
2) Third Stage Expressway Project (ETA), and
3) Krung Thep Kritha-Rom Klao Road (BMA).

Widening of the Eastern Outer Bangkok Ring Road and the Bangkok-Chonburi Motorway have almost been completed. It should be noted that the plan includes a north-south arterial road (Ram Intra-Rom Klao 1 Road, 30 m-width) included by the BMA, which will run through the Study Area.

There is another important development plan in the roading sector. The Aerotropolis Development Plan has proposed a number of roading projects around the SBIA over the next 30 years (2006- 2035) as shown in Figure 2.10. The sub-center development should follow this plan as it was approved by the cabinet, although some inconsistencies have been found between the Aerotropolis Development Plan and the existing plans by relevant agencies. According to the counterpart, however, it is possible to propose some modifications relating to the Lat Krabang Sub-center. The Plan includes four arterial roads, six secondary roads, and an “aerolane” for trucks in the Study Area. The BMA is regarded as the agency responsible for these projects as shown in Table 2.11.



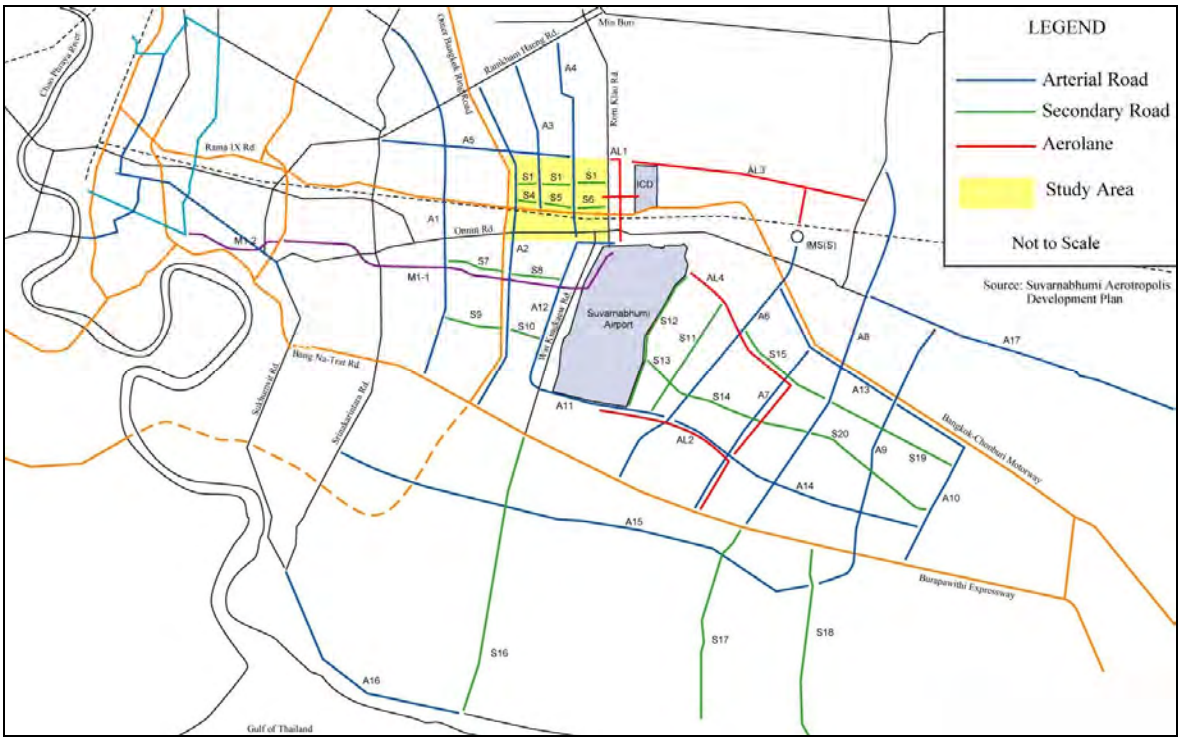
Source: Suvarnabhumi Aerotropolis Development Plan

Figure 2.9: Roading Projects

Table 2.11: Relevant Roading Projects in the Aerotropolis Development Plan

Project	Agency	Period	Budget (million Baht)
A2: Ramintra-Highway 34	BMA	2011-2015	2,748
A3: Ramkhamhang Rd.-(S4-S5)	BMA	2006-2010	1,289
A4: Ramkhamhaeng Rd. –A13	BMA	2011-2015	1,580
A5: Srinakarin Rd.-A4	BMA	2011-2015	2,063
AL1: Rom Klao ICD – To Airport	BMA	2006-2010	1,542
S1, S2, and S3	BMA	2006-2010	650
S4, S5, and S6	BMA	2011-2015	650

Source: Suvarnabhumi Aerotropolis Development Plan



Source: Bangkok Comprehensive Plan

Figure 2.10: Roading Projects SAPD

(2) Railway Sector by the OTP / SRT / MRTA

A study of the Urban Rail Transportation Plan (URMAP) for Bangkok and surrounding areas by the Office of Transport and Traffic Policy and Planning (OTP) was completed in 2002.

The routes designated in the URMAP consist of 376 kilometers in length with an estimated budget of 505,000 million baht. This will take more than 20 years to complete.

According to the URMAP, urban rail transportation is classified into two systems, namely, the Mass Rapid Transit system and the Commuter Train system. For the mass rapid transit system, there are two operating sectors. The Mass Rapid Transit Authority (MRTA) will be responsible for the Blue Line (two routes), Orange Line and Yellow Line. The Bangkok Metropolitan Administration (BMA) will be responsible for Green Line (two routes). The total length of the mass rapid transit system will be 261 km. For the commuter train system, the State Railway of Thailand (SRT) will be responsible for the operation of two routes. The total length of the system will be 115 km.

1) MRTA

The first section of Blue Line between Hua Lamphong and Bang Sue was opened in July 2004. For other extensions, the feasibility study and preliminary designs have been done, and the cabinet approval has been given.

2) BTS

The two routes of the Green line, Sukhumvit line (On Nut – Mo Chit) and Silom line (National Stadium – Saphan Taksin) were opened in December 1999. There is a plan to extend the routes in several directions. The total length of the expansion projects and the circular line project is approximately 187 km.

3) SRT

The commuter train project is composed of two major routes as follows;

1) North-South Route: from Rangsit to Mahachai, about 65 km.
2) East-West Route: from Talingchan to Suvarnabhumi airport, about 50 km.

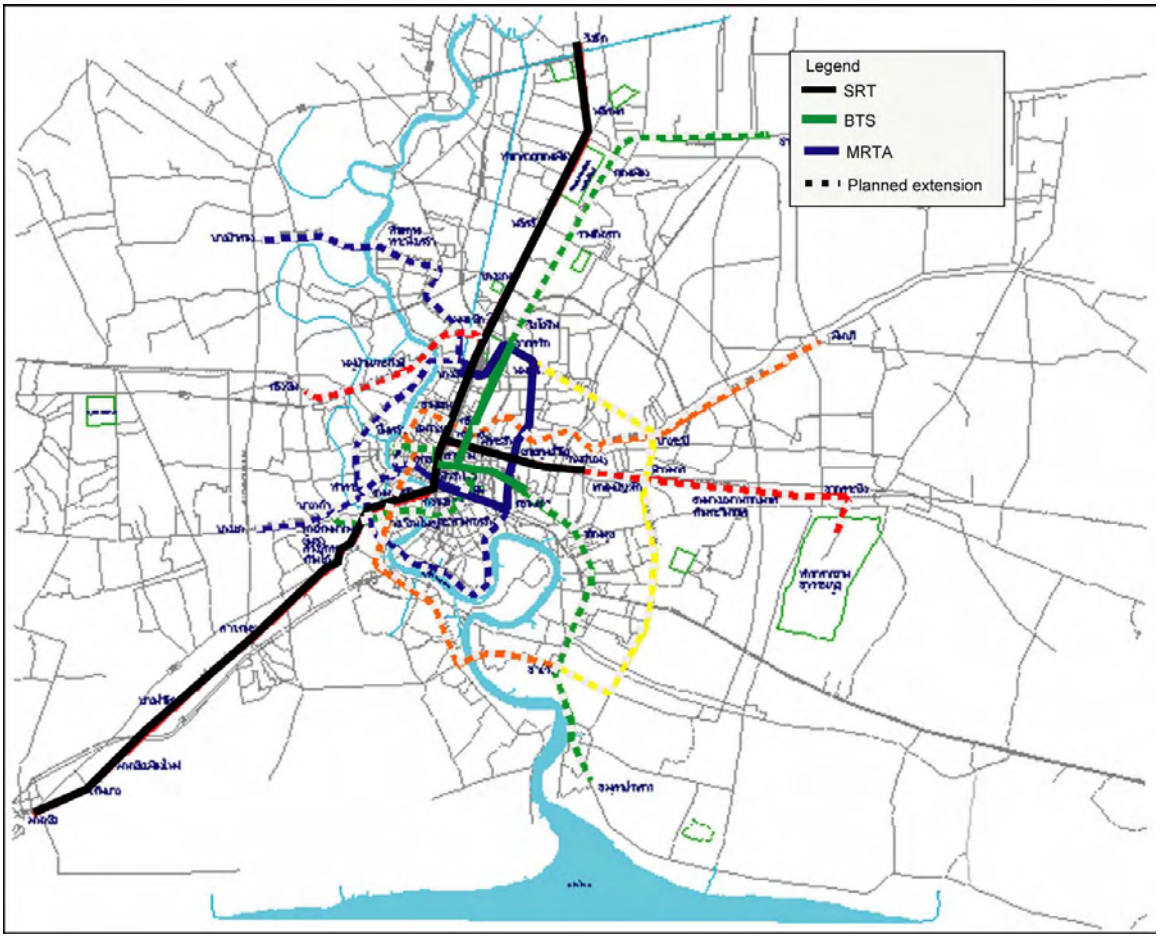


Figure 2.11: Railway Network