5.6 Cost Estimation

5.6.1 Unit Direct Construction Costs for Civil Work

In order to estimate the cost of implementing the sub-center development in Lat Krabang, the unit direct construction costs for the civil work were first estimated based on the standard prices issued by the Ministry of Commerce. The standard prices consist of the material cost and labor cost. Comparing the estimated unit construction cost with the contract price of the Outer Bangkok Ring Road (OBRR) project and the new second international airport project, the unit construction cost was reviewed and adjusted for this study.

In addition to the unit costs mentioned above, other unit construction costs were taken from similar projects for various types of work items. For instance, the unit construction cost of the wastewater treatment plant was estimated from similar projects in the BMA area according to the Feasibility Study of Bangkok Wastewater Project Stage 6, BMA, in 2005. The unit cost for the substation (60 MVA x 2) was based on the costs for a similar project.

As a LRT system has not yet been developed in Thailand, the unit cost of this system was based on the guidelines for introduction of the LRT system issued by the Ministry of Land and Transport in Japan in 2005.

Table 5.61: Summary of Unit Direct Construction Costs for Civil Work (1/2)

Item		Unit	Unit Cost (THB)	Note
Earthwork	Clearing and grubbing	m^2	5	
	Filling (On-site Material)	m^3	282	
	Filling (Borrow Material)	m^3	493	
	Excavation	m^3	17	
Transport	AC Pavement (9 – 60 m in width)	m	11,106 – 61,997	Incl. earthworks, pavements, sidewalks, roadside green areas, signs, and markings.
	RC Pavement (9 – 60 m in width)	m	8,610 – 38,718	Incl. removal of old AC pavements.
	Street Lighting	nos	55,000	@20m
	Traffic Signals	location	1,000,000	@intersection
	LRT	km	1,030,927,835	Incl. equipment, railways, and pavements.
	Bridge	m^2	9,000 – 15,100	10 - 50 m span
Flood Protection	RC Pipe (Dia. 600 – 1,200 mm)	m.	2,730 – 8,880	Covering depth of 0.6 – 3.0 m. Incl. manhole (@16m).
	Box Culvert (W x H: 1.2 x 1.2 – 1.8 x 1.8)	m.	6,530 – 14,080	Covering depth of 0.6 – 3.0 m. Incl. manhole (@16m).
	Pump (0.2 – 0.4 m^3/s)	m^3/s	1,500,000 – 2,250,000	
	Pressure Pipe (Dia 500 – 710 mm)	m	8,255 – 15,340	Incl. HDPE pipes, road & *khlong* crossings, and fittings.

Note: Unit cost consists of the material cost and labor cost issued by the Ministry of Commerce.

Table 5.62: Summary of Unit Direct Construction Costs for Civil Work (2/2)

Item		Unit	Unit Cost (THB)	Note
Khlong Improvement	*Khlong* Nung	m	39,275	Incl. king posts, batter piles, and handrails.
	Khlong Mae Chan	m	29,650	
	Khlong Pravet	m	77,530	
	Khlong Song	m	655	Incl. handrail.
	Sodding	m^2	35	
	Planting and Pedestrian	m^2	733	Average of planting and interblocking pavement.
	Water Gate	nos	7,454,545	Incl. structural works
	Gate Pump (2 m^3/s)	nos	21,227,273	Incl. pump, gate, auto screening, and structural works.
Water Supply	PVC pipe (Dia. 200 – 300 mm)	m	840 – 1,645	Incl. PVC pipes, road & *khlong* crossings, and fittings.
	Steel pipe (Dia. 400 – 710 mm)	m	4,820 – 7,420	Incl. steel pipes, road & *khlong* crossings, and fittings.
Wastewater	HDPE pipe (Dia. 200 – 250 mm)	m	1,280 – 2,570	Covering depth of 0.6 - 2.0 m. Incl. manhole (@50m).
	HDPE pipe (Dia. 300 – 710 mm)	m	2,410 – 12,620	Covering depth of 0.6 - 3.0 m. Incl. manhole (@50m).
	Central Treatment Plant	m^3/day	4,090	Incl. equipment, fittings, and structures.
	Pump (0.05 – 0.10 m^3/s)	set	2,050,000 – 2,100,000	
Power Supply	Cable (24 KV.)	m	2,400	Incl. installation work.
	Duct Bank (2 x 1 – 2 x 3/ 125 mm^2)	m	5,229 - 8,745	Incl. HDPE pipes, casings, and installation works.
	Manhole (C2/1 - A3/1)	nos	52,760 - 104,908	@70m/nos
	Unit Substation	unit	1,800,000	24 KV/ 1,500kVA
	Overhead Structure	m	77,000	For distribution lines.
	Substation	set	81,218,200	115kV/ 60MVA x 2
Communications	Cable (600 - 1,200 pairs)	m	1,340 - 2,550	Incl. installation works.
	Duct Bank (2 x 1/ 125 - 140 mm^2)	m	5,229 - 5,393	Incl. HDPE pipes, casings, and installation works.
	Manhole	nos	45,835	@70m/nos
	Terminal Panel (600 - 1,200 lines)	unit	76,000 - 165,000	
	Overhead Structure	m	25,000	For distribution line.
	Sub-telephone Junction	unit	3,100,000	
Green and Park		m^2	1,000	Incl. surface soils, sodding, trees, and multipurpose spaces.
Solid Waste	Side Loaded truck (1.5 t)	vehicle	510,000	
	Loaded Container Truck (6-wheels/1.5 – 5.0 ton)	vehicle	1,590,000 – 2,340,000	
	Compactor Truck (2.0 – 12.0 ton)	vehicle	1,500,000 – 3,460,000	

Note: Unit cost consists of the material cost and labor cost issued by the Ministry of Commerce.

5.6.2 Unit Direct Construction Costs for Building Work

The market costs issued by the Valuers' Association of Thailand were adopted for the unit direct construction costs for the building works. The estimated unit costs were reviewed in comparison with the market prices and unit costs for other projects and studies. These included the Din Daeng Redevelopment Master Plan by the JICA, the Din Daeng Feasibility Study by the NHA, and the new second airport project. The unit costs issued by the Thai Appraisal Foundation and the Bureau of Budget Thailand were used for the comparison against market prices.

Table 5.63: Summary of Unit Direct Construction Costs for Building Work

Type of Building Use		Unit Price (baht/m^2)	Note
Residential	Low-rise	9,295	1 – 3 floors
	Middle-rise	12,925	4 – 9 floors
	High-rise	17,930	Not less than 10 floors
Office	Low-rise	13,000	1 – 3 floors
	Middle-rise	18,000	4 – 9 floors
	High-rise	22,000	Not less than 10 floors
Commerce	Low-rise	9,865	1 – 3 floors
	Middle-rise	11,000	4 – 9 floors
	High-rise	16,000	Not less than 10 floors
Education	Pre-primary	8,000	
	Primary	11,500	
	Junior Secondary	13,500	
	Senior Secondary & Vocational	15,500	
Medical	Health Center	15,000	
	General Hosp.	16,250	
Test & Laboratory		22,000	Due to the relatively high requirements, the highest cost of all types of buildings is applied for this category.
Factory & Warehouse		15,500	Same as the unit cost of the vocational school.
University		15,500	Same as the unit cost of the vocational school.
Others	Low-rise (1-3Fl)	13,000	Same as the unit cost for the office.
	Middle-rise (4-9Fl)	18,000	Same as the unit cost for the office.
	High-rise (>10Fl)	22,000	Same as the unit cost for the office.

Source: The Valuers' Association of Thailand, 2005

5.6.3 Unit Direct Construction Cost for Land Reclamation

The unit direct construction cost for land reclamation was estimated based on the unit cost quoted in the Rama IX pilot project as outlined below.

1) The unit cost for the road pavements includes the sub-base course, base course and AC surface course. Earthwork is excluded from the construction cost. The estimated unit cost was increased by 20% for miscellaneous works including street lights, signs, and markings. This unit cost was used for the on-site and feeder roads.

2) It was assumed that the public utility system in the new development area would be fully formed by the installation of utilities along primary and secondary roads. Therefore, the unit cost for utilities was focused on surface preparation, such as the sodding, pedestrian walkways and planting.

3) In the regulatory managed area (or outside the new development area), the public utility system is assumed to be supplemented by the systems already installed along the feeder roads. Therefore, the unit cost for utilities includes the cost for surface preparation, drainage, water supply, power supply, and communications.

Table 5.64: Summary of Unit Direct Construction Costs for Land Development

Item	Within New Development Area (baht/m^2)	Outside New Development Area (baht/m^2)	Note
Utility and Others	550	1,158	• Unit cost for the new development area covers the sodding, pedestrian, and planting. • In addition to those works, the unit cost for the area outside the new development area covers drainage, power supply, communications, and water supply.
Road Pavement	3,751	3,751	• For 9 m and 12 m wide roads. • Excluding earthworks.

Source: Price Quotation for the Rama IX Pilot Project

5.6.4 Overheads, Profit, and Others

The Ministry of Commerce issued a regulation for Factor F that specified the percentage of overheads, profit, and indirect expenses for construction works. Factor F should be multiplied by the direct construction cost to estimate the total construction cost. Factor F is classified into three categories for road works, bridge works, and building works. As the construction works will be sub-contracted with differing contract amounts, Factor F will be set at 10% as an average value for different cost ranges.

The unit construction cost for the building works was estimated by multiplying the unit direct cost by 50%, which includes Factor F at 10% as well as other expenditure for furniture, equipment, and mobilization.

The engineering service cost was quoted for the pilot project area of 30 ha. Based on this quotation, the engineering service cost was set at 8% of the construction cost to cover the costs from the planning to construction supervision stages.

In the Din Daeng Master Plan, the total cost of engineering and management costs was set at around 20%. Considering the engineering service cost of 8%, the project management costs for the Study were set at a rate of 10% of the construction and engineering costs.

Table 5.65: Unit Rate of Overhead, Profit, Engineering Service, and Management Costs

Item	Description	Note
Overhead and Profit of Contractor for Civil Work	10% of direct construction cost	
Overhead and Profit of Contractor for Building Work	50% of direct construction cost	Incl. furniture, equipment, and moving expenses.
Engineering Service	8% of construction cost	
Project Management	10% of construction and engineering service costs	

5.6.5 Operation and Maintenance Cost

After considering the costs in the Din Daeng Master Plan, the operation and maintenance costs for the civil works were set at 1.0% of the construction costs. As the geological conditions in the study area are characterized by very soft soil, the asphalt road pavements will need to be repaired in the future. The cost of repairing the RC pavement is estimated to be incurred 15 years after completion of the initial AC pavement works in accordance with the design period (for the primary and secondary roads). The O&M costs for the building works was set at 0.5% of the construction cost.

5.6.6 Implementation Costs for the Sub-center Development

The implementation costs for the sub-center development of 1,945 ha are estimated to be 214,617 million baht which includes the construction, engineering service, and project management costs. In addition to this, the implementation costs for the regional transport system will amount to 3,035 million baht for the NS1, NS2, and EW1 roads and the interchange with the OBRR.

Table 5.66: Implementation Costs for the Sub-center Development

Item		Construction	Engineering Service	Project Management	Total	Share
		mil. baht	mil. baht	mil. baht	mil. baht	%
Transport	Primary and Secondary Roads	2,360.1	188.8	254.9	2,803.8	1.29
	Interchange	957.2	76.6	103.4	1,137.1	0.52
	LRT	9,387.6	751.0	1,013.9	11,152.5	5.12
Flood Protection	Drainage System	694.4	55.5	75.0	824.9	0.38
	Khlong Improvement	874.2	69.9	94.4	1,038.6	0.48
	Retention Pond in District Park	44.7	3.6	4.8	53.1	0.02
Water Supply	Distribution System	116.9	9.3	12.6	138.8	0.06
Wastewater	Collection System	112.6	9.0	12.2	133.8	0.06
	Central Treatment Plant	57.5	4.6	6.2	68.3	0.03
Power Supply	Distribution System	470.2	37.6	50.8	558.6	0.26
	Substation and Transformer	263.8	21.1	28.5	313.4	0.14
Communication	Distribution System	305.9	24.5	33.0	363.4	0.17
	Exchange System	12.3	1.0	1.3	14.6	0.01
Solid Waste	Collection System	96.8	7.7	10.5	115.0	0.05
Park and Green	Earthwork	162.1	13.0	17.5	192.6	0.09
	Planting	926.1	74.1	100.0	1,100.2	0.51

Item		Construction	Engineering Service	Project Management	Total	Share
		mil. baht	mil. baht	mil. baht	mil. baht	%
Land Develop.	Earthwork	6,995.1	559.6	755.5	8,310.2	3.82
	Road, Utility, and Pond	24,441.8	1,955.3	2,639.7	29,036.9	13.34
Building	Private	129,065.7	10,325.3	13,939.1	153,330.1	70.45
	Public	5,864.2	469.1	633.3	6,966.7	3.20
Total		183,209.1	14,656.7	19,786.6	217,652.5	100.00
	Excl. NS1, NS2, EW1, and IC	180,654.2	14,452.3	19,510.7	214,617.2	98.64

Note: Land acquisition cost for roads and canals (125.7ha), green area (99.9ha), and land plots for public facilities (74.0ha) are not included.

Excluding the regional transport system and the LRT system, the unit construction cost per square meter for civil works is estimated to be 1,863 baht/m^2 which would increase to 2,345 baht/m^2 if the investment for the LRT system is included. The overall unit construction cost including the civil and building works is estimated to be 9,264 baht/m^2.

Table 5.67: Implementation Unit Costs for the Sub-center Development

Item		Cost (million baht)	Unit Price (baht/m^2)	Note
Civil Works	Excl. NS1, NS2, EW1, IC, and LRT	36,337	1,863	For the study land area of 1,950 ha.
	Excl. NS1, NS2, EW1, and IC	45,724	2,345	For the study land area of 1,950 ha.
Building Works		129,066	19,487	For the floor area of the building works by the private sector at 662 ha.
Total of Civil and Building Works		180,654	9,264	Excl. NS1, NS2, EW1, and IC. For the study land area of 1,950 ha.
Total Implementation Cost		214,617	11,006	Excl. NS1, NS2, EW1, IC, and O&M costs.

The total implementation cost including O&M costs was estimated for the period from 2006 to 2035, based on the phased development plan for the sub-center as listed below.

1) The timing of investment for the main roads and utilities was adjusted based on the phased development plan.

2) The timing of investment for the land reclamation and building works was based on the level of development in each plot of land. The level of development was estimated from the ratio of the population in each year to the population in 2035.

3) The timing of investment for the public facilities is planned to provide 70% of the full capacity in the period in which the population increases to between 30% and 50% of the planned population in 2035. The intermediate capacity of 70% is improved to 100% when the population reaches the estimated 2035 population.

Table 5.68: Implementation Costs for the Sub-center Development by Fiscal Year

Year	Public Sector for Project Cost			Private Sector			Public Sector for Regional Transport	Total
	Civil & Building Incl. PM	O&M	Sub-total	Civil & Building Incl. PM	O&M	Sub-total		
	mil. baht	mil. baht	mil. baht	mil. baht	mil. baht	mil. baht	mil. baht	mil. baht
2006	214	0	214	4,105	0	4,105	380	4,699
2007	214	2	216	4,972	21	4,993	383	5,592
2008	391	4	395	6,088	46	6,134	386	6,914
2009	214	6	220	7,080	76	7,156	389	7,766
2010	449	8	457	8,593	112	8,705	392	9,555
2011	519	11	530	8,439	155	8,594	16	9,140
2012	519	14	533	8,750	198	8,948	16	9,497
2013	646	17	664	8,763	242	9,005	16	9,685
2014	950	21	971	8,882	286	9,168	16	10,155
2015	488	26	514	9,201	330	9,532	16	10,062
2016	504	29	533	5,408	377	5,785	16	6,334
2017	389	32	421	6,015	404	6,419	16	6,856
2018	677	35	712	6,701	434	7,136	16	7,863
2019	446	39	484	7,630	468	8,097	16	8,598
2020	609	42	651	7,571	506	8,077	16	8,744
2021	621	45	667	5,317	544	5,862	243	6,772
2022	621	47	669	5,107	571	5,678	245	6,592
2023	471	49	520	6,234	597	6,830	247	7,598
2024	487	50	537	5,853	628	6,481	249	7,268
2025	437	69	506	7,571	658	8,229	321	9,056
2026	2,481	70	2,552	5,783	696	6,479	95	9,126
2027	2,503	91	2,593	5,981	725	6,706	95	9,395
2028	2,625	111	2,736	6,194	755	6,949	95	9,780
2029	2,503	132	2,635	6,418	786	7,204	95	9,933
2030	2,546	180	2,725	6,651	818	7,470	26	10,220
2031	300	200	500	3,867	852	4,719	26	5,244
2032	300	201	501	4,052	871	4,924	26	5,450
2033	300	203	502	4,246	892	5,138	26	5,666
2034	300	204	504	4,451	913	5,364	26	5,893
2035	300	160	460	4,667	936	5,603	26	6,088
Total	**24,024**	**2,097**	**26,121**	**190,593**	**14,897**	**205,490**	**3,929**	**235,540**

Note:
1) "Civil & Building" covers the construction, engineering service, and project management costs.
2) "O&M" for public sector covers the repair cost for primary and secondary roads.
3) "Regional Transport" covers the construction, engineering service, project management, and O&M costs for the interchange and NS1, NS2, and EW1 roads.

5.6.7 Implementation Costs without the Sub-center Development

For comparison, the implementation costs were estimated for the hypothetical case of "without the sub-center". The cost is estimated at 34,429 million baht, including a cost for the regional transport systems of 1,898 million baht, as mentioned below.

1) Regional transport systems, namely the NS1, NS2, and EW1 roads, are assumed to be implemented regardless of the sub-center development.

2) Road construction for the study area is implemented to improve the existing roads together with the construction of utilities along those roads.

3) Based on the population density in the existing developed area and the existing floor area, the area required for the land reclamation and building works was estimated.

Table 5.69: Implementation Costs without the Sub-center Development

Item		Construction	Engineering Service	Project Management	Total	Share
		mil. baht	mil. baht	mil. baht	mil. baht	%
Transport	Existing Road Improvement	42.3	3.4	4.6	50.3	0.15
	New Road Construction	1,597.8	127.8	172.6	1,898.1	5.51
Flood Protection		261.6	20.9	28.3	310.8	0.90
Water Supply	Distribution System	64.5	5.2	7.0	76.7	0.22
Power Supply	Distribution System	417.3	33.4	45.1	495.7	1.44
	Transformers	49.5	4.0	5.3	58.8	0.17
Communication	Distribution System	414.0	33.1	44.7	491.8	1.43
	Exchange System	1.8	0.1	0.2	2.2	0.01
Solid Waste		77.4	6.2	8.4	91.9	0.27
Parks		368.9	29.5	39.8	438.3	1.27
Land Development		8,475.5	678.0	915.4	10,068.9	29.25
Buildings	Private	15,600.5	1,248.0	1,684.9	18,533.4	53.83
	Public	1,609.1	128.7	173.8	1,911.6	5.55
Total		28,980.2	2,318.4	3,129.9	34,428.5	100.00

Note: Land acquisition cost for roads and canals (49.1ha), green area (27.0ha), and land plots for public facilities (33.9ha) are not included.

The implementation costs including O&M costs were estimated for the period from 2006 – 2035 based on the conditions outlined below.

1) The construction costs for roads and utilities were planned to be the same amount for 30 years.

2) The progress of the building and land reclamation works was adjusted to match the projected population growth for the case “without the sub-center”.

3) The capacity of public facilities was planned to ensure 70% of the full capacity in the period in which the population increases from 20% to 50% of the planned population in 2035. The capacity is improved to 100% in the period when the population is increased from 70% to 100%.

Table 5.70: Implementation Costs without the Sub-center Development by Fiscal Year

Year	Public Sector for Project Cost			Private Sector			Public Sector for Regional Transport	Total
	Civil & Building	O&M	Sub-total	Civil & Building	O&M	Sub-total		
	mil. baht	mil. baht	mil. baht	mil. baht	mil. baht	mil. baht	mil. baht	mil. baht
2006	51	0	51	251	0	251	63	365
2007	51	0	51	302	1	303	64	418
2008	51	1	51	304	3	308	65	424
2009	51	1	52	297	5	302	66	419
2010	51	2	52	311	7	318	67	437
2011	51	2	53	922	9	930	67	1,050
2012	51	3	53	459	14	472	68	594
2013	51	3	54	458	16	474	69	597
2014	51	3	54	458	19	477	70	601
2015	51	4	54	487	22	509	71	634
2016	51	4	55	539	24	564	72	690
2017	219	5	224	574	28	601	72	897
2018	219	6	225	601	31	632	73	930
2019	219	7	226	637	34	671	74	971
2020	219	8	227	681	38	719	75	1,021
2021	219	9	229	823	42	865	76	1,169
2022	219	10	230	806	46	853	77	1,159
2023	219	12	231	859	51	910	77	1,218
2024	219	13	232	924	56	980	78	1,290
2025	219	14	233	996	61	1,057	79	1,369
2026	219	15	234	1,174	67	1,241	80	1,555
2027	51	16	67	1,190	74	1,264	81	1,411
2028	51	17	67	1,293	80	1,374	81	1,522
2029	51	17	68	1,409	88	1,497	82	1,647
2030	51	17	68	1,538	96	1,634	83	1,785
2031	195	18	213	1,684	104	1,789	84	2,086
2032	195	19	214	1,849	114	1,963	85	2,262
2033	195	20	215	2,036	124	2,160	86	2,461
2034	195	21	216	2,248	136	2,384	86	2,687
2035	195	22	217	2,492	149	2,640	87	2,945
Total	**3,930**	**289**	**4,216**	**28,602**	**1,539**	**30,142**	**2,258**	**36,614**

Note:
1) "Civil & Building" covers the construction, engineering service, and project management costs.
2) "O&M" for public sector covers the repair cost for primary and secondary roads.
3) "Regional Transport" covers the construction, engineering service, project management, and O&M costs for NS1, NS2, and EW1 road

CHAPTER 6:
FORMULATION OF STRATEGIC DEVELOPMENT PLAN

6.1 Basic Conditions and View Points for Planning

6.1.1 Existing Government Policies on Property Development

The central government of Thailand has a clear policy for implementation of new large-scale urban developments: The government constructs infrastructures and the private sector develops and utilizes the land plots and building structures. This policy of the government seems to be applied firmly to the Aerotropolis development. According to the draft bill for implementation of the Aerotropolis, a concept of the Special Economic Zone will be introduced and applied to the entire area of the Aerotropolis. Then a Specific Plan will be applied massively to the entire area of the SEZ. By doing this, all the infrastructures indicated in the Specific Plan will be constructed by the government sector, and all the land will be utilized by the private sector to achieve the land use designated in the Specific Plan.

6.1.2 View Points for Formulation of Strategic Development Plan

The above mentioned policy of the central government is reasonable and should be respected when considering the development of the Lat Krabang subcenter. However, the political process for promulgation of the SEZ law and consequent authorization of the Specific Plan will require significant time. As the opening of the new airport and the new airport link railway is coming closer, it is necessary for BMA to start development of the Lat Krabang subcenter without depending on the new legal framework for the time being.

Given the above, the view point for the formulation of a strategic development plan for Lat Krabang subcenter was set as follows:

- Utilize existing urban development/management measures which are applicable and manageable by BMA, and
- Establish a project scheme which can be combined with the new legal framework to be established for the entire Aerotropolis development scheme in the future.

6.2 Consideration on Applicable Urban Development/Management Measures

6.2.1 Existing Measures Available for BMA

Existing urban development/management methods readily available for BMA consist of three categories as briefly mentioned in the following:

(1) Individual Facility Development Measures

The infrastructures/public facilities can be constructed as a part of routine government works implemented by relevant organizations. These include roads, utilities infrastructures, and public facilities. The characteristics of this method can be summarized as follows:

- A certain amount of benefit must be provided by construction of each target facility:
- The target users have to consist of an unspecified and wide range of people:

(2) Super Block Development Measures

The super block development is often employed for development of real estate totally integrated with the construction of necessary infrastructures. Examples can be seen in development of new towns, industrial estates, and subcenters world wide. The major characteristics can be itemized as follows:

- It can cover construction of facilities of which users are relatively limited as it aims at effective use of the entire land:
- The implementation body can vary according to the objectives and the condition of the project site.

The super block development can be further divided in to two types; land acquisition method and property right adjustment method. The latter includes the Land Readjustment method. These methods are further discussed in the following subsection.

(3) Regulative and Incentives Measures

The regulative and incentives measures aim to guide private sector developers and individual land users to achieve the common goal of planned land use. The government provides various incentives to promote private investment in real estate development and building construction while setting regulations to ensure a necessary level of structures to be constructed. The major characteristics of this method are as follows:

- It aims at gradual achievement of goals in a very long time frame:
- The implementation body is the individual private sector. The government provides instructions and facilitation services only.

6.2.2 Selection of Facilities to be Implemented by the Government Sector (BMA)

Although construction of infrastructures and public facilities basically belongs to the responsibility of the government sector, there are several cases in which the private sector plays a key role in the planning, construction, and operation stages of the facilities. In the case of the Lat Krabang subcenter development, implementation of some key facilities definitely belongs to the government sector, while some smaller facilities can be entrusted to the implementation body of the super block development project, as users of the facilities in the development area are limited. The following table shows the principle of the allocation of responsibility for construction of major infrastructures planned in the Lat Krabang subcenter development.

Table 6.1: Major Facilities and Implementation Body (Provisional)

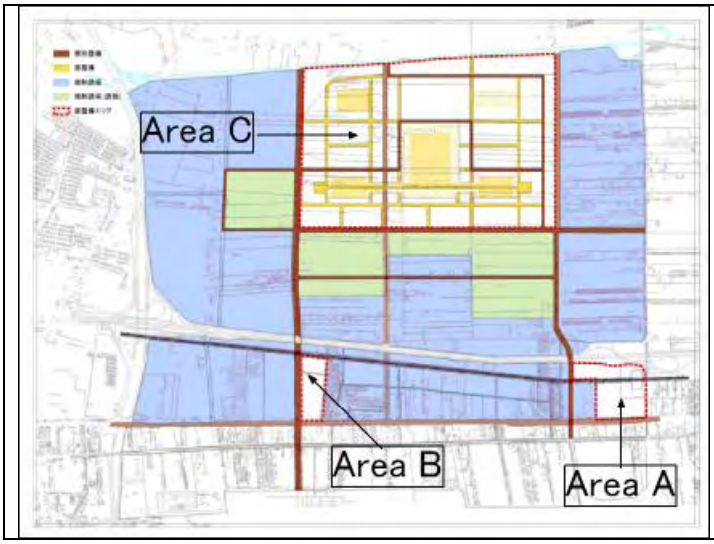
Items	Responsible Body for Implementation	Reasoning
a) Major Roads	Government	It aims to accommodate a large amount of through traffic.
b) Collector Roads	Government/ Developer	It serves a large area, but the users often are limited to a specific group of people if it is well planned to eliminate through traffic.
c) Service Roads	Developer	It serves only the owners/users of land plots situated along it.
d) Parks and Open Spaces	Government/Developer	The central park is planned to serve dwellers city wide while other parks only serve people in specific areas.
e) Canals	Government	It protects from floods in up-stream areas rather than the subcenter area.
f) Retention Ponds	Developer	It aims to smooth the curve of the peak discharge of rain water generated within the coverage area.

6.2.3 Selection of Areas to be Implemented as Super Block New Development

In general, the selection of land blocks for employment of super block development is made by taking the following aspects into consideration:

- Areas where the number of current land owners is rather limited:
- Areas where the current land is rather vacant:
- Areas where connection to existing mainstay infrastructures is rather easy:
- Areas where significant public benefit is expected if it is developed with all the necessary infrastructures in an integrated manner, such as inter-modal cores:

All of these aspects are integrated in the planning of land use discussed in Chapter 4. The three areas designated as non-residential areas in the plan have significant importance in terms of the function of the Lat Krabang subcenter, and therefore are worth being selected as the project sites for super block development. Selected areas are depicted in the following figure. Detailed analysis is made in section 6.3 of this report.



Area A: Lat Krabang Station Area
Area B: Wat Lanboon Station Area
Area C: Hybrid Town/RD&D Area

Figure 6.1: Selected Areas for Super Block New Development

6.2.4 Areas to be Covered by Regulative and Incentives Measures

Areas not specified as super block development areas will be covered by regulative and incentives measures for achievement of land use goals and construction of necessary infrastructure. The primary players in these areas are individual land owners, but it may include some developers for housing real estate as well. Thus it is important to employ various techniques in order to promote private sector investment. Some ideas for the promotion of private sector investment are described in section 6.4 of this report.

6.3 Analysis of Applicable Project Methods for New Development Areas

6.3.1 View Points for Analysis

All of the new developments selected in subsection 6.2.3 aim to change the current trend of growth in Bangkok by strategically constructing high grade infrastructures and introducing higher urban functions to the area. This means that a very strong government initiative is required to achieve its goal as there is no such trend formulated among the private sector yet. Thus it is safe to say that these new development projects basically belong to the responsibility of the government sector. Once the government initiative shows a significant output which is enough to convince the private sector, the accumulation of targeted urban functions may follow. There is a chance to formulate a strategic public-private partnership from the very beginning of the project, if the government shows a very firm policy commitment for development of the Lat Krabang subcenter. It is worth trying to share the land acquisition style super block development jointly with some experienced private sector developers.

Further, the Land Readjustment method has become one of the strongest tools for the super block development after the promulgation of the Land Readjustment Law in late December, 2004. It is worth considering employment of this method as the law provides many advantages and it provides opportunity for the private sector developers to join the project if the implementation body is set to be the Land Readjustment Association.

Based on the above considerations the following view points were set for the analysis:

1) The basic style of the project is the land acquisition type to be implemented by the government (BMA):

2) The Land Readjustment system shall be pursued if appropriate:

3) The public-private partnership shall be pursued to the maximum extent possible.

In the following subsections the applicability of the land readjustment method have been analyzed for each super block project area. Where the results show a negative sign, the best combination of the tasks of the government and private sector will be recommended based on the lessons learnt from the trial for application of the land readjustment method.

6.3.2 Conditions for Analysis

Several assumptions were made in order to carrying out the analysis work for assessing the applicability of the land readjustment method as follows:

(1) Assumptions on Completeness of Development

Since the land use of all the three areas consists of non-residential functions, and the development of detached housing estate is not expected the density of the roads is rather small. The road network depicted in the land use plan is basically sufficient for the purpose. However, in some blocks designated for residential use situated in the southern part of Area 3, it is necessary to conduct a secondary development to construct service roads for detached housing plots after the completion of the land readjustment project. Likewise, additional construction of retention ponds has to be expected in these residential blocks.

Regarding the earthwork, no import of soil is assumed. The construction of the many retention ponds, together with the waste soil to be generated by the construction of major roads, will provide a large amount of soil to fill the land plots. However, additional grading/leveling work is still expected after the land readjustment.

(2) Assumptions on Land Prices

In order to carry out the study of land readjustment, a land valuation survey was conducted in the course of the Study. Based on the result of the survey work summarized in Table 6.2, distribution of current land prices were formulated as depicted in Figure 6.2. The survey covered valuation of sample lands situated outside the Lat Krabang subcenter area, in order to estimate the prices after the project. Table 6.3 shows the survey result of sample plots currently being used similarly to those employed in the land use planning in this study. The assumed prices after the project are summarized in Table 6.4, categorized by the type of land use.

Figure 6.2: Assumed Existing Land Price Ranges in the Study Area

Table 6.2: Summary of Land Price Evaluation Survey Result (Samples within the Study Area)

SMG Code	Site Point				Market Value (Baht/m2)	Area (w2)	Area (㎡)	Land use	Size	Name of Service Road	Value Category
1	1	d	1		7,800	2,049	8,196	C&V	M	Ladkrabang	A
1	1	d	2		10,140	1,036	4,144	C	M		
3	1	c	R		9,809	100	400	V	S		
Average					9,000						
6	2	b			2,704	783	3,132	I	M	Ladkrabang	B
6	3	b	1		4,225	48	192	R	S		
Average					3,000						
1	3	a	A		2,028	16,588	66,352	A	L	Motorway Frontage	C
2	1	a	A		1,196	18,220	72,880	A	L		
2	2	a			1,196	20,280	81,120	I	L		
2	4	b			1,196	11,035	44,140	A	L		
2	1	e	A		1,196	3,961	15,844	A	M		
4	2	d			897	1,731	6,924	A	M		
4	1	b	R		1,794	641	2,564	R	M		
6	1	e	R		887	200	800	V	S		
6	5	a			1,099	8,684	34,736	V	L		
6	3	b	4		2,155	48	192	R	S		
6	1	a	R		2,535	58	232	R	S		
Average					1,000						
2	5	b			3,128	1,079	4,316	V	M	Motorway Frontage	D
2	1	d	4		4,600	496	1,984	R	M		

SMG Code	Site Point			Market Value (Baht/m2)	Area (w2)	Area (㎡)	Land use	Size	Name of Service Road	Value Category
3	4	a		3,751	4,451	17,804	A	M		
3	2	c		3,751	661	2,644	R	M		
3	1	b	A	4,905	1,864	7,456	A	M		
3	3	c	2	4,905	219	876	R	S		
3	3	a	R	7,357	461	1,844	R	M		
3	3	c	1	8,655	75	300	V	S		
Average				5,000						
6	3	b	2	10,563	94	376	R	S	Outer ring	E
Average				11,000						
1	1	c	A	6,006	38,374	153,496	V	L	Romklao	F
1	1	d	3	8,580	1,612	6,448	I	M		
6	3	b	3	6,338	40	160	R	S		
Average				7,000						

Table 6.3: Summary of Land Price Evaluation Survey Result (Samples outside the Study Area)

NO		Market Value (B/㎡)	Area (w^2)	Area (m^2)	Land use	Notes
1	(3)	15,600	4,930	19,720	C	Large Scale Shopping Center
3		19,500	135	540	C	Street side medium scale office building
4		19,500	135	540	C	Ditto
7		19,500	80	320	C	Convenience Store
8		23,400	19	76	C	Street side medium scale office building
2		5,070	74	296	C	Medium scale office building
Average		17,000				
10	(5)	9,360	4,480	17,920	I	Street-side factory/office
9		5,493	1,600	6,400	I	Ditto
Average		7,000				
12	(1)	11,100	82	328	R	High grade detached housing estate
Average		11,000				
11	(2)	7,690	9,917	39,668	R	High-rise apartment
Average		8,000				
6	(4)	132,600	4,500	18,000	C	Large-scale shopping center in Bangkok CBD
5		109,824	44,000	176,000	V	Cleared land in high potential area
Average		121,000				

Table 6.4: Assumed Land Prices after Project by Type of Land use

	Land use	Land Price (B/m^2)	Note
(1)	Detached Housing	11,000	
(2)	Apartment Housing	8,000	
(3)	Community Commercial	17,000	
(4)	Commercial/Business	85,000	Assumed as 70 % of CBD of Bangkok inner city.
(5)	Industry/R&D	7,000	

6.3.3 Analysis of Applicability of Land Readjustment Method in Super Block Development Areas

(1) Area A: Lat Krabang Station Area

1) Outline of the Case Study

The objectives of the development of the Lat Krabang Station Area are as follows:

- To construct the inter-modal functions needed to ensure the efficient link of the Airport-link Railway with the feeder transports which include access and service to the Hybrid town area; and
- To develop land plots with sufficient infrastructure to accommodate locating of commercial and business buildings at an early stage of the Lat Krabang subcenter development.

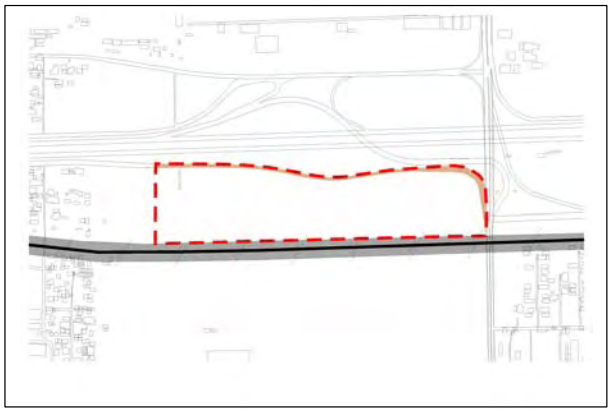
For ensuring these requirements, two alternative cases were generated as described below. The schematic development plan is shown in Figure 6.4 and the major features of the project are summarized in Table 6.5.

Case 1

This alternative case is designed to be completed within the area situated on the north side of the right of way of the existing SRT in order to minimize the investment cost for the project. The inter-modal facilities, such as station plaza and access roads can be constructed within this small area alone. However the access to the station plaza relies solely on the planned NS-2 road, and thus the effectiveness of this plan depends on the timing of the budgeting for the NS-2.

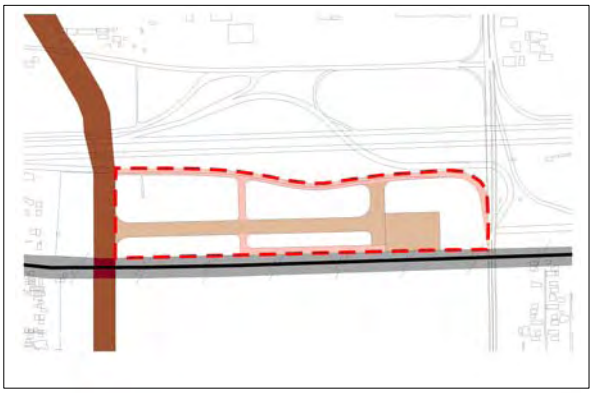
Case 2

This alternative case is designed to maximize the benefit of the construction of the airport-link line station. The area extends to the southern side of the SRT's right of way, but avoids the location of the existing water pumping station. The station plaza was planned on the southern side to be accessed from the On-nut road at the beginning. Access from the NS-2 will be developed when the road becomes available.



Case 1 | **Case 2**

Figure 6.3: Project Area of Case Study (Lat Krabang Station Area)



Case 1 | **Case 2**

Figure 6.4: Development Plan of Case Study Areas (Lat Krabang Station Area)

Table 6.5: Summary of Case Study Results for Lat Krabang Station Area

Item		Case 1	Case 2
Area		**98,900**	**279,800**
Area of Public Land (m^2)	Before Project	6,200	30,300
	After Project	36,500	111,200
Proportion of land remaining as Public Land after Project (%)		36.9	39.7
Average Land Price (B/m^2)	Before Project	1,000	5,000
	After Project	12,000	23,000
Land Price Increase Ratio		12.00	4.60
Public Facility Components	Collector Roads (m)	610	1,270
	Service Roads (m)	1,150	2,050
	Station Plaza (m^2)	7,000	7,000
	Parks & Open Spaces (m^2)	0	22,800
	Railroads (m^2)	0	24,100
Construction Cost(1000THB)	Collector Roads	22,369	46,572
	Service Roads	20,808	37,093
	Station Park	19,600	19,600
	Parks & Open Spaces		63,840
	Retention Pond		
	Water Supply	5,924	11,174

	Drainage	11,459	21,615
	Electricity	5,544	20,282
	Communication	96,456	10,458
	Building Compensation		
	Total	182,160	230,634
Average Construction Cost per Area (B/m^2)		1,842	824
Land Acquisition Cost(1000THB)	Entire Land	92,700	1,247,500
	Land for Public Facilities	30,300	404,500
Contribution Ratio	For Public Land	32.7%	32.4%
	For Reserved Land	8.7%	4.0%
	Aggregated	41.4%	36.4%

2) Considerations

In each case, the project is viable in terms of financial structure, supported by the significant increase in the average land price. Both cases however exceed the psychological ceiling of the aggregated contribution ratio target of 30%. Thus the applicability of the land readjustment method depends on the availability of the right holders' agreements.

In Case 1, obtaining the agreements is even tougher as the aggregated ratio is estimated around 41%. To pursue employment of land readjustment, financial support of the government seems necessary.

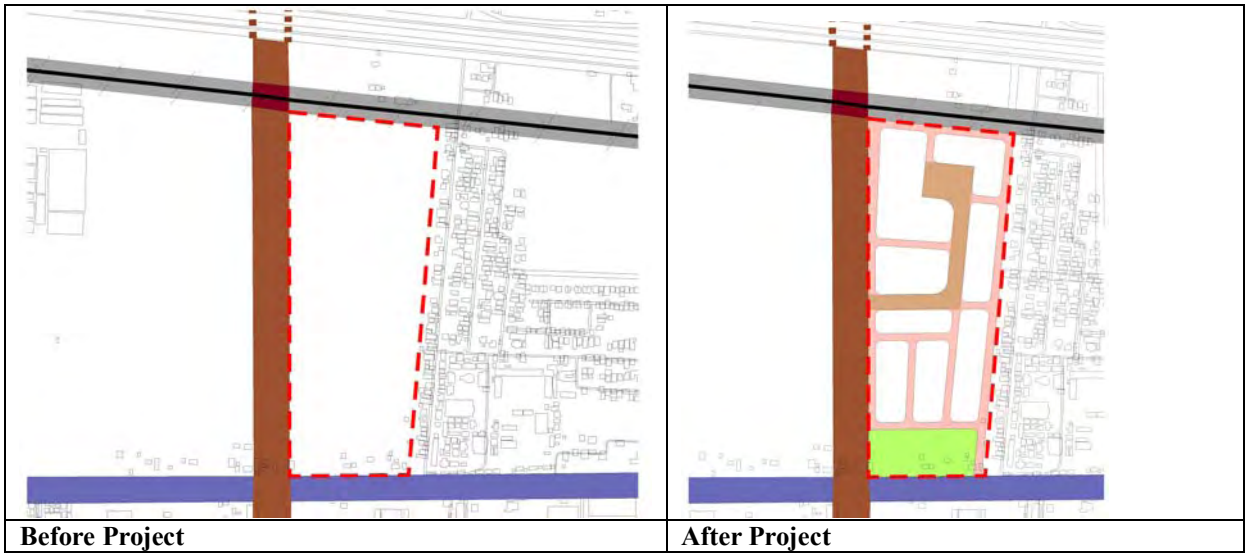
In Case 2, on the other hand, it seems possible to reduce the aggregated contribution ratio to around 30 % by both revising the road network to reduce the land contributed by the public, and by subsidizing construction of some infrastructures such as the station plaza and access road to the station. However, it seems that some of the land plots on the north side need to be replotted to the south side. This will make reaching agreement by the land owners a little bit more difficult.

As a conclusion, Case 2 is applicable and more suitable to apply the land readjustment method.

(2) Area B: Wat Lanboon Station Area

1) Outline of the Case Study

The objectives of the development of the Wat Lanboon station area are also to ensure introduction of an inter-modal function and promote efficient land use around the station plaza and nearby areas. The urgency of this project, however, is much lower than the Lat Krabang station area as the construction of SRT's Red Line is still not clearly foreseen. The development plan is depicted in Figure 6.5, and the result of the financial analysis is summarized in Table 6.6.



Before Project | **After Project**

Figure 6.5: Project Area and Development Plan of Area B (Wat Lanboon Station Area)

Table 6.6: Summary of Case Study Results for Wat Lanboon Station Area

Area		132,100
Area of Public Land (m^2)	Before Project	0
	After Project	57,000
Composition of Public Land after Project (%)		43.10
Average Land Price (B/m^2)	Before Project	3,000
	After Project	13,000
Land Price Increase Ratio		4.33
Public Facility Components	Collector Roads (m)	330
	Service Roads (m)	2,430
	Station Plazas (m^2)	5,000
	Parks & Open Spaces (m^2)	14,500
	Railroads (m^2)	0
Construction Cost(1000 THB)	Collector Roads	12,101
	Service Roads	43,968
	Station Parks	14,000
	Parks & Open Spaces	40,600
	Retention Pond	
	Water Supply	9,289
	Drainage	17,969
	Electricity	16,861
	Communications	8,694
	Building Compensation	
	Total	163,482
Average Construction Cost per Area (B/m^2)		1,238
Land Acquisition Cost (1000 THB)	Entire Land	396,300
	Land for Public Facilities	171,000
Contribution Ratio (%)	For Public Land	43.10
	For Reserved Land	9.50
	Aggregated	52.70

2) Considerations

The aggregated contribution ratio amounted to 50%, which is well beyond the psychological ceiling, although, in theory, the project is viable without requiring financial support by the government. The contribution ratio for public land amounts to 40%, reflecting the situation that currently there is no road constructed yet. Plus a relatively large park is planned in the area as it will serve as the end point for the pedestrian route for the day tourists starting from the Lat Krabang station area.

It is possible to reduce the contribution ratio to a level of around 30% by conducting prior land acquisition of around 10,000 m^2 on top of the total subsidization for the construction cost. However, it still seems difficult to obtain the agreement of property right holders, because it is hard to count the benefits of the construction of the station plaza as the Red Line project has not matured yet.

As a conclusion, it is more realistic that the government shall execute the construction of the station plaza and its access road individually while promoting investment by private developers in the surrounding areas.

(3) Area C: Hybrid Town/RD&D Area

1) Outline of the Case Study

The Hybrid Town/RD&D Area, with very large size of around 4,592,600 m^2 of land area, is the central function of the Lat Krabang subcenter. The area will consists of rather large land plots such as commercial, business, and RD&D use. Plus, some symbolic functions are to be provided such as a city central park and transit mall. In order to cope with these unique features, several alternative cases were considered as follows:

Case 1 is to cover the entire territory of the project area as a whole. It is obvious that obtaining the agreements for the land readjustment will be very difficult, but there are several possibilities as follows;

- It is possible for the existing residents to continue living within the project area by replotting their land parcels to the designated residential area situated in the southern part; and
- The on going upgrading programs for the squatters situated along the canals can be combined with the project. For instance, the land readjustment project will provide vacant land as reserved land, on which relevant organizations will build relocation housing and the residents of the squatter communities will have a legal right to purchase property right with compensation money provided from the relevant program.

Case 2 is to divide the area into three smaller blocks by grouping similar functions/land uses, and analyze the applicability of the land readjustment method. Although in theory it may still be possible to ensure the continuous habitation of the residents by cross replotting beyond the blocks, no such attempt was pursued in the

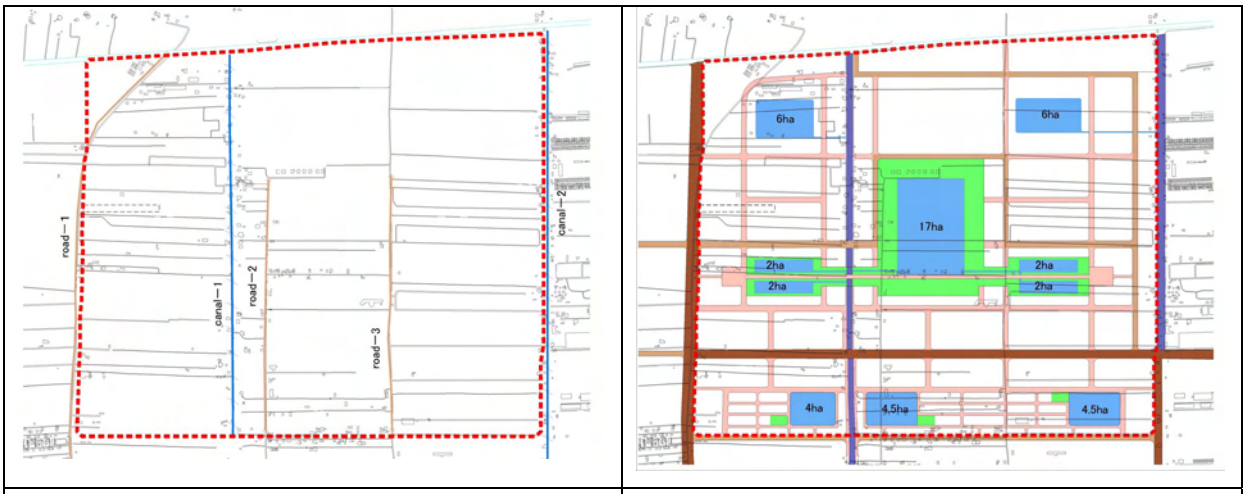
analysis work as it is not very realistic in the normal operation of land readjustment projects.

Case 3 is to divide the northern block further to seek a better fit for the land readjustment based on the results of the analysis of Case 2.

2) Considerations

Case 1

The aggregated contribution ratio amounted to nearly 40%, with a 32.1% contribution for the public land alone. Thus the financial support for the construction cost may not be sufficient enough to obtain the agreement of the land owners. Figure 6.6 shows the outline of the development and Table 6.7 shows the summary of the project features.



Before Project	After Project

Figure 6.6: Project Area and Development Plan of Area C, Case 1

Table 6.7: Summary of Case Study Results for Area C, Case 1

Area (m^2)		4,592,600
Public Land (m^2)	Before Project	40,300
	After Project	1,501,400
Composition of Public Land after Project (m^2)		32.7
Average Land Price (m^2)	Before Project	
	After project (B/m2)	10,500
Land Price Increase Ratio		
Construction Components	Collector roads (m)	6,500
	Service roads (m)	23,000
	Station Traffic parks (m2)	25,000
	Parks & Open areas (m2)	303,800
	Railroads (m)	
Construction Cost (1000 THB)	Collector roads	246,800
	Service roads	714,000
	Station parks	70,000
	Parks & Open areas	850,600
	Retention Pond	37,500
	Water supply	99,300
	Drainage	192,100
	Electricity	180,200
	Communication	92,900
	Building compensation	1,010,600
	Total	3,494,000
Construction Cost per Area (m2)		761
Contribution Ratio (%)	For Public Land	32.1
	For Reserved Land	7.3
	Aggregated	39.4

Case 2

In order to seek a realistic scale for obtaining the land owners agreement, as well as to separate some symbolic functions from the rather normal portions, the area was divided into three blocks to comprise similar land uses, namely i) Northern ii) Central, and iii) Southern blocks. The outline of the development is depicted in Figure 6.7 and the features of the project are summarized in Table 6.8.

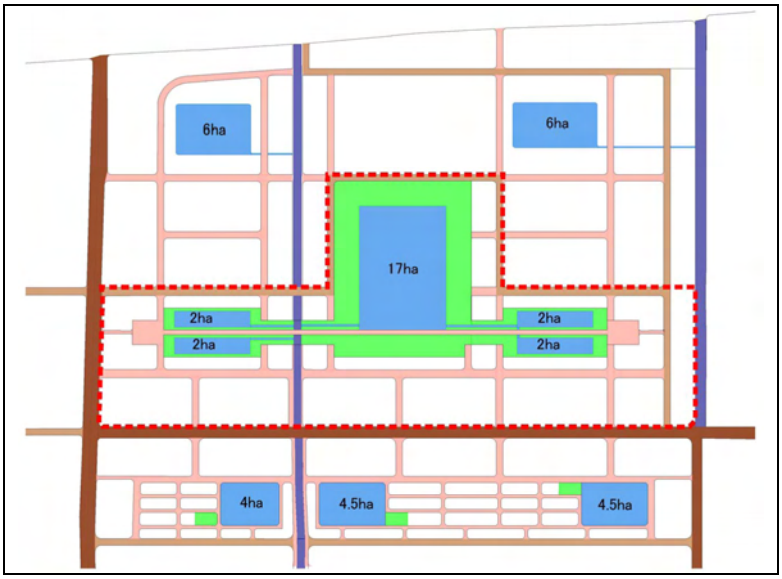


Figure 6.7: Project Area and Development Plan of Area C, Case 2

Table 6.8: Summary of Case Study Results for Area C, Case 2

Block		i) North	ii) Central	iii) South	Total
Area		2,023,700	1,631,400	937,500	4,592,600
Public Land	Before Project (m2)	9,100	21,120	10,080	40,300
	After Project (m2)	353,100	847,700	300,600	1,501,400
% of Public Land after Project		17	52	32	33
Construction Components	Roads (km)	9.0	11.1	9.4k	29.5
	Traffic parks	0	25,000	0	25,000
	Parks & Open Spaces (m2)	0	290,000	13,800	303,800
	Retention pond (m2)	120,000	250,000	130,000	500,000
Construction Cost (1000B)		1,027,300	1,841,800	624,900	3,494,000
Unit Construction Cost per Area (B/m2)		508	1,129	667	761
Contribution Ratio (%)	For Public Land	17.10	51.30	31.30	32.10
	For Reserved Land	7.30	5.90	7.90	7.30
	Aggregated	24.40	57.20	39.20	39.40
Average Land Price before Project (B/m2)		7,000	19,400	8,500	10,500
Share of the Project Cost (%)		29	53	18	100

North Block

Reflecting that the block is designated for RD&D functions, a large land plot is assumed and thus the road area is limited to only 17%. The aggregated contribution ratio is estimated to be 24.4%. In spite of this favorable financial condition, it may be hard for the land owners to positively participate in the project, because the North Block is entirely designated for non-residential use. All the existing residents will have to relocate their places of residence. The land owners may continue to hold their land within the Block, but they have to make decisions on whether to sell, entrust, or use them themselves for RD&D purposes.

As a conclusion, a large part of the North Block is not suitable for application of the Land Readjustment method, though there seem to be more suitable sub-blocks situated inside. More detailed analysis was carried out as Case 3 in order to figure out the most suitable sub-block area for the method.

Central Block

The Central Block shares almost the half of the entire project cost as well as the area of public land as this block accommodates symbolic spaces of the subcenter. It is not appropriate to expect contribution of land from the land owners. The project should be carried out as a government (BMA) project, most probably by the land acquisition method.

South Block

The South Block was originally planned as a buffer between the busy subcenter areas and the quiet garden suburb residences. There are some residential blocks planed within the South Block, which inflates the composition of land for public facilities. Consequently, the contribution ratio for public land exceeds 30%. Considering that the land use is residential, it is more suited to induce funding and know-how from well experienced private developers.

Case 3

The result of the analysis on Case 2 revealed that the financial structure for the North Block has favorable features for application of the land readjustment method. In the following, a western part of the North Block is examined because that sub-block has the following characteristics:

- The land parcels have already been sub-divided into relatively smaller sizes compared to the other parts;
- Some large scale industrial buildings have been constructed recently:
- A curving road is located in the sub-block creating some irregularly shaped land parcels: and
- An existing canal forms a boundary for the communities.

The composition of public land is larger than the other remaining parts as the land parcels are smaller in this sub-block. Consequently, the contribution ratio for both public land and reserved land will be larger. The aggregated contribution ratio was estimated at 32 %, which is slightly larger than the psychological limit. There is much room to reduce this contribution ratio such as i) revision of alignment of roads, and subsidizing the retention pond and its surroundings.

As a conclusion, it is worth trying to apply the land readjustment method to the block of Case 3.

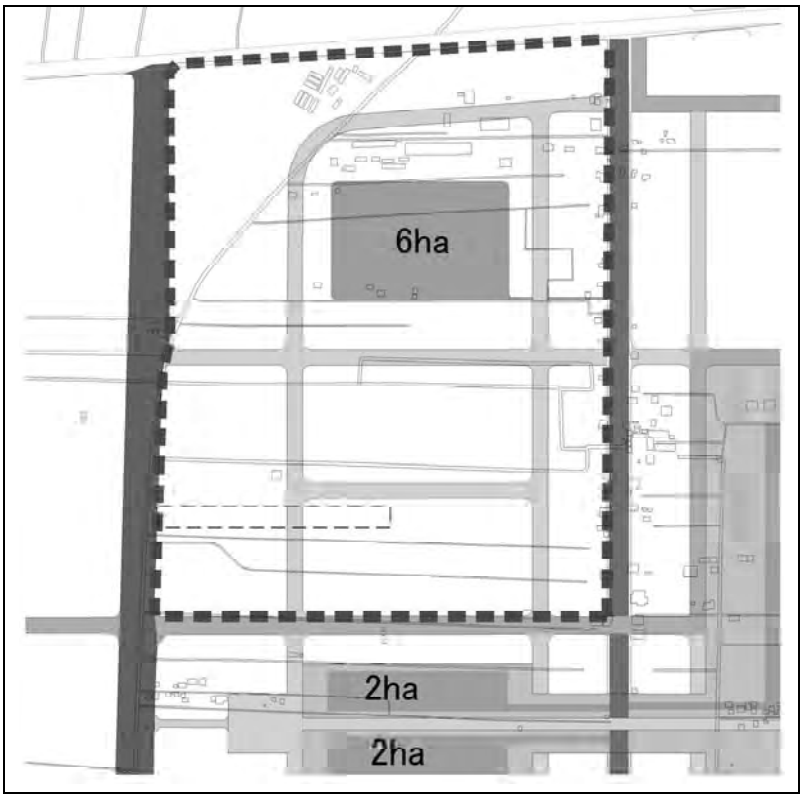


Figure 6.8: Project Area and Development Plan of Area C, Case 3

Table 6.9: Summary of Case Study Results for Area C, Case 3

Area (m2)		713,900
Public Land (m2)	Before Project	9,100
	After Project	145,700
Composition of Public Land after Project		20.40
Average Land Price	Before Project	1,000
	After Project	7,000
Increase of Land Price		7
Component of Facilities	Collector roads	0
	Service roads	0
	Station Traffic parks	0
	Parks & Open areas	
	Railroads	
Construction Cost(1000 THB)	Collector roads	0
	Service roads	121,000
	Station parks	
	Parks & Open areas	
	Retention Pond	4,500
	Water supply	11,100
	Drainage	21,500
	Electricity	20,200
	Communication	10,400
	Building compensation	435,000
	Total	623,700
Project Cost per Area (B/m2)		874
Land Acquisition Cost (1000 Baht)	Entire Area	704,800
	Public Facilities	136,600
Contribution Ratio (%)	For Public Land	19.40
	For Reserved Land	12.60
	Aggregated	32.00

Case 4 Alternative Scheme for RD&D City Development

A more privately financed oriented scheme has been sought by utilizing the advantage of the land readjustment scheme. The most important characteristics of this alternative scheme can be summarized as follows:

1) *Two-step development approach* to separate building structures and service-infrastructure development from the land development.

2) *Procurement of vacant land by Land Readjustment* by replotting land parcels owned by those who are willing to continue living and/or earning on the land within Area C to a designated zone located in the southern part of the area. Other owners' land may be replotted to the northern part and they will be allowed to choose from selling, long-term leasing, equity participation, etc., For this purpose, it might be necessary to establish an authority which will work as a middleman between land owners and final land users.

3) *Minimum construction by Land Readjustment* by limiting its land development to the housing estates for replotted dwellers to significantly reduce the cost and thus the contribution rate.

The following figure shows the conceptual image of the Alternative Scheme for the RD&D City development.

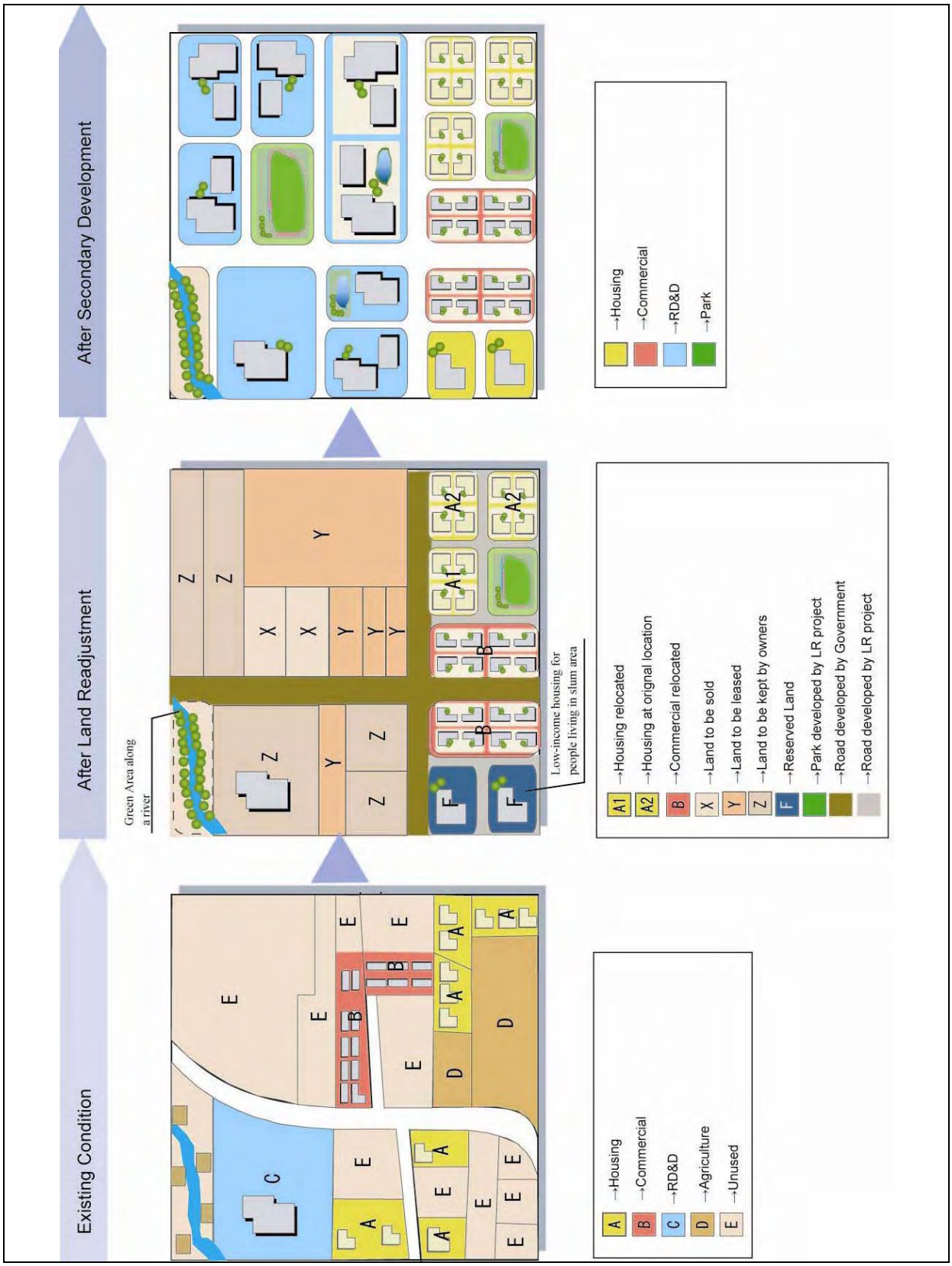


Figure 6.9: Conceptual Image of the Alternative Development Scheme for the RD&D City

The following figure shows the land readjustment scheme for the First Step, where the replotting of lands are initiated to exclude building structures and service-infrastructure development from the land development. Applying this scheme, favorable project feasibility indices were calculated as shown below;

	Private land after implementation		**Contributed area**			**Contribution ratio**		
Private land before implementation	Including reserve land	Excluding reserve land	For public	For reserve land	Total	For public	For reserve land	Total
m^2	m^2	m^2	m^2	m^2	m^2	%	%	%
3,785,700	3,662,000	3,588,000	123,700	74,000	197,700	3.27	1.95	5.22

Total land value		**Increase of land value**	**Unit land price After project**	**Maximum amount of reserve land**	**Amount of planned reserve land**	**R/Rmax**	**Unit land price before project**
Before	After						
1,000B	1,000B	1,000B	B/m^2	m^2	m^2	%	B/m^2
7,571,400	8,422,600	851,200	2,300	370,086.96	74,000.00	20.00	2,000

After the First Step of land readjustment, the land will have been replotted in large size parcels with simplified land ownership. The development of buildings and facilities could be initiated in the replotted land in the northern part and by choosing selling, long-term leasing, equity participation, etc., by the authority of the RD&D Development established by BMA.

The merit of the alternative scheme is that by applying the land readjustment on a large scale in the RD&D City, the social impact to those who hope to stay inside of the area would be minimized as they could do so in the replotted land. The scheme itself is implementable with a low contribution rate, and stakeholder agreement for land readjustment could be achieved despite the large number of landowners if the stakeholders are well informed of the development plan. Thus in this study, the alternative scheme has been adopted.

6.3.4 Strategic Development Plan by Area and Facility Types

Based on the analysis and clarification of the facilities and sub areas comprising the Lat Krabang subcenter area, an area and facility type based classification plan was formulated. The categories of areas and facilities that comprise the strategic development plan are as follows:

(1) Area based categories

- Areas to be developed by land adjustment scheme, as integrated super block development in these areas is strategically important and suitable for adoption of the land readjustment scheme. These areas include the RD&D city area and the Lat Krabang Station development area.
- Areas to be developed by public private partnerships, as super block development is desired but not suitable for implementation by the land readjustment scheme. These

areas include the Wat Ranboon Station development area and the Value Creation Center area.

- Areas to be managed by regulative and incentives measures residual in the urban planning system of BMA, as the main players in these areas are likely to be small scale developers and household investment entities. This category covers the majority of the Study Area.
- Areas to be managed by a combination of urban management systems as well as community based development schemes of BMA, as these areas are strategically important but heavily inhabited already. This category is designed to support development efforts originated by local citizens.

(2) Facility based categories

- Facilities to be developed by national government agencies, as these facilities are for inter regional purposes. These facilities include the rail transit systems connecting the central area of Bangkok to various areas throughout the Study Area.
- Facilities to be developed by BMA within its ordinary annual investment program, as these facilities are necessary to support all the sub-center functions and can be managed by public works within the area of BMA. Typical facilities include regional roads, canals, and various utility infrastructures.
- Facilities to be developed by implementation bodies for super-block developments, as users of these facilities are rather limited to those workers and visitors in the super block development area.

The following figure shows the Strategic Development Plan by category of areas and facilities mentioned above.

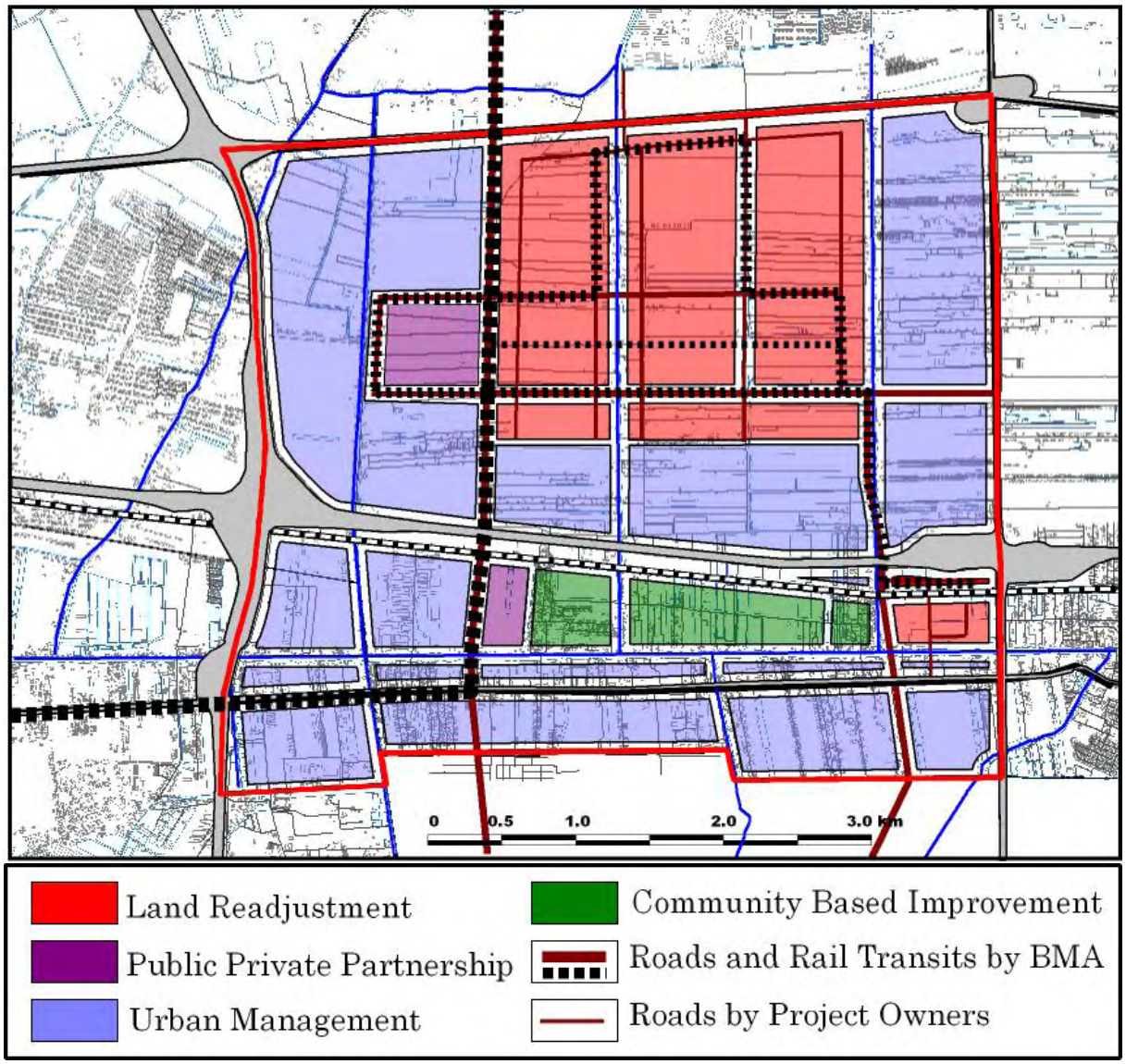


Figure 6.10: Strategic Development Plan by Category of Areas and Facilities

6.4 Development Phasing

The development of super block development projects is scheduled together with the expected urban growth in the area entrusted to the regulative and incentives measures. The following figures show the projected pace of development in the entire Study Area, indicating the timing of achievement against the planned development framework, mostly focusing on night time and day time populations. Some key public facilities, such as a waste water treatment plant, MRT, and feeder rail system are also indicated at which the timing meets the environmental requirements and allows healthy, stable operation.

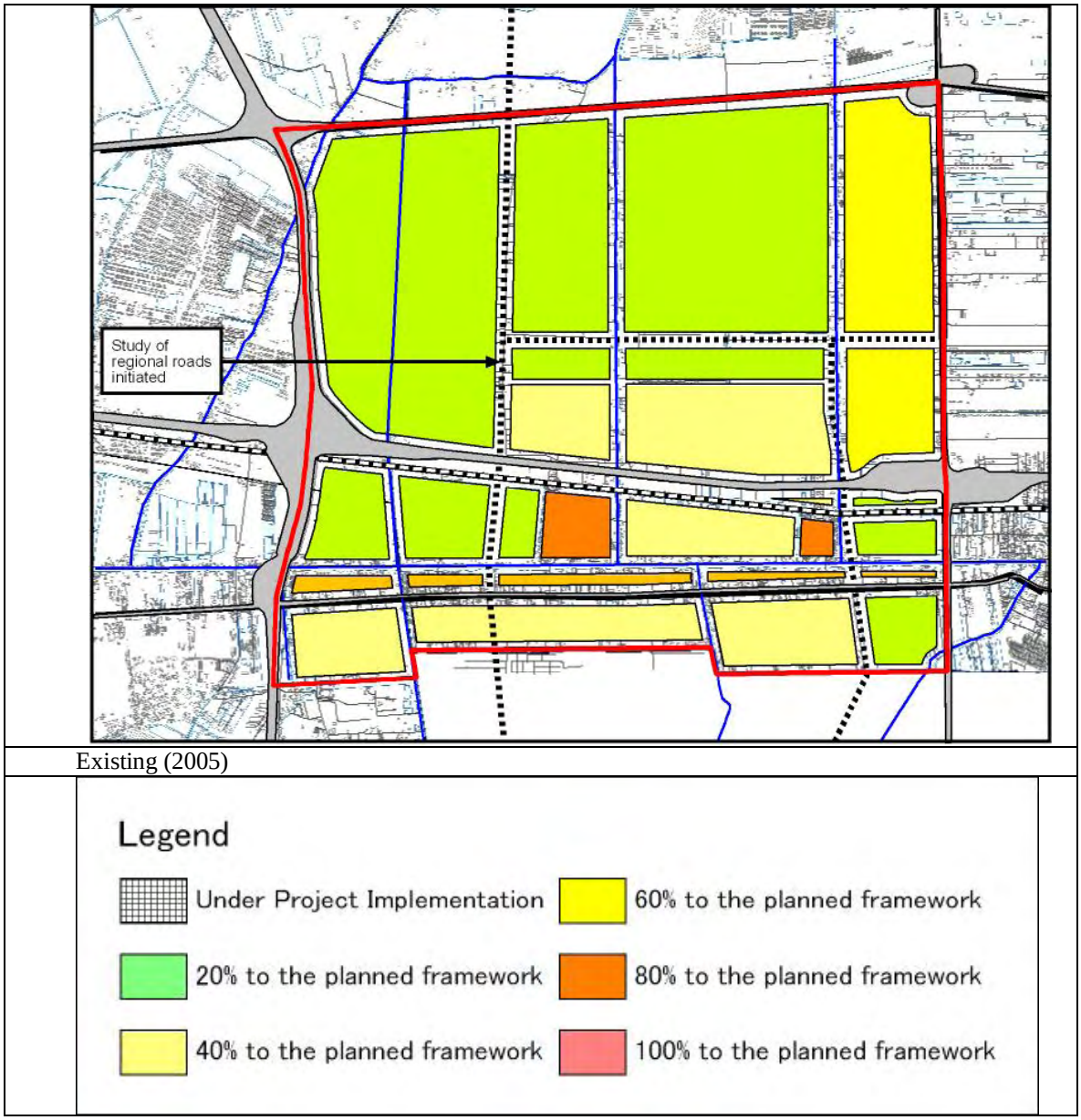
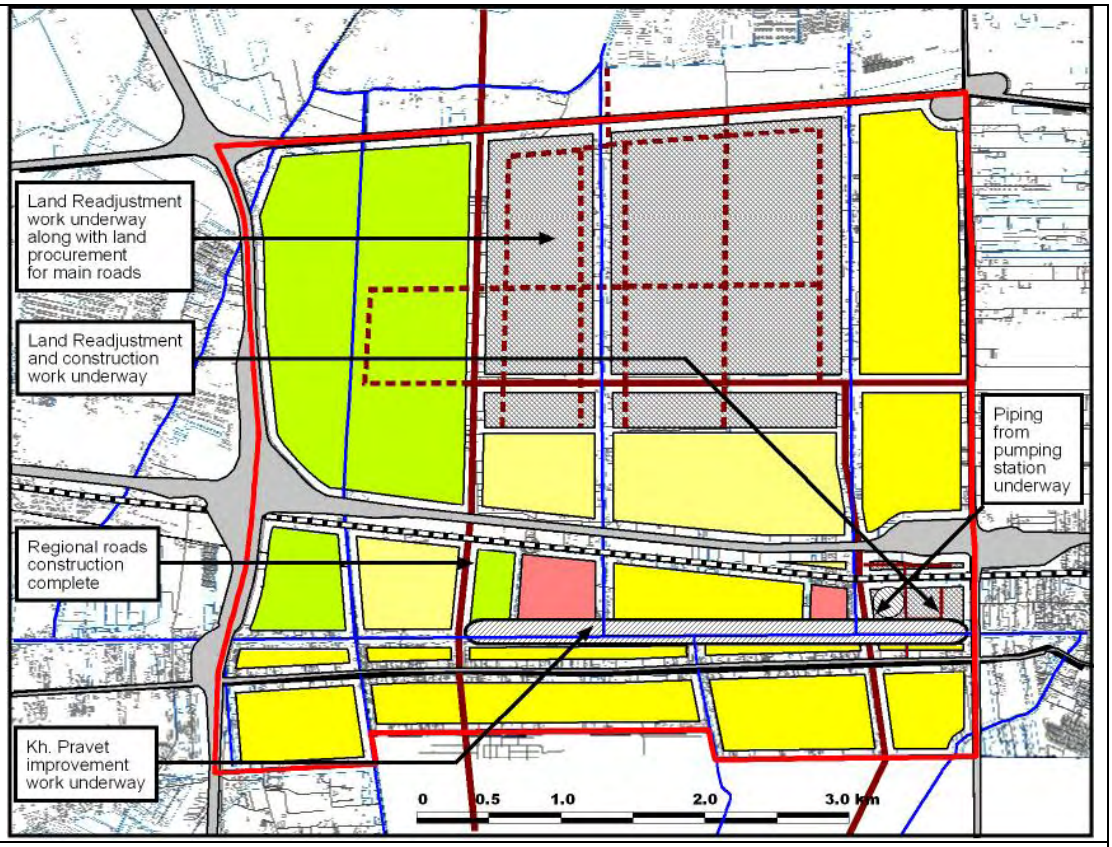
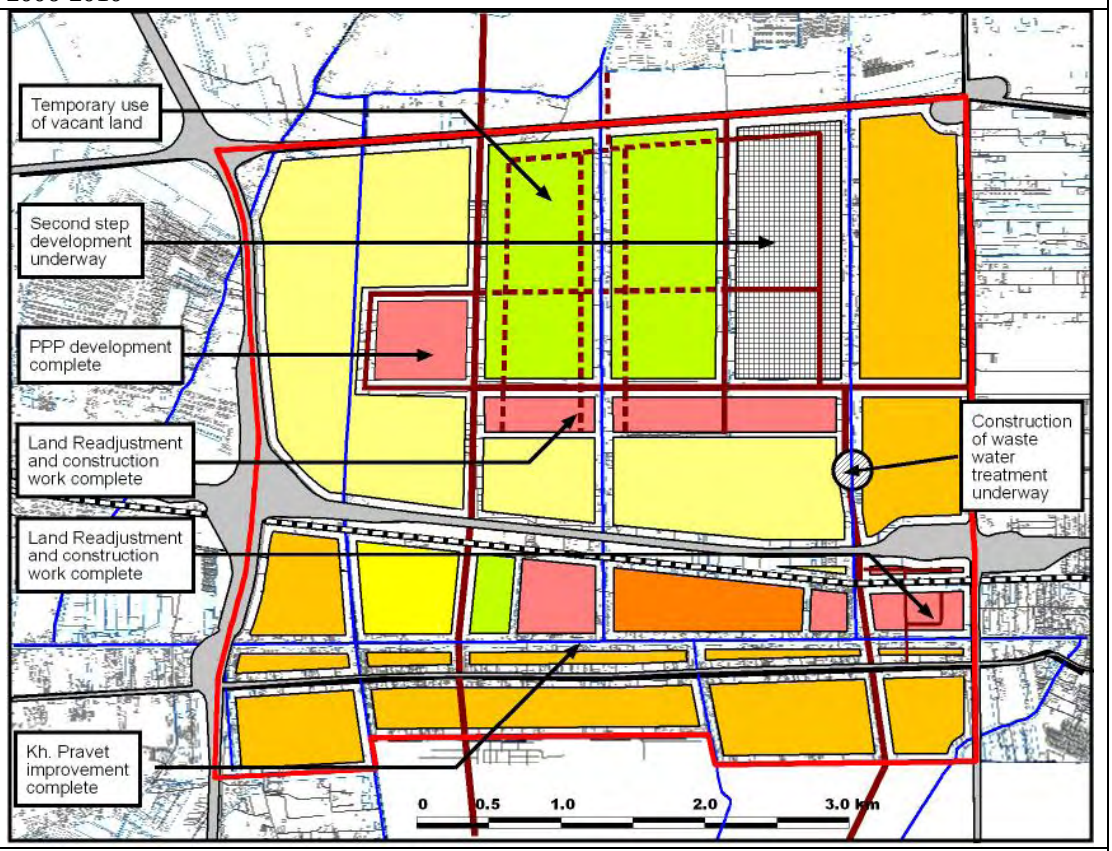


Figure 6.11: Scheduled Growth and Development

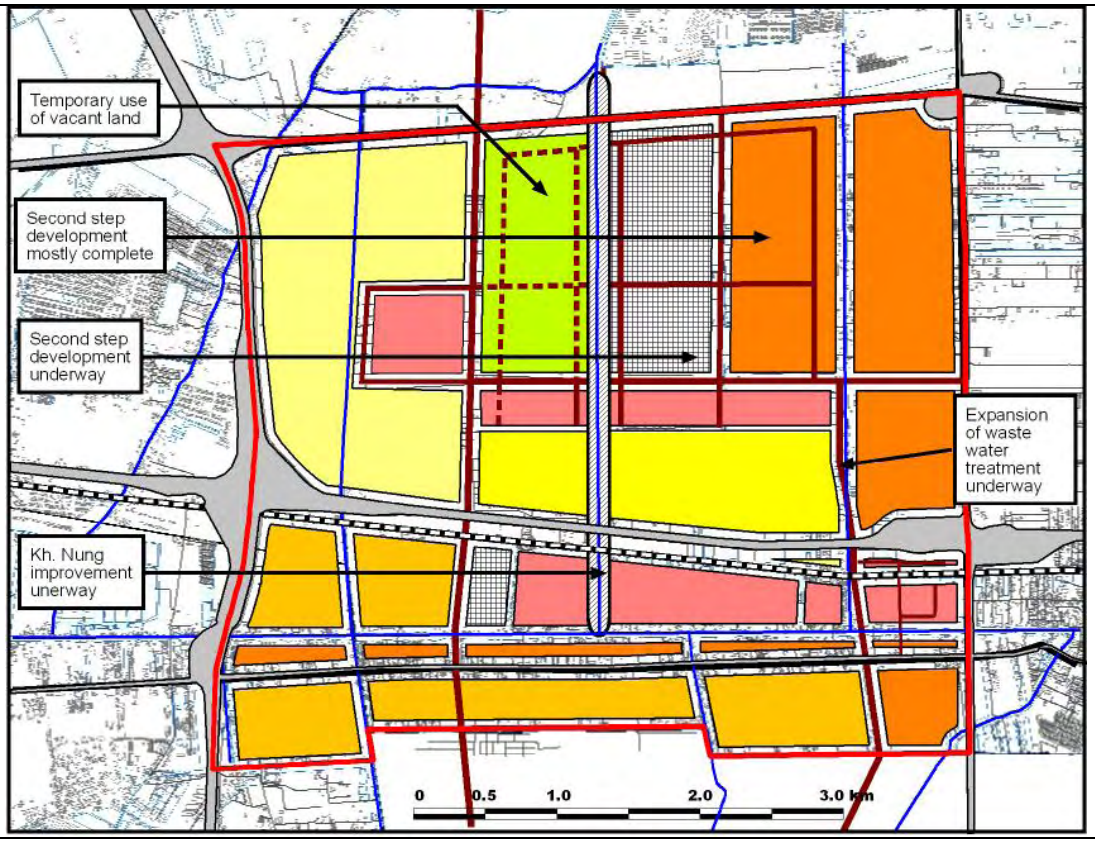


2006-2010

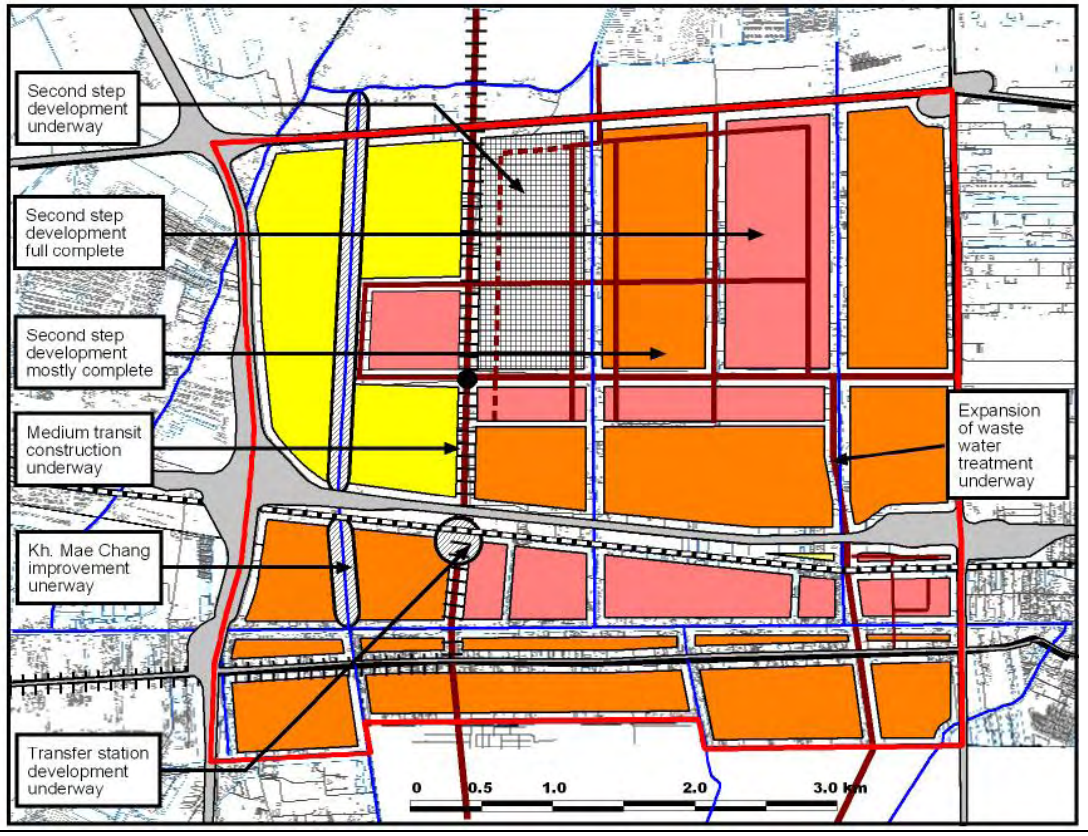


2011-2015

Figure 6.11: Scheduled Growth and Development (Continued)

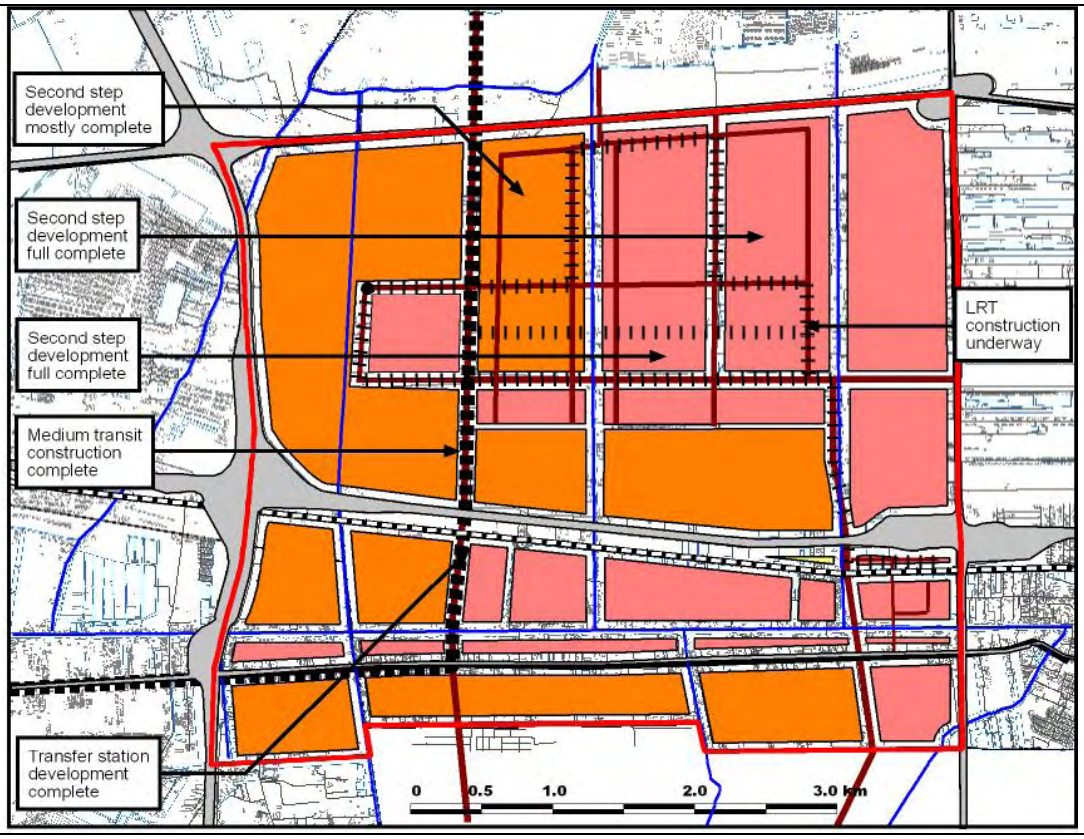


2016-2020

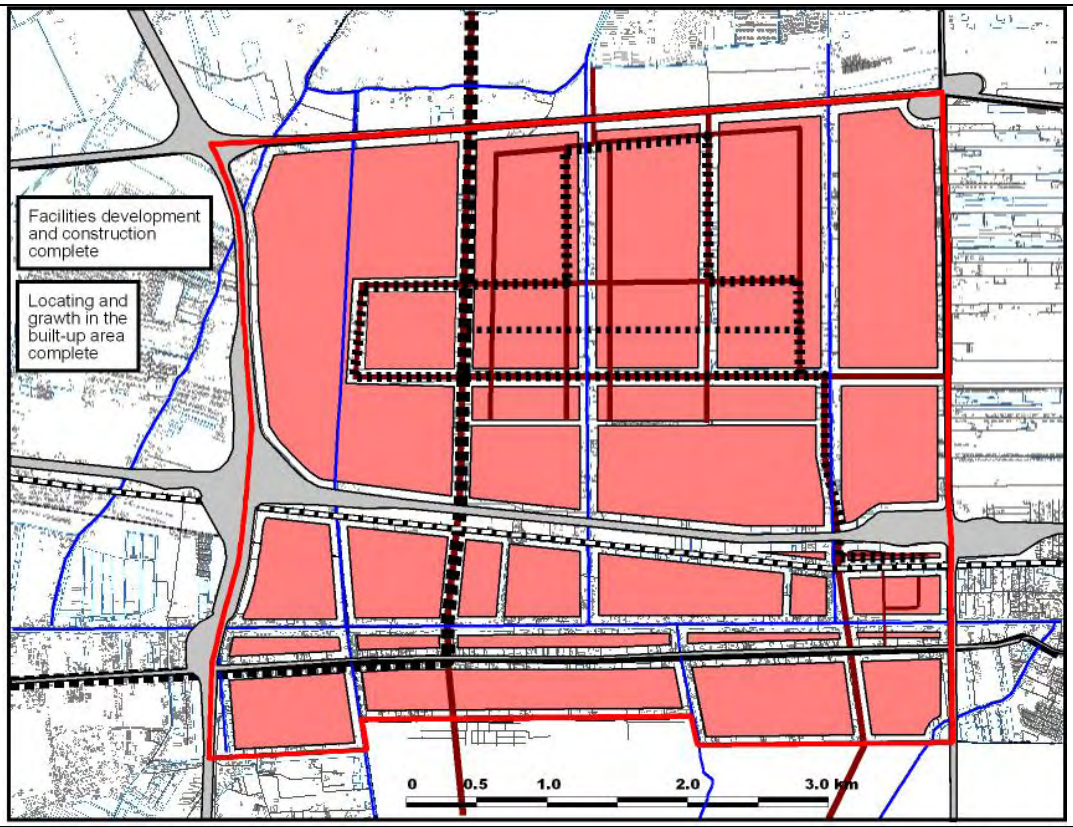


2021-2025

Figure 6.11: Scheduled Growth and Development (Continued)



2026-2030



2031-2035

Figure 6.11: Scheduled Growth and Development (Continued)