

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

**August 2006**

**Japan International Cooperation Agency (JICA)**

**Nippon Koei Co., Ltd.**

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| <b>06-056</b> |

**Bangkok Metropolitan Administration  
Government of Thailand**

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Monetary Exchange Rate

(As of March 2006)

**US\$ = 38.947 Baht**

## PREFACE

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

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

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

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

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

August 2006

Kazuhisa Matsuoka  
Vice President  
Japan International Cooperation Agency

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

**Subject: Letter of Transmittal**

Dear Madam,

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

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

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

Yours Faithfully,

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



Figure: Full Development Image of Pilot Project Area

## **Executive Summary**

### **Introduction**

#### **01 Background/Objectives**

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

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

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

### **Conclusions**

#### **02 Planning Context**

##### **(1) BMA’s Urban Planning Policy Context**

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

(2) International and National Policy Context

The international policy for trade and industry is moving towards free trade of goods and services. There is a steady movement towards a free trade zone within the ASEAN nations, denoted as the ASEAN Free Trade Area, of AFTA, which is calling for significantly lowering import tariffs at the international borders of the member countries from the present level. It is widely discussed amongst the academics and practitioners alike that the policy framework towards free trade and open market will accelerate regional and international integration of manufacturing modes.

The Thai Government has launched various promotion activities for their industries for higher value-added components or value creation. The essence of higher added value or value creation resides in shifting from relatively low added value assembling and production of parts and components categories towards the upstream functions such as research and development (R&D) and designing, or downstream to marketing and branding .

(3) Regional Development around the New International Airport of Bangkok

The Suvarnabhumi Aerotropolis Development Plan was prepared by the National Economic and Social Development Board (NESDB) for the development of a new airport, Suvarnabhumi Airport, and its immediate surrounding area over the next three decades to 2035. Upon instruction by the Bureau of the Suvarnabhumi Airport Development, NESDB, the Department of Public Works and Town and Country Planning (DPT), MOI initiated the regional development plan around the new airport. DPT formulated the draft final report in January 2006 and still continues to receive public comments on the report. Since the DPT study focuses on physical planning rather than conceptual, and various analyses on physical aspects were conducted, the study consequently resulted in changing the proposals in the previous plan of NESDB. The committee of the DPT's development plan has decided to employ a draft land use plan.

### **03 Directions and Development Framework**

For the development of the Lat Krabang Sub-center, the following six development principles were adopted.

- 1) Harmony with Existing Communities and New Communities
- 2) Environmentally Friendly Suburban Sub-Center
- 3) Coordination between Urban Development and Transport
- 4) Making a Flood-Free City
- 5) Preserve and Activate the Thai Traditional Urban Atmosphere, where appropriate
- 6) Create a Model for Subcenter Development in Bangkok Metropolis

For estimating the development framework, four scenarios shown in the following table were formulated and the "Medium-High Growth Scenario" was adopted based mostly on the planning principles described above.



**Projected Number of Population by Development Scenario**

| Development Scenarios       | Population |        |         |         |
|-----------------------------|------------|--------|---------|---------|
|                             | 2003       | 2015   | 2025    | 2035    |
| Low Growth Scenario         | 30,000     | 44,000 | 62,000  | 115,000 |
| Medim Growth Scenario       | 30,000     | 53,000 | 80,000  | 151,000 |
| Medium-High Growth Scenario | 30,000     | 57,000 | 89,000  | 168,000 |
| High Growth Scenario        | 30,000     | 75,000 | 114,000 | 203,000 |

**Projected Employment by Development Scenario**

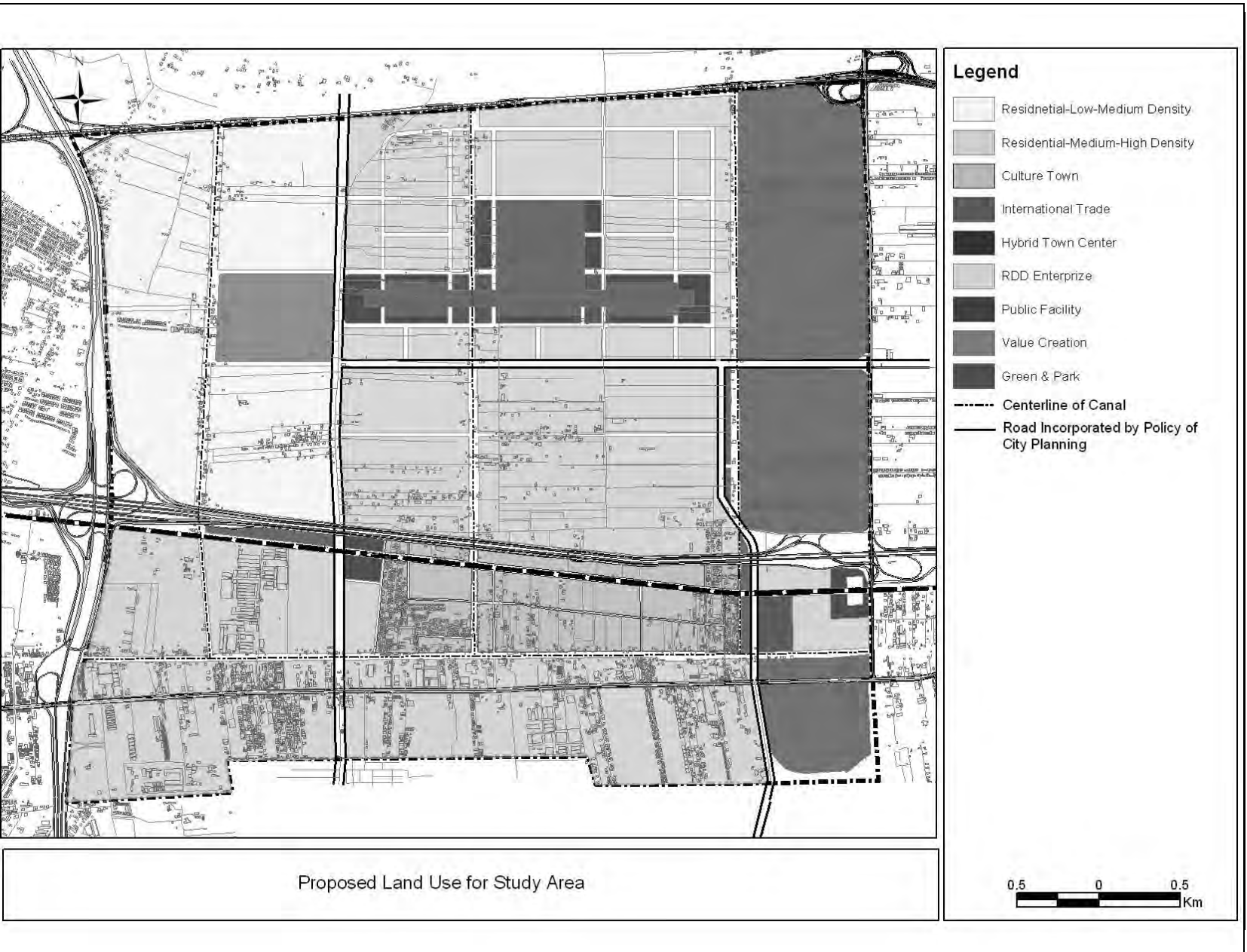
| Development Scenarios       | Employment |        |        |         |
|-----------------------------|------------|--------|--------|---------|
|                             | 2003       | 2015   | 2025   | 2035    |
| Low Growth Scenario         | 3,000      | 13,000 | 26,000 | 59,000  |
| Medim Growth Scenario       | 3,000      | 19,000 | 38,000 | 82,000  |
| Medium-High Growth Scenario | 3,000      | 23,000 | 50,000 | 102,000 |
| High Growth Scenario        | 3,000      | 36,000 | 67,000 | 115,000 |

The following are the considerations for the functions to be introduced in each of the zones in the Lat Krabang Subcenter.

- (1) Research, Development and Design Function
- (2) Airport Related Business Function
- (3) International Trade Function
- (4) Value Creation Center Function
- (5) Sub-Center Core Function
  - 1) Town Center Function
  - 2) Transportation Function
- (6) Garden Suburb Function
  - 1) Suburban Residential Function
  - 2) Neighborhood Commercial Function
- (7) Culture Town Function
  - 1) Canal Function for Day-tourism
  - 2) Airport Town Function
  - 3) Neighborhood Commercial Function

#### **04 Physical Development Plan**

Based on the conceptual plans mentioned above, the overall master plan was formulated as presented in the following figure.



Based on the planning framework mentioned earlier, the following table shows the breakdown of zones.

**Rough Breakdown of Land Use by Zones**

Unit: ha

| Zone  | Sub-Center /<br>Air Gate Zone | Garden Suburb<br>Zone | Culture Town<br>Zone | Total        |
|---|-------------------------------|-----------------------|----------------------|--------------|
| RESIDENTIAL ZONE                            | 0                             | 300                   | 500                  | 800          |
| COMMERCIAL ZONE                             | 80                            | 10                    | 10                   | 100          |
| ENTERPRISE ZONE                             | 380                           | 0                     | 20                   | 400          |
| PUBLIC ZONE                                 | 40                            | 20                    | 20                   | 80           |
| RECREATION ZONE                             | 120                           | 80                    | 120                  | 320          |
| INFRASTRUCTURE - Main trunk<br>road/railway | 100                           | 100                   | 50                   | 250          |
| <b>TOTAL</b>                                | <b>720</b>                    | <b>510</b>            | <b>720</b>           | <b>1,950</b> |

Implementation cost for the subcenter development of 1,950 ha is estimated at 214,701 million baht which includes the construction, engineering services, and project management costs. In addition to this, the implementation cost for the regional transport system shall be 2,951 million baht for NS1, NS2, and EW1 roads and the interchange at the OBRR.

**Summary of Implementation Cost**

| Item                     | Construction                       | Engineering<br>Service | Project<br>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<br>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<br>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 Transformers        | 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   |
| Parks and Green<br>areas | Earthwork                          | 162.1                  | 13.0                  | 17.5      | 192.6     | 0.09   |
|                          | Planting                           | 926.1                  | 74.1                  | 100.0     | 1,100.2   | 0.51   |
| 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              | 14,528.9              | 19,518.3  | 214,701.4 | 98.64  |

## 05 Strategic Development Plan

The Strategic Development Plan was formulated in order to visually present considerations on how to materialize the master plan discussed in the previous chapters. The strategy for development of the Lat Krabang sub-center area was formulated focusing on the suitable implementation body for the various land blocks and facilities to be constructed. The plan also clarifies the areas to be intensively developed from the areas in which the goal can be achieved by urban management.

The categories of areas and facilities that comprise the strategic development plan are as follows:

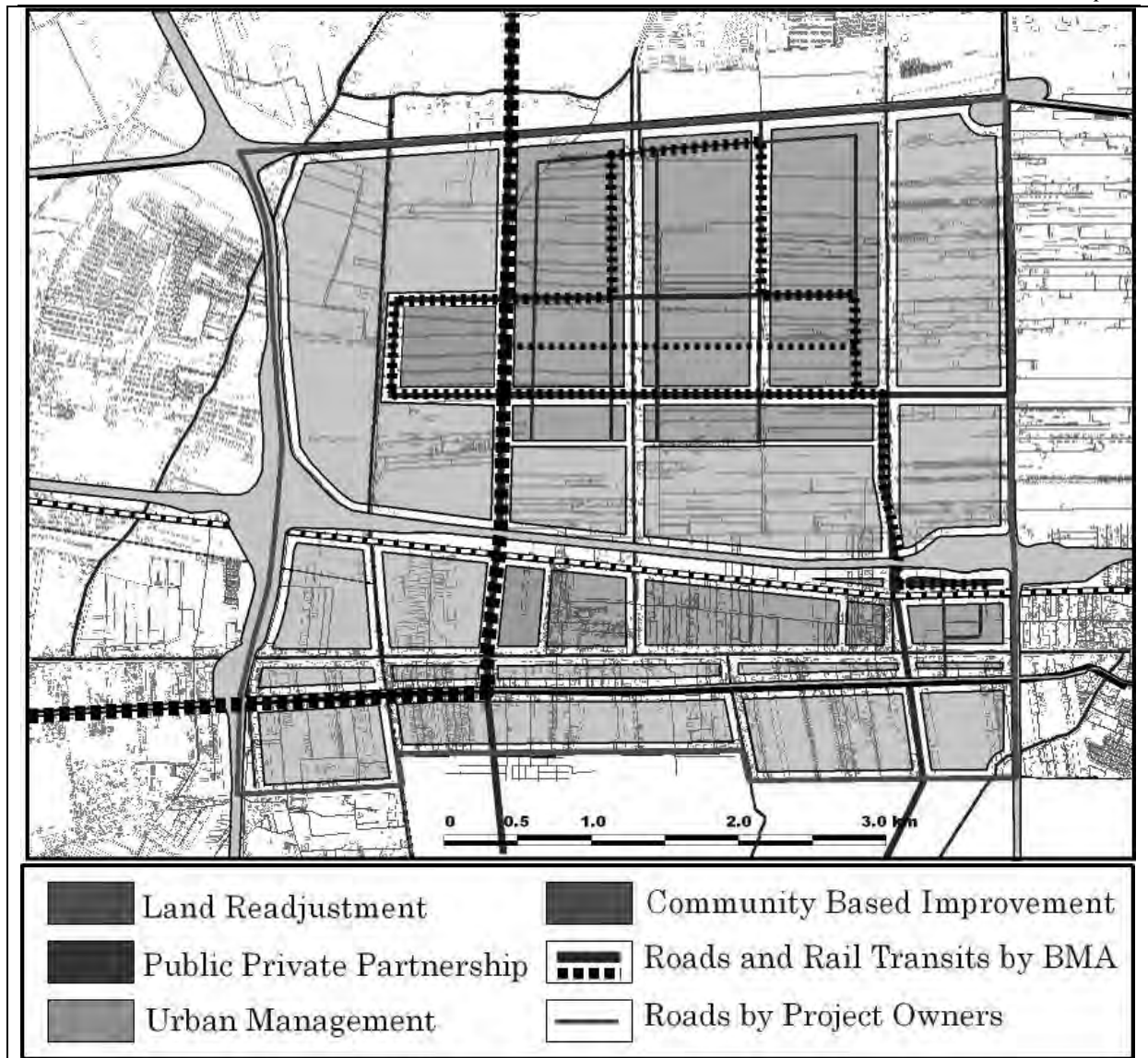
(1) Area based categories

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

(2) Facility based categories

- Facilities to be developed by national governmental agencies, as these facilities are for interregional 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 as its ordinary annual investment program, as these facilities are necessary to support the entire set of 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 mostly limited to those workers and visitors in the super block development area.

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



Strategic Development Plan by Category of Area and Facilities

The implementation cost, including O&M cost, is estimated for the period from 2006 to 2035, based on the phase-wise development plan for the subcenter as listed below.

**Implementation Cost for the Subcenter 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      |                                      |                |
| 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          |
| <b>Total</b> | <b>24,024</b>                  | <b>2,097</b> | <b>26,121</b> | <b>190,593</b>            | <b>14,897</b> | <b>205,490</b> | <b>3,929</b>                         | <b>235,540</b> |

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.

## 06 Economic Analysis

The calculation of EIRR and NPV was done by comparing project benefits and costs, both expressed in terms of economic prices over the project life. As is conventional practice, calculation of EIRR, NPV and B/C ratio was done by calculating only the stock effect (long term impact of the economic surplus to be generated by the completed urban area) and excluding the flow effect (short term impact of the construction investment).

### Indices for Economic Evaluation

| EIRR  | NPV @ 10%       | B/C @ 10% | NPV @ 5.3%       | B/C @ 5.3% |
|-------|-----------------|-----------|------------------|------------|
| 26.3% | 79 billion Baht | 2.2       | 191 billion Baht | 2.92       |

Source: Calculated and prepared by JICA Study Team

## 07 Pre-feasibility Study for Pilot Project

The pilot project area was selected from three super-block development areas indicated in the strategic development plan discussed above. Through a preliminary analysis of the land readjustment scheme on each candidate site, the Lat Kraban station area was selected as the pilot project area.

Currently, the entire area of the pilot project is vacant. The land consists of six parcels, each of which is comparatively large in size. The major considerations on the physical development planning are summarized below. A land use plan was formulated in order to obtain necessary indices, though in Thailand there is no legal infrastructure available to ensure the plan. Based on the land use plan, together with existing and foreseeable regulations applicable to the project area, the probable type of buildings to be constructed after the project implementation was assumed.

|   |  |
|---|--|
| Transport Facilities                      | <ul style="list-style-type: none"> <li>• The size of the station plazas was set based on a guide line provided by a separate JICA study named the “Study on Formulation of Guideline of Station Plaza Development and on Station Plaza Development Method, March 2005”. The north side plaza will have an area of 4,000 m<sup>2</sup> and the south side, 5,000 m<sup>2</sup>. Functionally, the north side station plaza will accommodate the feeder transit system and park and ride connection, while the south plaza will support rail to vehicle inter-modal functions by providing bus bays and a taxi pool.</li> <li>• The main road connection from the north side station plaza to the NS-2 road will have a 25-meter width. This road will have an intersection with NS-2 at an elevated level and run down to the station plaza. The main road connection from the south station plaza will also have the same road width of 25 m, joining to the NS-3 road which connects between On-Nut road and the northern arterial road.</li> <li>• Local roads with widths of 9-15 m will be introduced to provide better access to land plots.</li> </ul>   |
| Parks                                     | <ul style="list-style-type: none"> <li>• By the Land Subdivision Law of Thailand, land for parks has to be allocated within the project area with a minimum size of 5% of the total project area. In the pilot project, two parks will be introduced; one in the north side and the other in the south side of the SRT. The park in the northern part will be situated between the station plaza and the residential area. The park in the south side will be set along the canal and serve as the departing point for the water market to be developed for day-tourism activities.</li> </ul>   |
| Land Use and Expected Building Facilities | <ol style="list-style-type: none"> <li>1) Shopping Center<br/>A large scale shopping center is likely to be located in the center of the south part of the area since the area has good connectivity to the station plaza and arterial road, with a single plot which is large enough to accommodate a large-scale shopping mall.</li> <li>2) Hotel &amp; Serviced Apartments<br/>Accommodation facilities such as hotels and serviced apartments are likely to be located in the south part of the area directly facing the station plaza.</li> <li>3) Middle-Low-density Commercial Buildings<br/>Small-scale shops will be located along the canal on the south side of arterial road. This will be a result of strategic locating efforts to formulate a symbolic space for the culture town, which shall provide very Thai-like scenery and an atmosphere of traditional Bangkok life.</li> <li>4) Office Buildings<br/>Office buildings are likely to be located in the north part of the area which is adjacent to the station plaza.</li> <li>5) Parking Building<br/>A parking building will be located adjacent to the north side station plaza to support the park-and-ride inter-modal connection.</li> <li>6) High-rise Residential Buildings<br/>High-rise residential buildings will be located in the other area which is comparatively far from the station plaza.</li> </ol> |

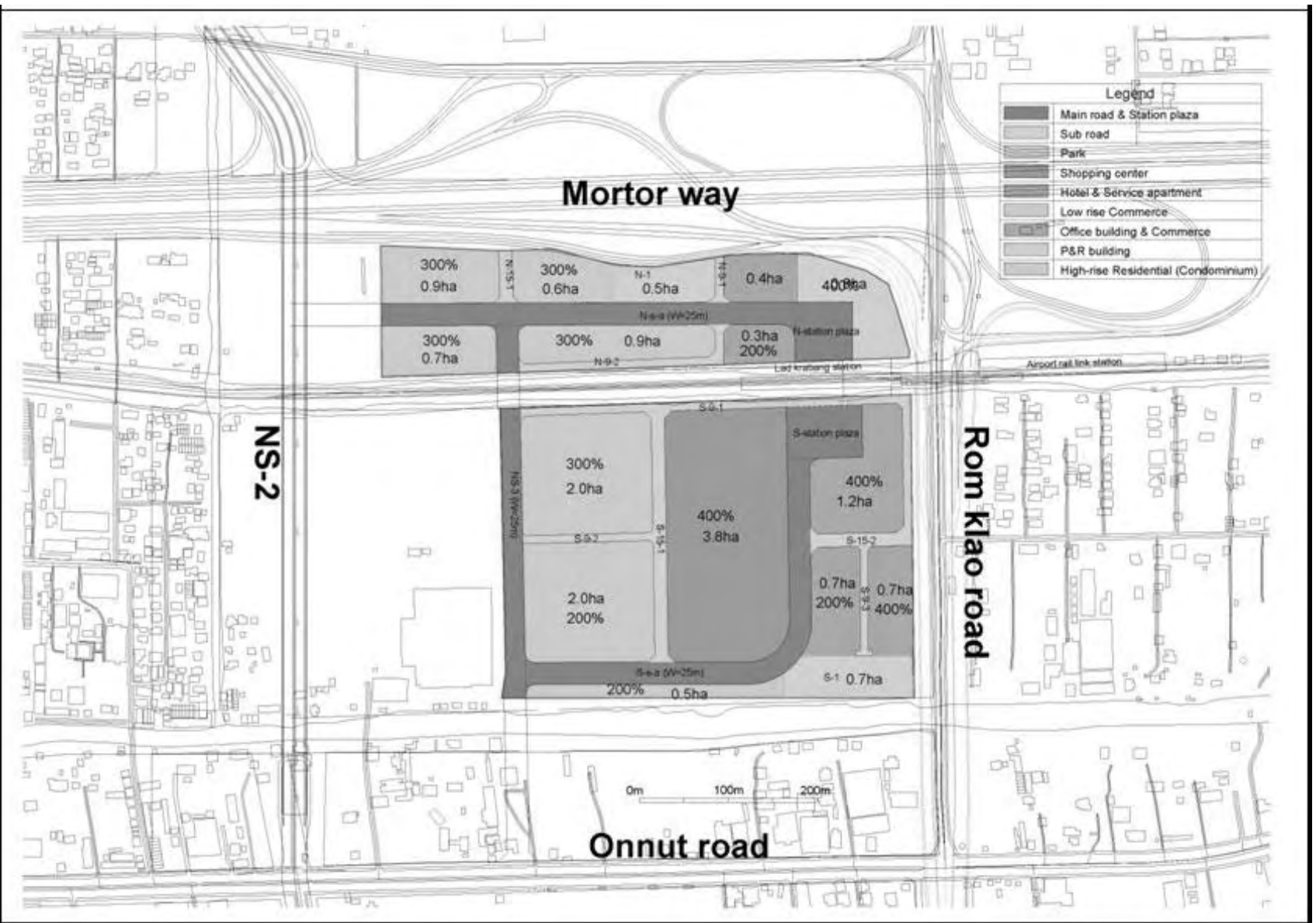


Figure 8.05: Development Plan



The investment schedule for the project is planned to ensure the financial viability of the project, as indicated in the table below.

#### Project Investment Schedule

| Items                               |                                    | First Year | Second Year | Third Year  | Fourth Year | Fifth Year | Total       |
|-------------------------------------|------------------------------------|------------|-------------|-------------|-------------|------------|-------------|
| Income                              | LR fund                            | 5,000,000  | 5,000,000   | 5,000,000   |             |            | 15,000,000  |
|                                     | Income from reserve land sales     | 0          | 0           | 0           | 30,000,000  | 22,850,000 | 52,850,000  |
|                                     | Government investment              | 8,000,000  | 100,000,000 | 130,000,000 | 120,000,000 | 37,706,000 | 395,706,000 |
|                                     | Other government's subsidy         | 50,000,000 | 50,000,000  | 50,000,000  | 50,000,000  | 31,134,000 | 231,134,000 |
|                                     | Total                              | 63,000,000 | 155,000,000 | 185,000,000 | 200,000,000 | 91,690,000 | 694,690,000 |
| Private Loan                        |                                    | 16,000,000 | 15,000,000  | 5,000,000   |             |            | 36,000,000  |
| Total                               |                                    | 79,000,000 | 170,000,000 | 190,000,000 | 200,000,000 | 91,690,000 | 730,690,000 |
| Expenditure                         | Development cost for roads & Parks | 30,000,000 | 70,000,000  | 90,000,000  | 70,000,000  | 37,662,968 | 297,662,968 |
|                                     | Development cost for utilities     | 30,000,000 | 80,000,000  | 80,000,000  | 70,000,000  | 29,955,587 | 289,955,587 |
|                                     | Cost for land leveling             | 3,000,000  | 4,000,000   | 4,000,000   | 4,000,000   | 3,761,384  | 18,761,384  |
|                                     | Design/office expenses             | 14,000,000 | 14,000,000  | 14,000,000  | 14,000,000  | 11,310,061 | 67,310,061  |
|                                     | Interest on loan                   | 2,000,000  | 2,000,000   | 2,000,000   | 0           | 0          | 6,000,000   |
|                                     | Total                              | 79,000,000 | 170,000,000 | 190,000,000 | 158,000,000 | 82,690,000 | 679,690,000 |
| Repayment for LR fund               |                                    |            |             |             | 10,000,000  | 5,000,000  | 15,000,000  |
| Repayment for private sectors       |                                    |            |             |             | 32,000,000  | 4,000,000  | 36,000,000  |
| Total                               |                                    | 79,000,000 | 170,000,000 | 190,000,000 | 200,000,000 | 91,690,000 | 730,690,000 |
| Single year's excess and deficiency |                                    | 0          | 0           | 0           | 0           | 0          | 0           |

#### Total Income and the share

| Items  | Income (THB) | Responsible Body               |
|--|--------------|--------------------------------|
| Reserve land sales   | 42,395,472   | Association                    |
| Land acquisition for the reserved land for regional                | 112,552,200  | Association and government     |
| Government investment for construction of regional infrastructures | 318,025,800  | Government                     |
| Investment by Utilities Service Providers                          | 206,716,528  | Government or Service provider |
| Total  | 679,690,000  |                                |

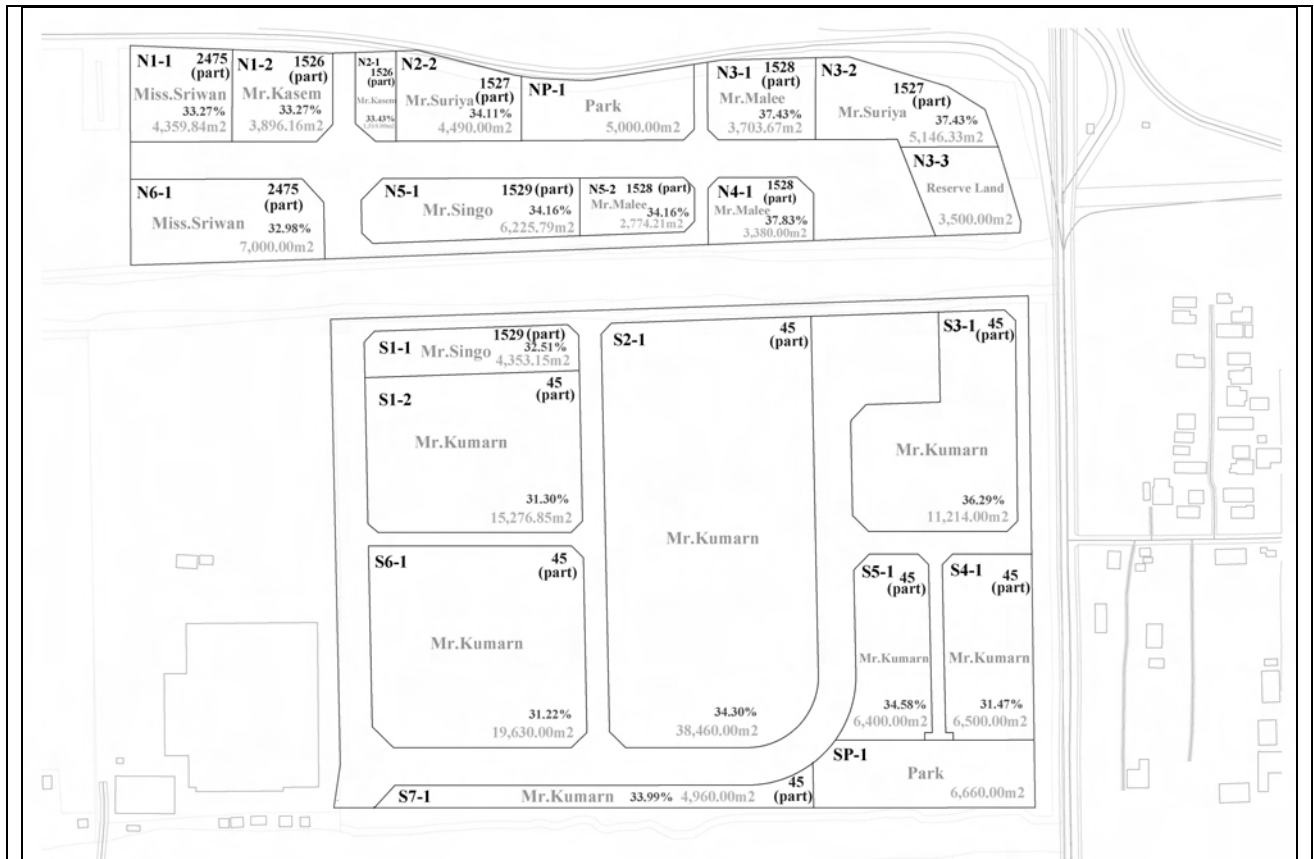
The following tables indicate the estimated aggregate contribution ratio and overview of reserve land.

#### Calculation of Aggregate Contribution Ratio

| Private land before implementation | Private land before implementation (Including Gap) | Private land after implementation |                        | Contributed area |                  |                | Contribution ratio                                      |                  |       |
|------------------------------------|--|-----------------------------------|------------------------|------------------|------------------|----------------|---|------------------|-------|
|                                    |  | Including reserve land            | Excluding reserve land | For public       | For reserve land | total          | For public (incl. reserve for regional infrastructures) | For reserve land | Total |
| m <sup>2</sup>                     | m <sup>2</sup>                                     | m <sup>2</sup>                    | m <sup>2</sup>         | m <sup>2</sup>   | m <sup>2</sup>   | m <sup>2</sup> | %   | %                | %     |
| 219,304                            | 225,300  | 152,780                           | 149,972                | 72,520           | 2,808            | 75,328         | 32.19   | 1.25             | 33.43 |

Although it is impossible to formulate a final shape for the replotting plan, a model plan was formulated in order to verify the applicability of the financial plan mentioned above. Another important reason to generate a model replotting plan is to foresee the most balanced shape of

replotting by using the proportional valuation method, which is well developed in Japan. In Thailand, the proportional valuation method is not immediately adoptable due to limited supporting regulations in related fields, such as urban management and taxation systems. Thus the replotting plan for the pilot project will be finalized by the Thai counterparts employing the area based method, for which the process and the results of the model replotting work will be helpful. The following figure shows the result of the model replotting plan.



Model Replotting Plan for Pilot Area

## 08 Environmental Considerations

### (1) Initial Environmental Examination on the Strategic Development Plan

The predicted potential impacts were compared between the “Without Project Case” and the “With Project Case”. Comparing the “without project case”, it is expected that the strategic development plan proposed will rise or increase positive impacts related to economic activities, local society, land use condition, traffic, public services, cultural property, religious activities, waste management, and decrease the risks of hazards, and land and water pollution. The strategic plan will also contribute to mitigation of adverse impacts related to land acquisition and relocation, and air pollution.

### (2) Initial Environmental Examination on the Pilot Project

The predicted potential impacts were compared between the “Without Project Case” and the “With Project Case”. Comparing the “without project case”, it is expected that the pilot project proposed will rise or increase positive impacts related to economic activities, local

society, land use condition, public services, waste management, and decrease the risk of hazards and water pollution. The strategic plan will also contribute to mitigation of adverse impacts related to land acquisition and relocation, and water pollution.

### (3) Pre-Environmental Impact Assessment on the Pilot Project

As mentioned above, the pilot project will have overall benefits, but also will have localized adverse impacts. It is necessary to adopt mitigation measures for such adverse impacts as follows:

#### Land acquisition and relocation:

- When connection roads are constructed, land acquisition and relocation will occur.
- It is necessary to consider how to provide compensation to the people who do not officially own their property, such as residents living on the governmental land along the existing canals.

#### Air pollution:

- With the increase in vehicle traffic, the air pollution load will increase.
- It is recommended that measures to increase the attractiveness of public transportation systems be examined when a station plaza is developed.

#### Water pollution:

- With encouragement of economic activities in the pilot project area, the water pollution load will be increased.
- Individual wastewater treatment facilities should be installed based on Thai legislation.

#### Noise and vibration:

- A part of the pilot project area may be affected by aircraft noise when the 100 MAP scenario is actualized.
- Aircraft noise should be monitored, and soundproofing measures should be adopted based on the monitoring results and the Suvarnabhumi airport operation plan.

## **Recommendations**

Building a sub-center involves various facets of public works and private development combined with an overall management. It is thus important to set the clear target, and control the allocation of various resources correctly to proceed to the target of sub-center development.

## **09 BMA's Roles in the Sub-center Development**

### (1) Development Initiatives

Policy coherence: The development of Lat Krabang Sub-Center needs to be clearly adopted in the urban development and management policy of BMA as well as in the planning context of the Aerotropolis development plan, as will be discussed later.

Public consultation: The Lat Krabang Sub-center development has been discussed openly in public consultation meetings for this Study in six occasions, and the opinions of the local people have been reflected in the planning as much as possible. It is thus essential to proceed with the concrete projects that follow the master planning in the same spirit of public involvement.

Consensus building: As the project approaches the implementation phase, it will be increasingly inevitable to proceed with the consensus of the stakeholders. The land readjustment, in particular, involves the changes in individual real estate properties, and the consensus is thus imperative.

### (2) Coordination for Development

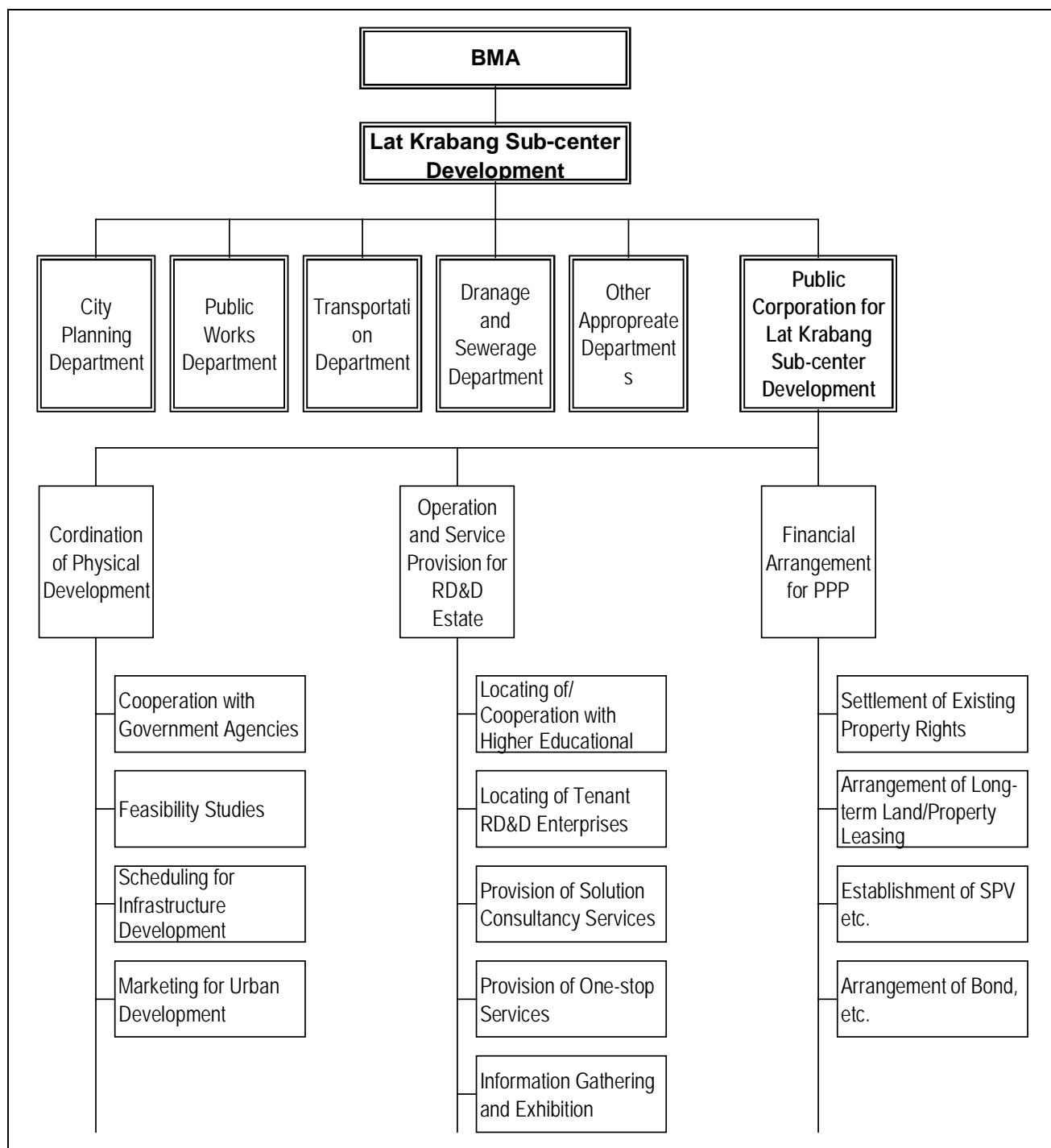
BMA Lat Krabang Development Committee: The development of the sub-center involve various facets of urban development and services, and thus within BMA, coordination of various activities over different departments and divisions need to be made. The coordination body may be called BMA Lat Krabang Development Committee. The City Planning Department will be in the center of the BMA coordination, which shall involve divisions of Department as well as Department of Public Works, Department of Drainage and Sewerage, and other departments as needed.

Coordination outside BMA: The Lat Krabang Sub-center development also involves other organizations and agencies outside of BMA on the national and regional levels. The organizations that need to be involved in this coordination will include the departments and agencies that formed the Steering Committee for this Study, as well as other organizations and agency as needed. The coordination meetings shall need to be chaired by BMA.

### (3) Organizational Development

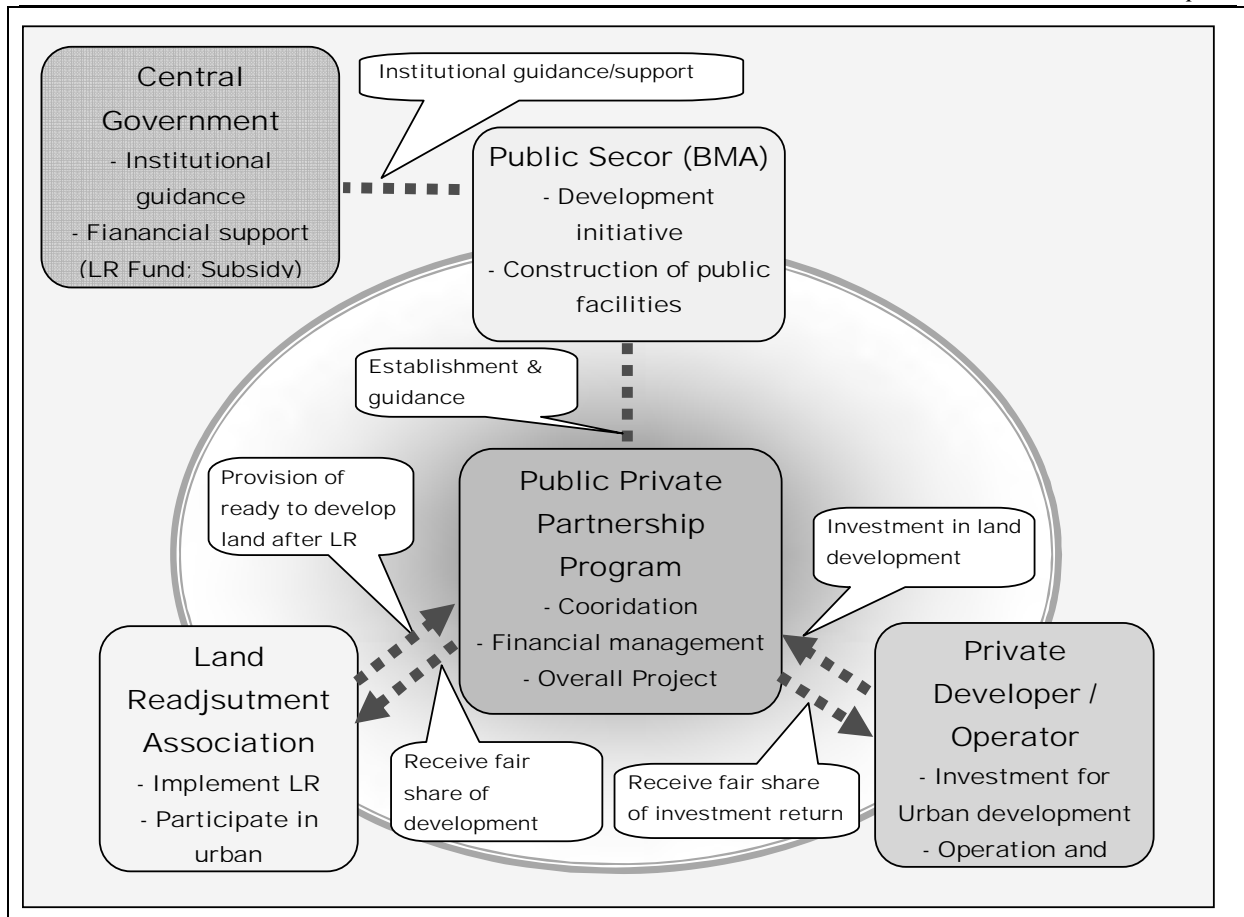
Public Corporation for Lat Krabang Sub-Center Development: In order for the Lat Krabang Sub-Center development to grow momentum for implementation and promote participation from the private sector, it will be desirable to set up a development body that is flexible and active. For this purpose, a public corporation shall be established under the initiative of BMA with the mandate of Lat Krabang Sub-center development, including 1) coordination of physical development, 2) operation and provision of services for RD&D estate, and 3) financial arrangement to promote and enhance PPP. This public company, tentatively called Public Corporation for Lat Krabang Sub-Center Development shall act as the project manager company (PMC) for the overall sub-center development. This company could be formulated either as a new public corporation, or by expanding the existing

functions of the Krungthep Thanakom company, which is a public corporation under BMA for land development.



**Implementation Arrangement under BMA**

Public Private Partnership Program: As the substantial part of the sub-center development shall involve land development for commercial purposes, it will be important to arrange a method for facilitating a Public Private Partnership Program. (PPP). The public sector and the private sector shall put in their respective resources where they have strength, and combine them to make a overall urban development.



**Public Private Partnership Program for Sub-Center Development**

## 10 Action Plan

In implementing the Lat Krabang Sub-Center project, the essential factor is to keep up the momentum for development by continuously carrying out necessary actions as necessary. The following depicts some of the major tasks to be undertaken by BMA for the implementation of the Lat Krabang Sub-center development in the next 5 years.

### (1) Critical Developments in the Next Five Years

- 1) Completion of land readjustment, or the first step development, at the site of the Sub-Center (Area-C),
- 2) Completion of Urban Development including building facilities at the Pilot Project Area as the gateway for both the Sub-Center and the Culture Town,
- 3) Completion of trunk roads projects (NS-1, NS-2, and EW-1)
- 4) Certain level of development in Culture Town as a day-tourism destination

### (2) Immediate Actions

- 1) Committee
  - Establishing BMA Lat Krabang Development Committee which will act as the advocate of the Sub-Center Development
- 2) Development Company
  - Establishing Public Corporation for Lat Krabang Sub-Center Development, either anew or using Krungthep Thanakom as the parent
  - The company shall have the capacity for 1) urban development and urban design, 2) operation of RD&D city including the locating of a value creation facility such as world class university laboratory etc., 3) support for operation of firms located in estates including providing business solutions
- 3) Further survey and planning for Sub-center Development (Area C)
  - Detail scheme for 2-step land readjustment in Area C
  - Contact land owners and conduct a survey of their intention of their land for development
  - Commence the 1st step land readjustment

- 4) Pilot Project (Area A)
  - Contact land owners and achieve agreement for land readjustment
  - Detail considerations of cost sharing ? subsidy from Central government, utilities etc.
  - Revision of the replotting plan and financial scheme as per reflecting the various conditions and requests from the stakeholders,
  - Formation of LR association and commence the land readjustment
- 5) Thai Culture Town Development
  - Master plan for Thai Culture Town Development
  - Research on similar projects overseas (such as Narita Airport Day Tourism Project)
  - Facilitation and assistance to local people groups for the implementation of their projects
- 6) Road Development
  - Basic design and construction of NS-1, NS-2 and EW1 roads
  - Basic design and construction of an interchange on OBR at BMA New Krungthep Kreeta Road
- 7) Transportation Facilities
  - Conduct a Feasibility Study for public transport for Lat Krabang area including Light Rail Transit (LRT) and Bus Rapid Transit (BRT)

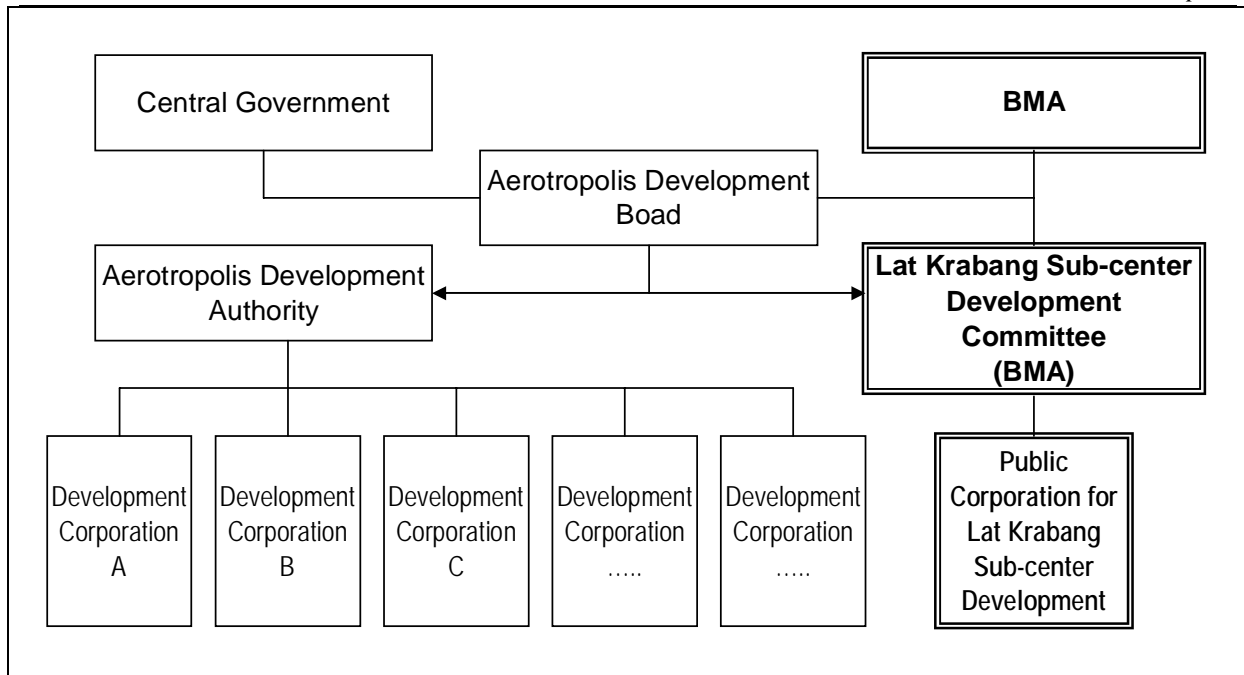
## **11 Issues for Further Considerations**

### **(1) Coordination with Aerotropolis Development**

The Government of Thailand has been initiating the Aerotropolis project, which intends to develop the areas surrounding the New Bangkok International Airport as one new city, including the Lat Krabang Sub-center area, to which concept BMA has been opposing. The final settlement is not yet reached.

The implementing scheme of the Aerotropolis should be area-wise, and the Lat Krabang sub-center which is under the BMA jurisdiction shall be developed and managed by BMA, unless otherwise determined officially. If the area of Lat Krabang Sub-center is shifted to the new administrative body, such as Aerotropolis City, the public investment by BMA that would have been made at the time of transfer shall be counted as the input for development, and should be duly considered in reallocating the development benefits duly.

Throughout this Study the concept of organizational structure for the Lat Krabang Sub-center Development has been sought for 1) an immediate commencement and 2) a flexible scheme that could easily be integrated into the planned organizational scheme of Aerotropolis Development. It is very likely that the Lat Krabang Sub-center will be the first project to be initiated among those designated project components in the Aerotropolis Development. The organizational structure for the Lat Krabang Sub-center Development should coordinate with the foreseeable organizations of Aerotropolis Development from the beginning, and should be regarded as a preceding model for other area-wise developments. The following figure illustrates the recommended coordinating structure among the major organizations related to the Aerotropolis Development.



**Coordination with Aerotropolis Development**

(2) Capacity Building for Implementation Body

The land development using the land readjustment method is a new concept for Thailand. As the law on land readjustment was enacted and the related regulations and guidelines are in preparation, the real experience of land readjustment has not been attained by the Thai side. Until the first real experience is achieved, assistance and support from Japan will be very precious. The areas where the capacity building shall be necessary area in the following

Land Readjustment; Capacity for formulating replotting plans as per reflecting the requirements of the land owners, and adjusting the financial plan accordingly, which will be essential for implementing a land readjustment project

Urban development and urban design; Capacity for land development and designing involving the private sector developers and investors, which is essential for materializing the urban development after the land readjustment

(3) Collaboration with DPT in Advancing Land Readjustment

JICA has been assisting Thailand in the field of urban planning and land readjustment in the last ten years or so, where the major counterpart agencies are DPT under the Ministry of Interior, and BMA. One of the outcrops of the assistance was the establishment of the Land Readjustment Law which has taken effect in December 2004. Nonetheless, there has not been a concrete example of urban development using the land readjustment method yet in Thailand. As a new tool for urban development, producing concrete examples for development is crucial for dispersing the method.

The Pilot Project for land readjustment in Lat Krabang is an important stepping stone for establishing the land readjustment method in Thailand. DPT is in the center of establishing and dissemination the land readjustment and BMA has been active in promoting some earlier projects in the past with high potential for development. It is thus necessary for BMA and



DPT to collaborate on this front in establishing regulations and guidelines for implementation of land readjustment in Thailand, and advancing the pilot project by land readjustment.

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

**Final Report**

**VOLUME I: MAIN TEXT**

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### ABBREVIATIONS

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

## **ABBREVIATIONS**

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

## MEASUREMENT UNITS

### Extent

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

### Length

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

### Energy

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

### Others

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

### Volume

cm<sup>3</sup> = Cubic-centimeters  
m<sup>3</sup> = cu.m = Cubic-meters  
l = Liter

### Weight

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

### Time

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