

THE STUDY ON NATIONAL INTEGRATED STRATEGY
OF COASTAL AREA
AND MASTER PLAN OF SIHANOUK-VILLE
FOR SUSTAINABLE DEVELOPMENT

FINAL REPORT
< SUMMARY >

BOOK II

MASTER PLAN FOR PREAH SIHANOUK
AND
DEVELOPMENT STRATEGY FOR KAMPOT

CiCaDs
Cambodia Integrated Coastal Area
Development Strategies

NOVEMBER 2010

NIPPON KOEI CO., LTD.
KRI INTERNATIONAL CORP.
VALUE PLANNING INTERNATIONAL, INC.

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MINISTRY OF LAND MANAGEMENT, URBAN
PLANNING AND CONSTRUCTION (MLMUPC)
ROYAL GOVERNMENT OF CAMBODIA

JAPAN INTERNATIONAL
COOPERATION AGENCY (JICA)

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PREFACE

In response to a request from the Royal Government of Cambodia (RGC), the Government of Japan decided to conduct “The Study on National Integrated Strategy of Coastal Area and Master Plan of Sihanouk-ville for Sustainable Development”, and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA selected and dispatched a Study Team headed by Mr. YAMADA Koji of Nippon Koei Co., Ltd. to Cambodia between March 2009 and June 2010.

In cooperation with RGC, the JICA study team conducted field surveys and formulated the National Integrated Strategy of Coastal Area and Master Plan of Sihanouk-viile, through discussions with concerned officials of RGC. Upon returning to Japan, the JICA study team conducted further studies and prepared this final report.

I hope that this report will contribute to the sustainable development of Coastal Area and to the enhancement of the friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation for all the official concerned of RGC and other experts for their close cooperation and assistance extended to the study team.

November 2010

Kiyofumi KONISHI

Director General

Economic Infrastructure Department

Japan International Cooperation Agency

November 2010

Mr. Kiyofumi KONISHI
Director General, Economic Infrastructure Department
Japan International Cooperation Agency
Tokyo, Japan

Subject: Letter of Transmittal

Dear Sir,

We are pleased to submit herewith the Final Report of “The Study on National Integrated Strategy of Coastal Area and Master Plan of Sihanouk-ville for Sustainable Development”. This study was conducted by Nippon Koei Co., Ltd. in association with KRI International Corp and Value Planning International Inc., under a contract to JICA during the period from March 2009 to September 2010. The report comprises a Summary and Main Report for the National Strategy of Coastal Area (as Book I), plus a Summary and Main Report for the Master Plan of Sihanouk-ville (as Book II).

The report proposes strategies and recommends implementation plans to achieve the well-balanced and sustainable development in Coastal Area of Cambodia. These recommendations reflect the results of National Integrated Strategy of Coastal Area and the Master Plan of Sihanouk-ville.

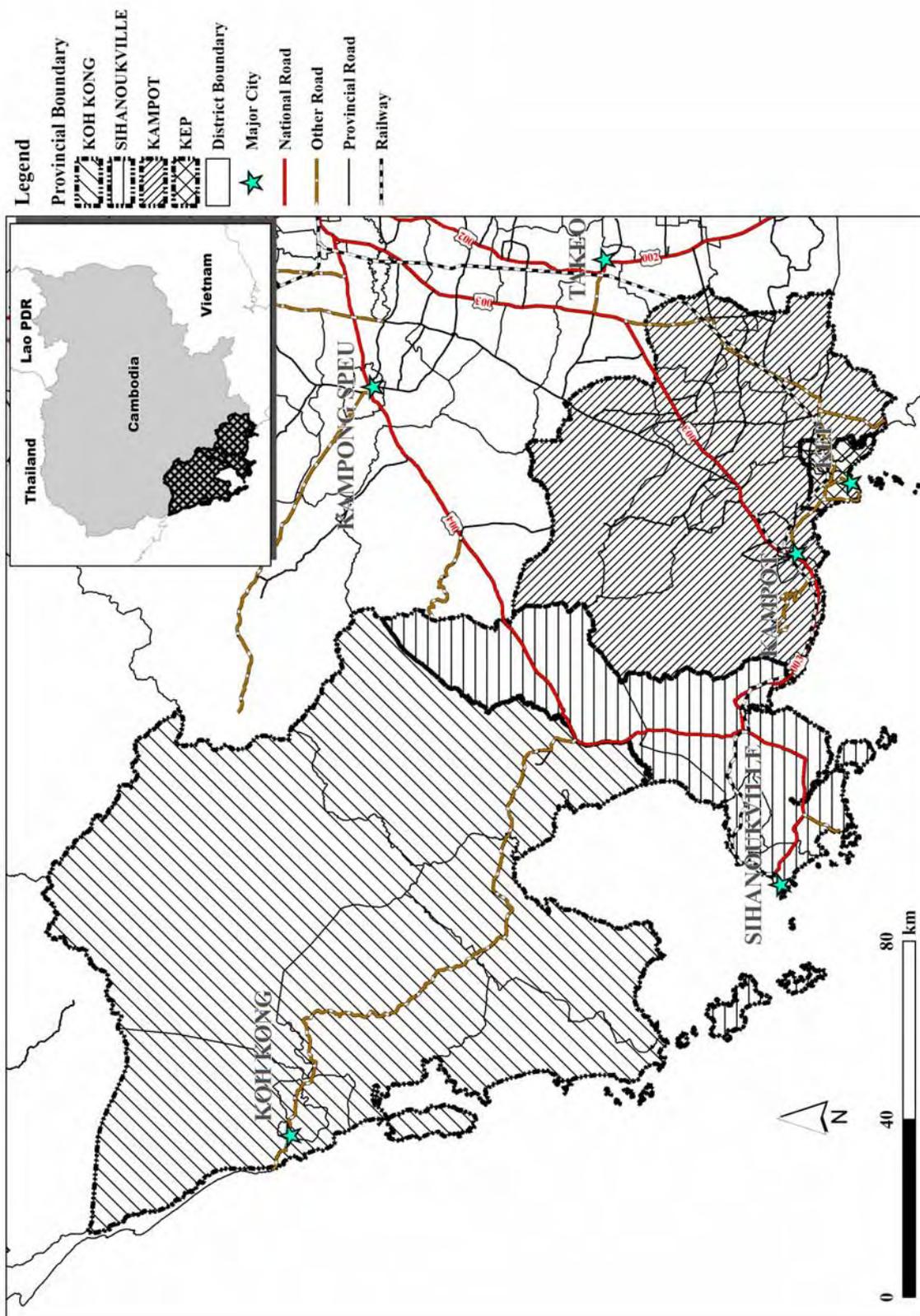
We would like to take this opportunity to express our sincere gratitude to your Agency, Ministry of Foreign Affairs of Japan, JICA Cambodia Office, the Embassy of Japan, and the Royal Government of Cambodia including the main counterpart, Ministry of Land Management, Urban Planning and Construction (MLMUPC) and all the other concerned organizations those who rendered unstinting assistance to JICA Study Team through the study period. The Final Report is the fruit of excellent collaboration between all participants in this study.

Yours faithfully,

YAMADA Koji

Team Leader, JICA Study Team

The Study on National Integrated Strategy of
Coastal Area and Master Plan of
Sihanouk-ville for Sustainable Development



Location Map

Executive Summary

1. **Background:** Numbers of projects have been developed recently without substantial urban development plan and management in Coastal area of Cambodia, which is composed of the four (4) provinces; Preah Sihanouk, Koh Kong, Kep, and Kampot. Some negative aspects have also started to take shape in this region. In order to regulate and control such the uncontrolled developments in Coastal area, a thorough study for sustainable development needs to be carried out.

“The Study on National Integrated Strategy of Coastal area and Master Plan of Sihanouk-ville for Sustainable Development”, hereinafter called the Study, has been conducted since March 2009 to formulate “the national integrated strategy of Coastal area” and “master plan of Preah Sihanouk for sustainable development”, targeting at year of 2030.

This report focuses the Master Plan of Preah Sihanouk and Development Strategy for Kampot.

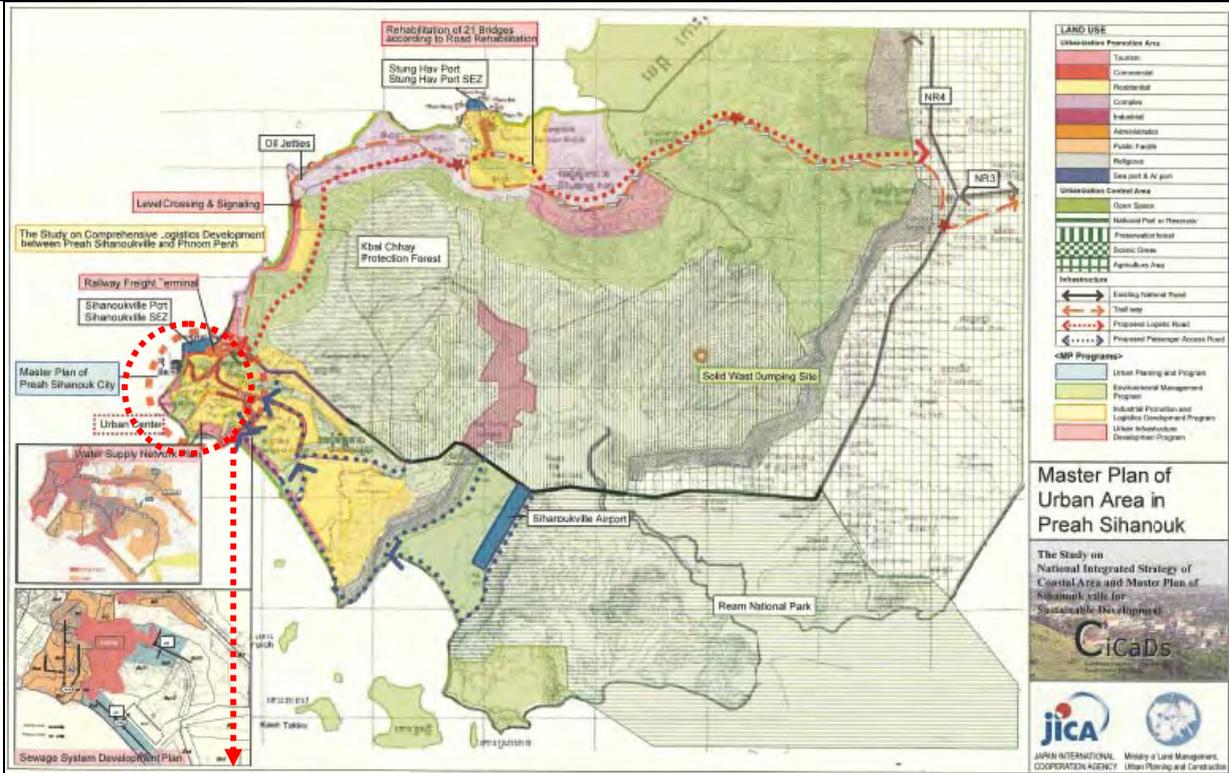
2. **Development Issues in the Present Condition:** Summarized as follows:

Land Use Condition	Infrastructure
<ul style="list-style-type: none"> • Urban areas are spreading at fringe area of existing urban areas without proper provision of infrastructure, as the center of the urban area is weak and unclear. • NR No.4 is the sole road network, so all the heavy tracks/trailers, buses and cars for residents and tourists are mixed. • Conservation of two water reservoirs that is important concern on urban land use planning. • Informal settlements are scattered in and around the urban area. 	<p>Road: The mixed traffic of heavy vehicles and light vehicles and container trailers’ parking on the shoulder of the road lead to traffic accidents on NR. No.4.</p> <p>Railway: Delay of the on-going rehabilitation project by ADB, and needs for further improvement after this projects for the safe and stable railway transportation.</p> <p>Port: Inconsistent development plans of ports in Coastal area and competition to Cai Mep Chi Bai Port.</p> <p>Water Supply: Low access rate of urban water supply system and deterioration of existing main pipes and lack of storage facility’s capacity.</p> <p>Sewage: Low connection rate and limited service provision due to the lack of government’s monitoring system and that connecting to the system is not compulsory.</p> <p>Solid Waste: Low quality of collection and dumping services by the private operator, and urgent needs for constructing a new dumping facility.</p>

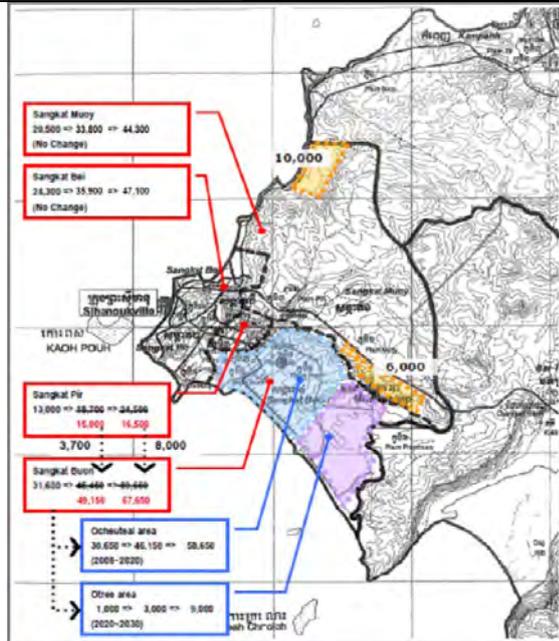
3. **Master Plan of Preah Sihanouk:** Based on the abovementioned development issues, M/P for Preah Sihanouk toward the target year of 2030 have been prepared, as summarized below:

Development Goals	Population Frame of Preah Sihanouk Province for 2030																					
<ol style="list-style-type: none"> 1. Function as the National Gateway of international trade, economies, human resource and technologies; 2. Be a National Growth Center with diversified economic activities and urban services; 3. Be the National Logistic Center liked with World Markets; 4. Be an Industrial Center with modern & non-traditional manufactures and agro-industries; 5. Be an internationally reputable Marine Resort harmonized with the most livable environment 	<table border="1" style="margin: 10px auto;"> <caption>Population and Growth Rate Data (2008-2030)</caption> <thead> <tr> <th>Year</th> <th>Population</th> <th>Population Growth Rate (%)</th> </tr> </thead> <tbody> <tr> <td>2008</td> <td>221,396</td> <td>2.7%</td> </tr> <tr> <td>2010</td> <td>233,740</td> <td>2.8%</td> </tr> <tr> <td>2015</td> <td>270,970</td> <td>3.0%</td> </tr> <tr> <td>2020</td> <td>309,580</td> <td>2.7%</td> </tr> <tr> <td>2025</td> <td>351,870</td> <td>2.6%</td> </tr> <tr> <td>2030</td> <td>399,220</td> <td>2.5%</td> </tr> </tbody> </table>	Year	Population	Population Growth Rate (%)	2008	221,396	2.7%	2010	233,740	2.8%	2015	270,970	3.0%	2020	309,580	2.7%	2025	351,870	2.6%	2030	399,220	2.5%
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Industrial Promotion Strategies for Preah Sihanouk																						
Type of Industries	Industrial Promotion Strategies																					
Export-oriented Industries	Improvement and Strengthening the SEZ Scheme																					
	Improvement of the skills of labors and securing labor forces																					
	Securing competitive and stable electricity																					
	Creation of industrial cluster by targeting industries to be promoted																					
Resource-based Industry	Promotion of Fishery via Aquaculture																					
	Improvement of quality and quantity of agricultural products																					
Tourism	Promotion of Regional Tourism via establishment of Coastal Area Hotel Association																					
	Activation of tourists’ movement in Preah Sihanouk and Coastal Area																					

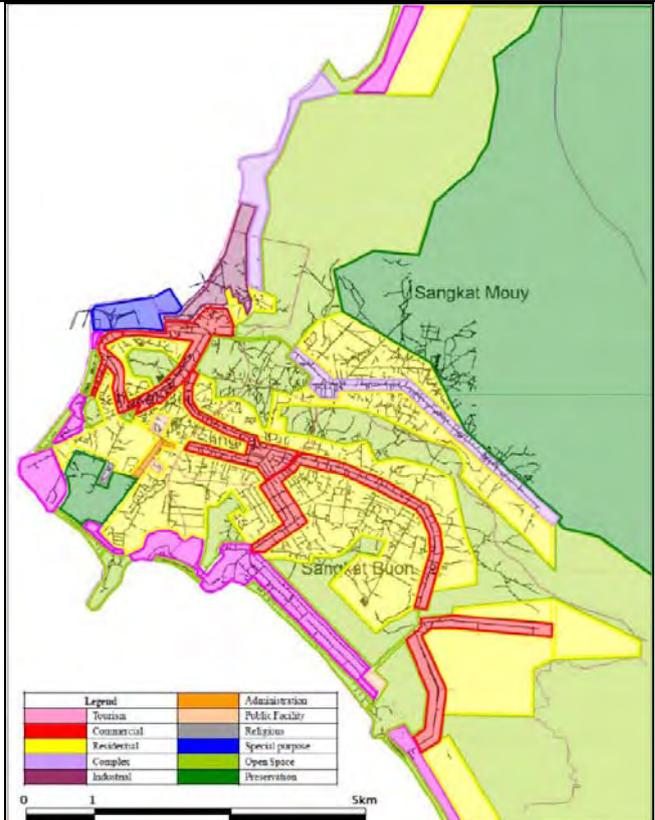
Major Infrastructure Development Plans and Land Use Plan of Target Area of Preah Sihanouk M/P



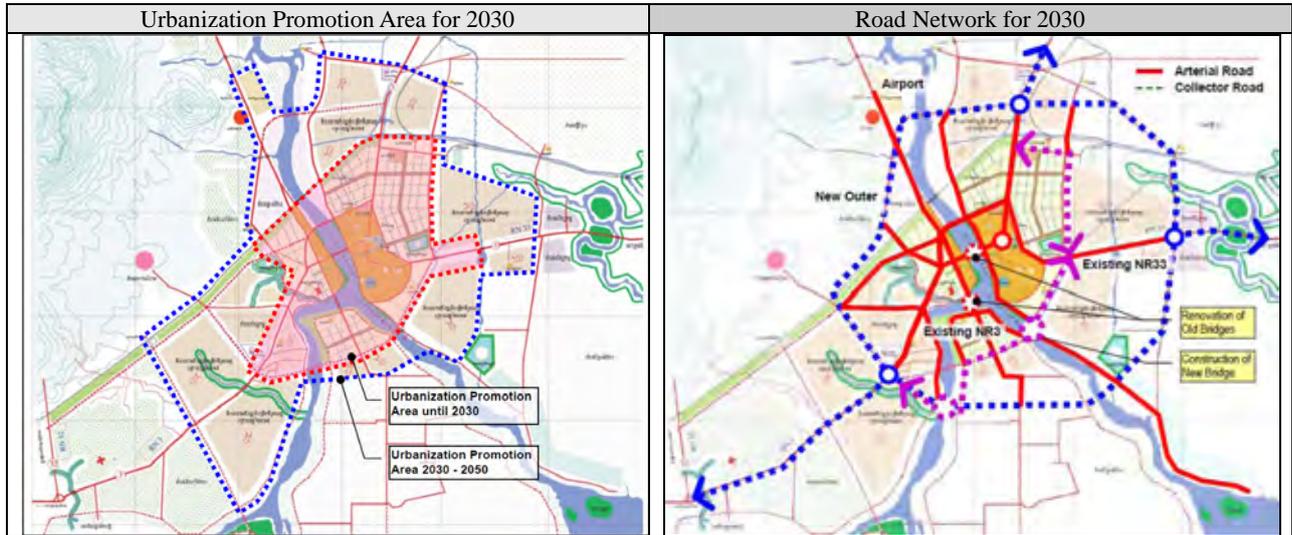
Detailed Land Use Plan and Population Framework of Designated Urban Area



	2008*	2010		2020		2030	
		No.	G-R(%)	No.	G-R(%)	No.	G-R(%)
Sangkat Mouy	20,492	21,700	2.9	33,800	4.5	44,300	2.7
Sangkat Pir	13,041	13,800	2.9	15,000	0.8	16,500	1.0
Sangkat Bei	24,276	25,750	3.0	35,900	3.4	47,100	2.8
Sangkat Buon	31,638	33,550	3.0	49,150	3.9	67,650	3.2
Urban Area	89,447	94,800	3.0	133,850	3.5	175,550	2.7



4. Development Strategy for Kampot: Urban Development concepts of Kampot City for the year 2030 are as follows:



5. Priority Projects: The Priority Projects based on the M/P of Preah Sihanouk and Development Strategy of Kampot have been identified as follows:

Priority Projects	
<p>Urban Planning Program</p> <p>UD-01: National Spatial Planning Project</p> <p>UD-02: Urban Development Master plan for the Coastal Area</p> <p>Environmental Management Program</p> <p>EV-01: Strengthening EIA Implementation Capacity Project</p> <p>EV-02: Establishment of Public-Private Partnerships and Development of Infrastructure for Solid Waste Management for Pursuit of Sustainable Environmental Protection and Development in Cambodian Coastal Areas</p> <p>Industrial Promotion and Logistics Development Program</p> <p>L-01: Master Plan Study on Comprehensive Logistic System Development between Preah Sihanouk and Phnom Penh</p>	<p>Infrastructure Development Program</p> <p>WS-01: Preah Sihanouk Water Supply System Development Project</p> <p>WS-02: Preah Sihanouk Sewage System Development Project</p> <p>WS-03: Kampot Water Supply System Development Project</p> <p>WS-04: Kampot Sewage System Development Project</p> <p>T-01: Sihanouk-ville Road Network Construction and Improvement Project</p> <p>T-02: Kampot Road Network Construction and Old Bridge Rehabilitation Project</p>

The Study on National Integrated Strategy of Coastal Area and Master Plan of Sihanouk-ville for Sustainable Development

Final Report <Summary (Book II)>

Master Plan for Preah Sihanouk and Development Strategy for Kampot

Preface
Letter of Transmittal
Location Map
Executive Summary

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Master Plan of Urban Area in Preah Sihanouk

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List of Abbreviations

ADB	Asian Development Bank
ASEAN	Association of South-East Asian Nations
BOT	Build-Operate-Transfer
CADPCC	Coastal Area Development Project Coordination Committee
CDC	Council for the Development of Cambodia
CNR	Cambodian National Railway
CR	Cambodia Riel
DLMUPCC	Department of Land Management, Urban Planning, Construction and Cadastre
EIA	Environmental Impact Assessment
FDI	Foreign Direct Investment
GIS	Geographic Information System
GMS	Greater Mekong Sub-region
GOJ	Government of Japan
GSP	Generalized Tariff Preferences
JICA	Japan International Cooperation Agency
LOI	Law on Investment
MAFF	Ministry of Agriculture, Forestry and Fisheries
MLMUPC	Ministry of Land Management, Urban Planning, and Construction
MOE	Ministry of Environment
MOI	Ministry of Interior
MPWT	Ministry of Public Works and Transportation
NGO	Non-governmental Organization
NIS	National Institute of Statistics
NSDP	National Strategic Development Plan
ODA	Official Development Assistance
PAS	Port Authority of Sihanoukville
PRRO	Provincial Rural Road Office
QIP	Qualified Investment Project
RGC	Royal Government of Cambodia
S/C	Steering Committee
SEZ	Special Economic Zone
SHM	Stakeholder Meeting
SWSA	Sihanoukville Water Supply Authority
UNDP	United Nations Development Programme
USD	US dollar

W/G

Working Group

WTO

World Trade Organization

1: INTRODUCTION

1.01 The importance of Coastal Area to the Cambodian economy lies primarily in the fact that it accommodates the nation's only deep seaport, Sihanoukville Port, which is expected to facilitate Cambodia with modernized, efficient seaport as the gateway to the world for international trades. Another important factor is the areas encompassing Preah Sihanouk (formerly called Sihanoukville) and Phnom Penh, which were denoted as "the Growth Corridor of Cambodia", are the fastest growing regions of the nation powering the economic growth.

1.02 With active development in Coastal Area, some negative aspects have also started to take shape. In Preah Sihanouk city, various developers started numerous development projects, cutting down greenery on the hills and polluting environment. In order to regulate and control development projects in Coastal Area, a through study for sustainable development needs to be carried out. Also, urban areas susceptible to uncontrolled development need to have urban master plans in effect.

1.03 In 2008, the Royal Government of Cambodia (RGC) made an official request to the Government of Japan (GOJ) to carry out this study to counter the aforementioned issues, and GOJ decided to accept this request. Japan International Cooperation Agency (JICA) dispatched a preliminary study mission to Cambodia in 2008, and agreed upon the scope of work for this study in December 2008. A Team to carry out this study (JICA Study Team), consisting of experts in relevant fields, was dispatched by JICA to Cambodia in March 2009.

1.04 The Study on National Integrated Strategy of Coastal Area and Master Plan of Sihanouk-ville for Sustainable Development, hereinafter called the Study, has the following objectives;

- 1) to formulate the national integrated strategy of coastal area and master plan of Preah Sihanouk for sustainable development, targeting at year of 2030
- 2) to formulate capacity development plan for governments including the Ministry of Land Management, Urban Planning, and Construction (MLMUPC), and the provinces on regional development, through examination of the systems and institutions to enhance the effectiveness of the master plans of Preah Sihanouk and other cities in Cambodia

1.05 The study area covers Coastal area of Cambodia including the following four provinces: Preah Sihanouk, Koh Kong, Kampot and Kep (See the Location Map).

1.06 The executing agency of the Study was set as MLMUPC, together with the four provinces. And, accordingly the Steering Committee (S/C) was established under the chairmanship of Secretary of State for MLMUPC.

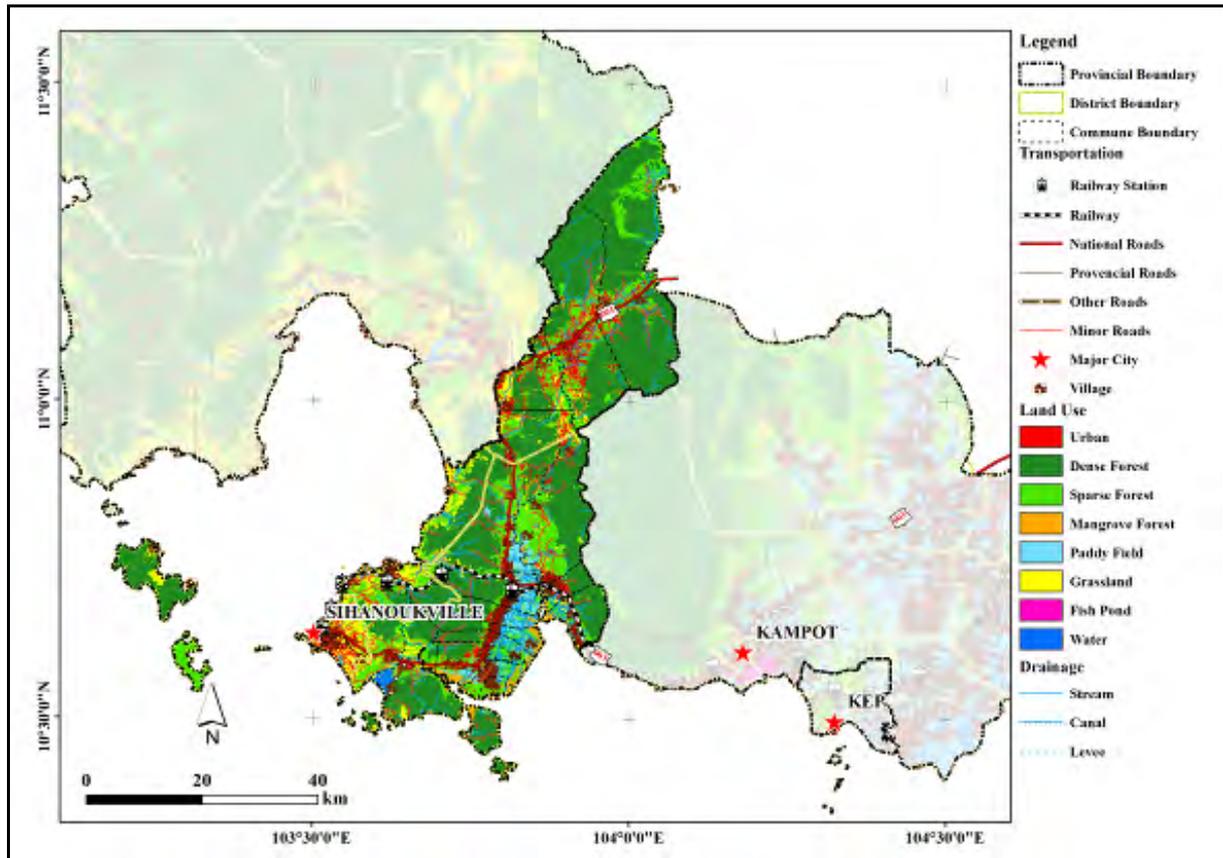
1.07 JICA Study Team was dispatched by JICA to Cambodia in March 2009, and commenced the Study based on the schedule as agreed upon in the 1st S/C, held in Phnom Penh in 30th March, 2009. Progress Report was submitted in September 2009 and the contents were approved by the Cambodian side in the 2nd S/C. Interim report was submitted and the Integrated Strategy for Coastal area was firstly proposed in the 3rd S/C meeting held in November 2009. Subsequently, Draft Final Report was submitted in May 2010, and the contents were approved by the Cambodian side in the 4th S/C meeting.

1.08 This summary report 2 is a part of Final Report that summarizes the work for the master plan of Preah Sihanouk for sustainable development and the development strategy for Kampot..

2: ISSUES IN THE PRESENT CONDITIONS OF PREAH SIHANOUK

<Existing Land Use in Preah Sihanouk Province>

2.01 Figure S2.01 shows the existing land use in detail and Table S2.01 provides the corresponding land use area in (ha) in Preah Sihanouk Province. As per analysis, about 81% of the provincial land is covered with forest (dense or sparse), while 6% of the land is urban. The urban area is concentrated at the tip of the peninsula around the Sihanoukville Port.



Source: JICA Study Team

Figure S2.01 Land Use Map of Preah Sihanouk Province

Table S2.01 The land area in (ha) of each land use category in Preah Sihanouk Province

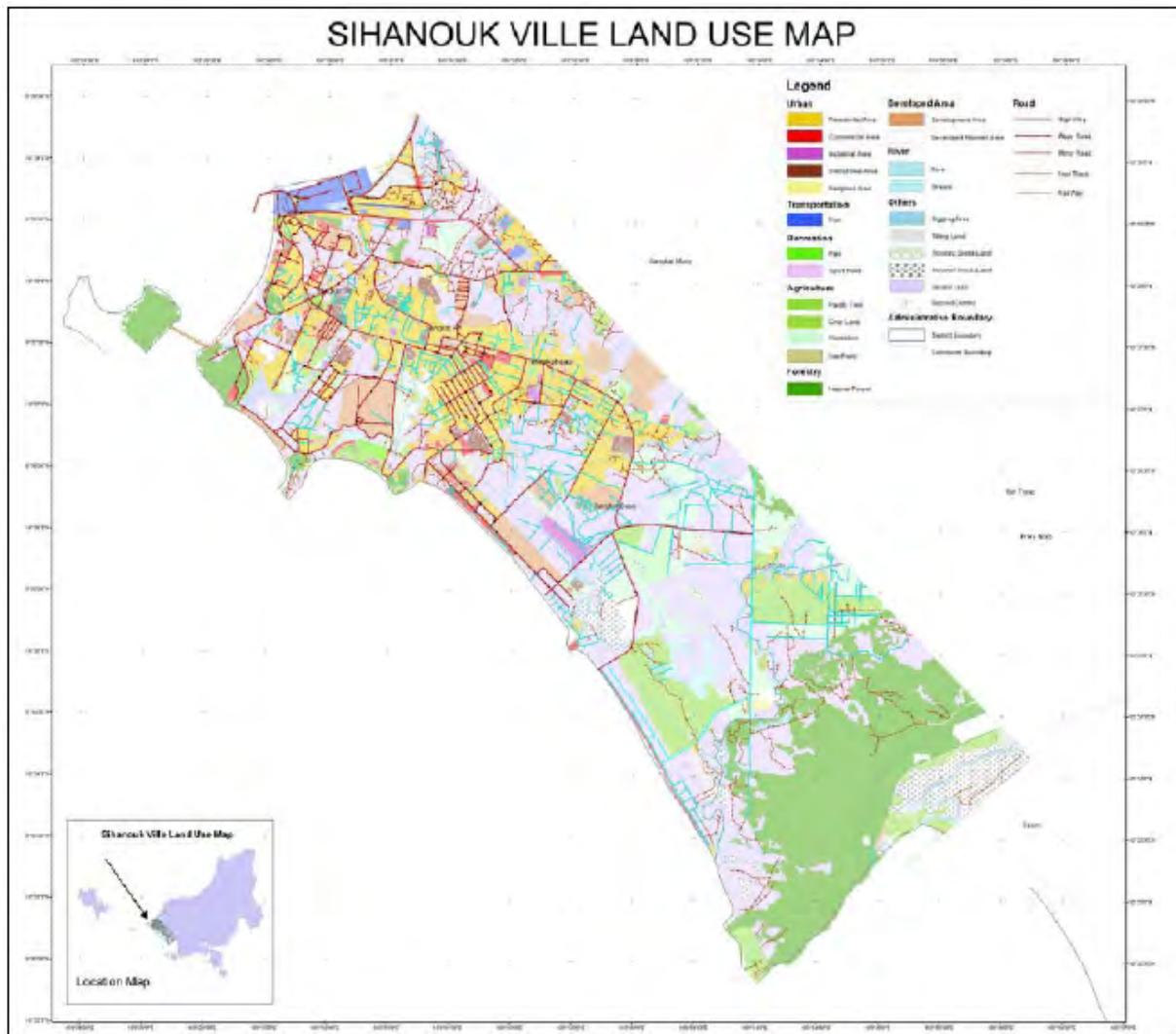
Land Use Class	Description	Area (ha)	Area (%)
Urban	A construction material, e.g. asphalt and concrete, typical commercial and industrial buildings, dams, dikes, residential development (including single/multiple houses), transportation facilities, e.g. highways and local roads	15,176	6
Dense Forest	Evergreen broad leafed forest	136,133	52
Sparse Forest	Bamboo and secondary forests, deciduous forest, and dry deciduous (open) forest.	67,697	26
Mangrove Forest	Mangrove forest, and Degraded mangrove forest	7,372	3
Paddy Field	A flooded parcel of arable land used for growing rice and other semi-aquatic crops.	7,802	3
Grassland	A natural plant cover which is potentiality useful as grazing. Grasslands are not usually seeded, fertilized, drained, irrigated, or cultivated.	22,569	9
Fish Pond	Shrimp/Fish farming and Salt pan	11	0
Water	All areas of open water, including streams and lakes	3,941	2
Total		260,701	100

Source: JICA Study Team

<Existing Land Use of Urban District in Preah Sihanouk>

2.02 Of the total urban area, the detailed mapping of urbanized areas of Preah Sihanouk City (75km²) was carried out at the scale of one to ten thousand (1:10,000). The Figure S2.02 shows the detailed land use mapping of the urbanized area in Preah Sihanouk. The description of the land uses in each Commune that is located in the residential area is summarized below:

- **Sangkat Bei Commune:** Sangkat Bei Commune is located at the west end of Preah Sihanouk City, which includes Sihanoukville Port, Victoria Beach, and Independence Beach. The residential and commercial area covers 25% of the total area of the commune. The vacant land (unused land) represents 320 ha or 29% of the total land. The natural forest covers 111 ha or 10% of the commune land. The development area, which is either under construction or fenced or allotted for development projects shares 72 ha or 7% of the total area.
- **Sangkat Buon Commune:** Sangkat Buon Commune is located in the southern part of Preah Sihanouk City and includes Ocheuteal Beach and Otres Beach. The residential and commercial area covers 394 ha or 16% of the total land. More than 40% of the commune area or 1,000 ha is vacant land. The development area covers 156 ha or 6.5% of the area. Agricultural land use, which includes paddy field, cropland and plantation covers about 400 ha or 17% of the total area.
- **Sangkat Pir Commune:** Sangkat Pir Commune is small but located in the downtown of Preah Sihanouk City. More than half of its land area is in residential and commercial use. The vacant land area is 52 ha or shares a 22% of the total land area, which is not enough to accommodate the future population growth



Source: JICA Study Team

Figure S2.02 Land Use Map of Urban District in Preah Sihanouk

2.03 By reviewing the previous urban planning efforts for Sihanouk City, various lessons could be learnt for the present urban planning of the city. The following summarizes the lessons:

- **Center of the city:** Although the city is dispersed and somewhat scattered over a wide area, Downtown is the central area, as planned in the first master plan, and elaborated further in the Unofficial Urban Plan by DLMUPCC. All the subsequent master plans followed this presumption.
- **Preserved area:** The protected area is established for the Ream National Park covering the forest and Coastal area located in south of the Peninsula. In addition, the conservation of watershed of the Preak Tuk Sap River, which is the main water source for the city, is generally respected in the planning such as observed in the Sihanoukville Coastal Strategy, MOE.

- **Beaches:** All the master plans agreed upon preserving and maintaining the beaches southeast of the city as a belt for beach resorts with hotels and guesthouses.
- **New industrial corridor:** Two of private sector urban master plans, namely, Ariston Plan and SCA/Vinci Plan, considered the coastal area north of the city around Stung Hav area as a site for a new industrial and mixed development zone. Land Use Planning for Stung Hav District by MLMUPC followed this in principle, allowing for a more detailed spatial structure through participatory planning process.

<Living Environment of Urban Poor Areas in Sihanouk City>

2.04 Urban poor areas in Preah Sihanouk province are scattered all over the province. The maximum number of such urban poor areas, which are five (5) in numbers are located in the City of Preah Sihanouk. Urban poor areas are distributed not only in coastal areas but also in other areas too.

Table S2.02 Profile of Urban Poor Areas in Preah Sihanouk Province

Urban Poor Areas	Location	Household	Year of Living	Issues
<u>City of Preah Sihanouk</u>				
Village 1 Sangkat Muoy:	Inland	100HH	5 years	employment, toilet
Village 2 Sangkat Muoy:	Inland	250HH	2 years	land for plantation
Village 3 Sangkat Muoy	Coast	360HH	25 years	land title
Village 1 Sangkat Bay	Coast	80HH	20 years	land title, soft-loan
Village 3 Sangkat Bay	Coast	200HH	12 years	land title, employment
<u>Stenung Hav District</u>				
Village 3, Tumnob Rolok Commune	Inland	20HH	30 years	land title, micro-finance
Village 1, Tumnob Rolok Commune	Coast	350HH	30 years	low catch of fish
<u>Prey Nob District</u>				
Boeng Veng Village, Veal Renh Commune	Inland	100HH	30 years	Food

Source: JICA Study Team

2.05 There are certain issues related to urban poor areas that need to be tackled and are as follows:

- **Lack of land use control:** Often the local government does not control any new emerging poor areas in the outskirts of City of Preah Sihanouk. Village offices, which are the lowest level of governmental bodies, cannot control emerging poor areas without any legal evidences.
- **Lack of community based organizations:** Community based organizations do not exist in most of urban poor areas. In very few areas under the UPDF scheme, such organization has been established. In some areas the special purpose organization such as fisheries and water resources management has been established.
- **Insufficient supports by government and NGO:** No governmental activities such as dissemination of administrative information have been observed in poor areas. The support by NGOs are found in the sector of legal education, health care, and child care. The NGOs supports in the provision of basic infrastructure and access to soft-loan has not been observed.
- **Insufficient infrastructure and public services:** Infrastructure services in the urban poor areas are not sufficient. Wooden houses on the sea and land are partially broken, and it cannot

ensure safety to inhabitants Most of the households discharge human waste directly to the sea and there is no control on littering too. As a result, sea water near the poor area is contaminated. In addition, use of public health centre, which is located at the walking distance, is limited.

<Road>

2.06 At the present, NR4 is the only access road to the center of Preah Sihanouk. A detour along with NR4 is required to have a better access to the beaches. For Preah Sihanouk, where tourism is a major local industry it is important to establish more efficient transport network. This will enhance the tourism in the region. However, the existing road in Preah Sihanouk has not functioned as an efficient network. It is expected that after the commencement of public operation of Sihanoukville Airport, the tourism will in forthcoming years increase substantially. Despite such a tourism potential, currently, tourist are left with an available option of NR4 to reach to the coastal resorts

2.07 Though the road exists between the Preah Sihanouk and Stueng Hav but in no case it can be considered as an industrial road as the existing grade of road is not able to meet the industrial demand and the requirements of heavy vehicles. According to the development plan of Sihanoukville Port SEZ, the rehabilitation of the existing road has been planned but this also won't be able to reach to the sufficient capacity to meet the requirements of heavy vehicles. Apart from tank trucks, which visit oil jetty, most of the heavy vehicles come to Preah Sihanouk through NR4. Thus, currently NR4 is overloaded with large volume of mixed traffic. This has also been confirmed by the traffic volume survey. The result shows that near to Preah Sihanouk on NR4, motorcycles account for majority of the traffic and the occurrence of traffic congestion is mainly due to mixed traffic, which includes motorcycles, light vehicles and heavy vehicles. In addition, the road connecting Stueng Hav with Veal Renh was rehabilitated in 2007 but it is deteriorating rapidly..

<Railway>

2.08 Commodities have not been transported by railway on time in Cambodia due to the frequent derailment and lack of maintenance. Currently rehabilitation of railway is on-going under the financial assistance of ADB. However, the main components of the rehabilitation of the southern line which links Phnom Penh and Preah Sihanouk are repairing of embankments, replacing worn out and unserviceable sleepers, fittings and ballasting, rehabilitating or reconstructing structures including bridges, culverts, buildings and drains, and so on. So, the rehabilitation project does not include the critical components for the safety and reliable transportation service, such as exchange of the deteriorated rail, installing a signaling system and level crossing.

2.09 Although the initial schedule mentioned that the project completion would be 2010, the completion will be in 2013 including the additional work which is development of depot and workshop..

<Water Supply>

2.10 Water system of Preah Sihanouk supplies approximately 23,400 customers within the urban area of the province. The water supply system serves only 32% of the urban population (2008). Considering the future water demand, expansion and improvement of the existing distribution system is needed.

<Sewage Supply>

2.11 As mentioned in the Book I, urban wastewater treatment system does not exist in all urban centers except for a part of Preah Sihanouk. The uncontrolled discharge of waster water has a negative impact on beaches, tourism development, and fishing industry. It should also be noted that lack of sufficient monitoring is another issue.

2.12 Currently the extent of Preah Sihanouk's existing wastewater collection system is on-going. It covers the commercial core and densely populated areas. The collection system is designed to serve a population of 89,000 at full capacity. However, the number of households currently connected to the system is unknown, as there is no flow measurement to indicate the amount of wastewater reaching to the treatment plant. Some of the existing system is the low connection of the wastewater sources to the system. This is partly due to the fact that there is no by-law exists which can enforce compulsory connection to sewage system..

<Solid Waste Management (SWM)>

2.13 The existing dumping site will be used up in the near future, and thereby, provincial government plans to construct a new sanitary landfill site to receive waster from the central town of Preah Sihanouk and Prey Nob district. As sanitary condition of the current dumping site is quite bad due to the improper treatment system, it is recommended to adopt the appropriate technologies and operation systems for the new dumping site.

2.14 The collection service of solid waste is another key issue for SWM in Preah Sihanouk. Although, currently a private company provides the collection service currently in a part of the central town of Preah Sihanouk, the service level is insufficient. The main reason for such poor service is the lack of administrative systems to control and monitor the solid waste collection service.

3: MASTER PLAN FOR PREAH SIHANOUK

<Development Goals>

3.01 Main features of Preah Sihanouk are that the province accommodates the only deep seaport of Cambodia, and is a core for the fast growing Coastal Area. At the same time, Preah Sihanouk is gifted with beautiful nature and attractive beaches. Considering these main features of Preah Sihanouk together with the Visions for the Integrated Development Strategy for Coastal area, which stipulates the development orientation of the M/P of Preah Sihanouk, the following five (5) major development goals of Preah Sihanouk Province have been proposed, as shown in Figure S3.01.



Source: JICA Study Team

Figure S3.01 Interrelations between Development Goals and Major Features

3.02 In order to achieve these goals, emphasis needs to be laid on balancing the development related to the seaport and conservation of the nature in the spatial framework. In order to achieve the balanced development, an additional arterial road for the containers is proposed to separate the heavy freight traffic from the other general traffic, which is currently mixed on NR4. This will support the industrial and logistic functions centering around the seaport and SEZs in the province.

3.03 The areas along the beaches will be considered as the site for international resort, and necessary conservation measures will be devised to maintain the good environment. In particular, emphasis will be on protecting the mangrove forests along the coastal line, whose most of the part lies within the National Park area.. As the conservation areas tend to be deteriorated from the wastewater discharged from development areas, appropriate control of wastewater discharge shall be carried out..

3.04 The zoning scheme is proposed as shown in Figure S3.02. The islands and Ream national park have higher importance. Also the watershed of Kbal Chhay river is designated for protection.

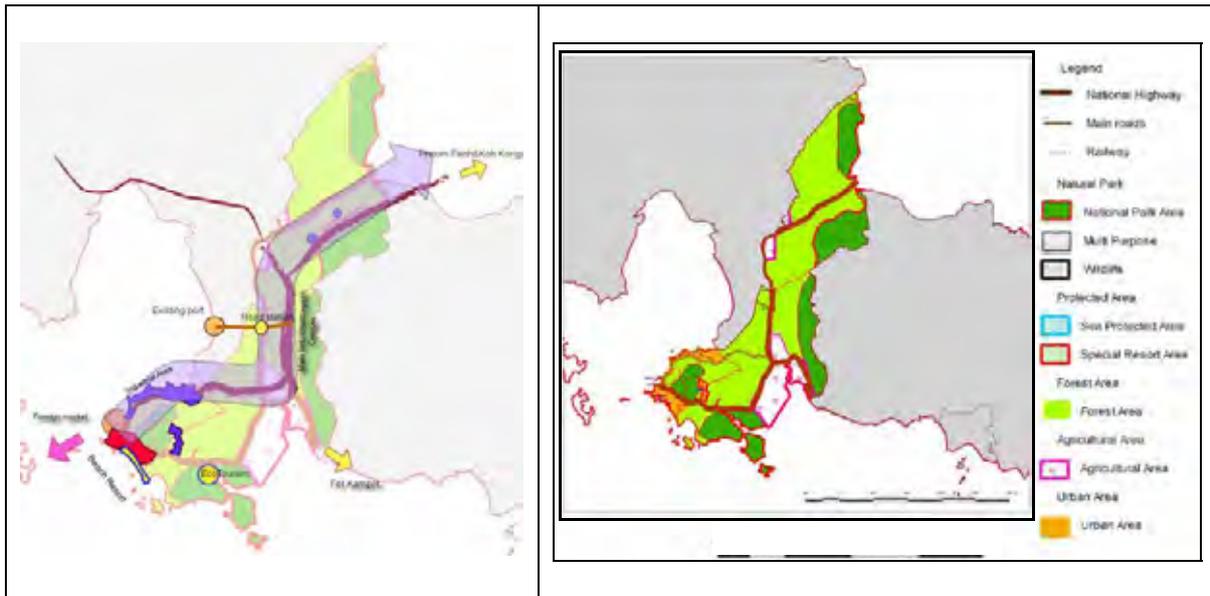
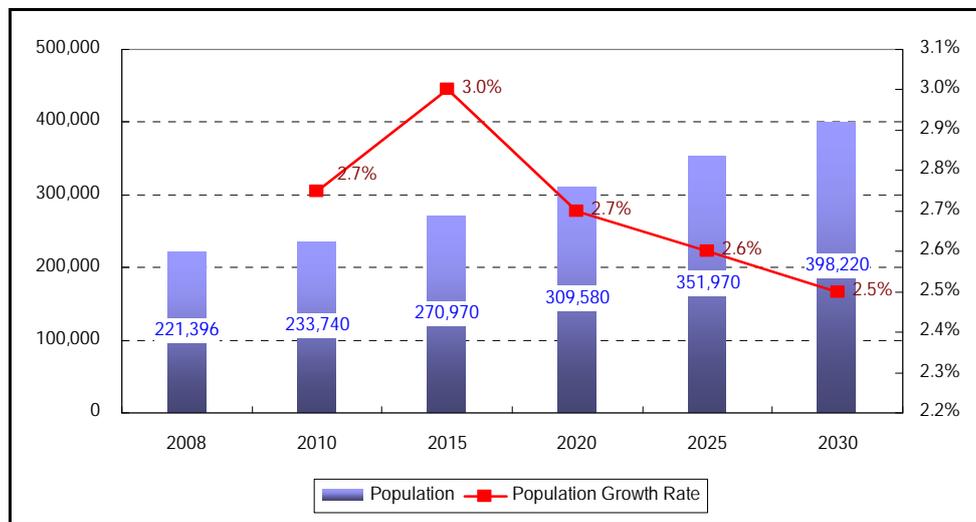


Figure S3.02 Spatial Development Scheme (Left) and General Zoning Scheme (Right)

<Population>

3.05 The population projection for Preah Sihanouk province was prepared as shown in Figure 3.2.1, based upon the current demographic analysis as well as in reference to the NIS 2004 population projection.



Note: *Final results for Census 2008.
 Source: JICA Study Team

Figure S3.03 Population Projection and Growth Rate for Preah Sihanouk Province

Table S3.01 Population Projection and Growth Rate for Preah Sihanouk Province

	2008*	2010	2015	2020	2025	2030
Population	221,396	233,740	270,970	309,580	351,970	398,220
Urban	89,846	100,510	127,360	170,270	204,140	238,930
Rural	131,550	133,230	143,610	139,310	147,830	159,290
Population Growth (%)	--	2.7%	3.0%	2.7%	2.6%	2.5%

Note: *Final results for Census 2008.

<Employment>

3.06 According to the Team's projection, the total labor force of Preah Sihanouk province will increase from 102,283 in 2008 to 142,870 in 2020 and to 195,670 in 2030. Labor force in Preah Sihanouk province is projected to grow at the rate of 3.0% from 2008 to 2030 (4.7% per annum in urban area, and 1.4% in rural area).

Table S3.02 Forecasted Number of Labor Force in Preah Sihanouk Province

	2008 (actual)			2020 (forecasted)			2030 (forecasted)		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Agriculture, hunting and forestry	867	40,959	41,826	650	35,610	36,260	570	36,370	36,940
Fishing	2,083	4,299	6,382	1,560	3,520	5,080	1,380	3,390	4,770
Manufacturing	6,867	2,264	9,131	18,060	6,150	24,210	32,060	11,170	43,230
Construction	4,016	1,521	5,537	9,950	3,890	13,840	16,650	6,660	23,310
Other Secondary Industry	349	197	546	850	500	1,350	1,400	860	2,260
Wholesale and retail trade, repair goods	9,243	5,697	14,940	13,950	8,880	22,830	18,100	11,790	29,890
Hotel and restaurants	2,956	496	3,452	4,460	770	5,230	6,920	1,030	7,950
Transport, storage and communication	5,497	2,251	7,748	11,140	3,510	14,650	17,270	4,660	21,930
Other Services	8,524	4,197	12,721	12,870	6,540	19,410	16,700	8,680	25,380
Total	40,402	61,881	102,283	73,490	69,380	142,870	111,060	84,610	195,670

Source: JICA Study Team

<Industrial Promotion Strategies in Preah Sihanouk>

3.07 As the Industrial Promotion Strategy for Coastal area, the Study Team (see the section 5.3 of Book I) proposed the development and promotion of following industries in Preah Sihanouk : i) Export Industries and SEZ, ii) Resource-based Industry; such as aquaculture and fish processing, and iii) Tourism. The promotion strategy for each targeted sector is summarized in the following subsequent sections and is illustrated in Figure S3.04.

3.08 Promotion of Export Industries and SEZ: the following strategies are proposed for the promotion and development of industrial sector:

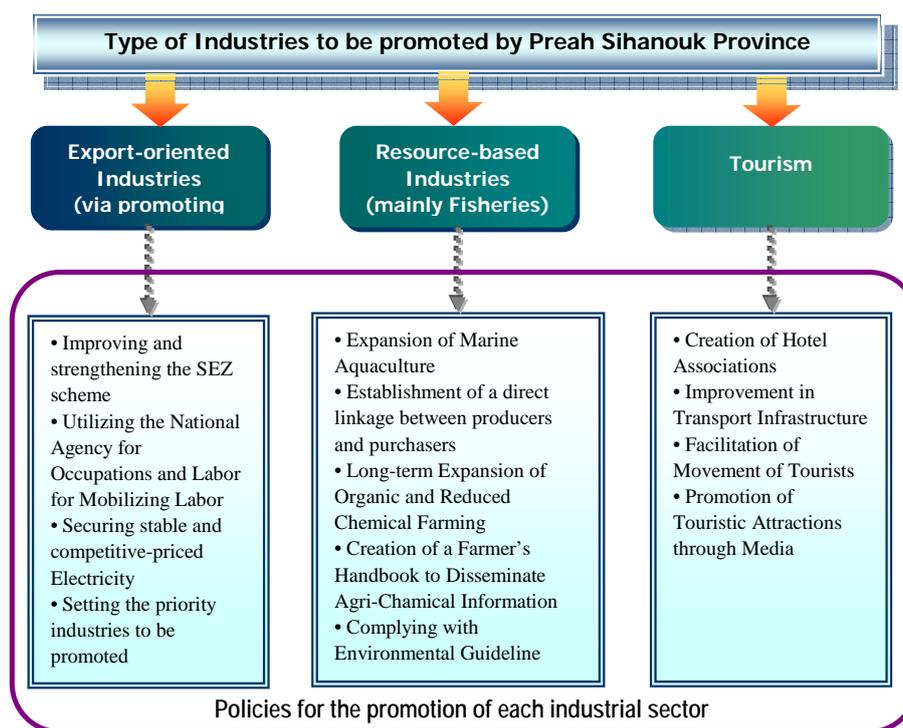
- Improving and Strengthening the SEZ scheme by means of;
 - i) Enactment of SEZ Law, ii) Enforcement of the Requirement and Duties of the SEZ Developers, iii) Strict License Withdrawal, iv) Clearer Definition of EPZ, v) Application of Concept of “Different Customs Territory”, vi) Adoption of “Free Zone” Concept, vii) Admittance of Non-QIPs to Locate in the SEZ, Area-wise SEZ, and viii) Enhanced Investment Promotion into the SEZs.
- Utilizing the National Agency for Occupations and Labor for Mobilizing Labor;
- Supplying Stable and Affordable Electricity; and
- Selecting Type of Export-oriented Industries to be Promoted

3.09 Promotion of Resource-based Industries: the following strategies are proposed for the promotion and development of Resource-based Industries:

- Expansion of Marine Aquaculture;
- Establishment of a Direct Linkage between Producers and Purchasers;
- Long-term Expansion of Organic and Reduction in Chemical Farming;
- Creation of a Farmer’s Handbook to Disseminate Agri-Chemical Information; and
- Complying with Environmental Guideline

3.10 Promotion of Tourism Sector: the following strategies are proposed for the promotion and development of tourism sector:

- Creation of Hotel Associations in Three Provincial Regions;
 - including i) Regional Advertising, ii) Training and Collective Action, and iii) Tour Packages.
- Improvement in Transport Infrastructure;
- Facilitation of Movement of Tourists; and
- Promotion of Touristic Attractions through Media



Source: JICA Study Team

Figure S3.04 Industry Promotion Strategy for Preah Sihanouk

<Target Area of Master Plan>

3.11 Based on the development goals, to produce the best effect of the role of City of Preah Sihanouk and to achieve the sustainable development compatible with environmental preservation, the spatial target of Master Plan (M/P) should be set with due regard to the prospective urban expansion area consisting of residential and commercial land use expansion and industrial land use expansion, and the main access network area for Preah Sihanouk, a city of the tip of cape.

3.12 Due to the location of the Preah Sihanouk, the junction of Route NR 3 and 4 is the main gate to Phnom Penh and other regions and access networks. Therefore, the junction of NR3 and 4 shall be included in the target area of M/P for Preah Sihanouk.

3.13 Considering the land use analysis results and its hilly geographic situation, Stueng Hav district will be an appropriate area for absorbing the future expansion of the industrial use area. Therefore, in terms of the industrial land use expansion, the target area of M/P should cover Stueng Hav district.

3.14 Based on the abovementioned analysis of urban expansion and the main access network, the target area of Master Plan covers the area from the junctions at NR3 and NR4 in the west to Stueng Hav district in the north, which is also been proposed as a future industrial area. The entire coverage area is shown in Figure S3.05. The current population of the target area is estimated at 179 thousand, and will reach 340 thousand in 2030, the target year of this M/P.

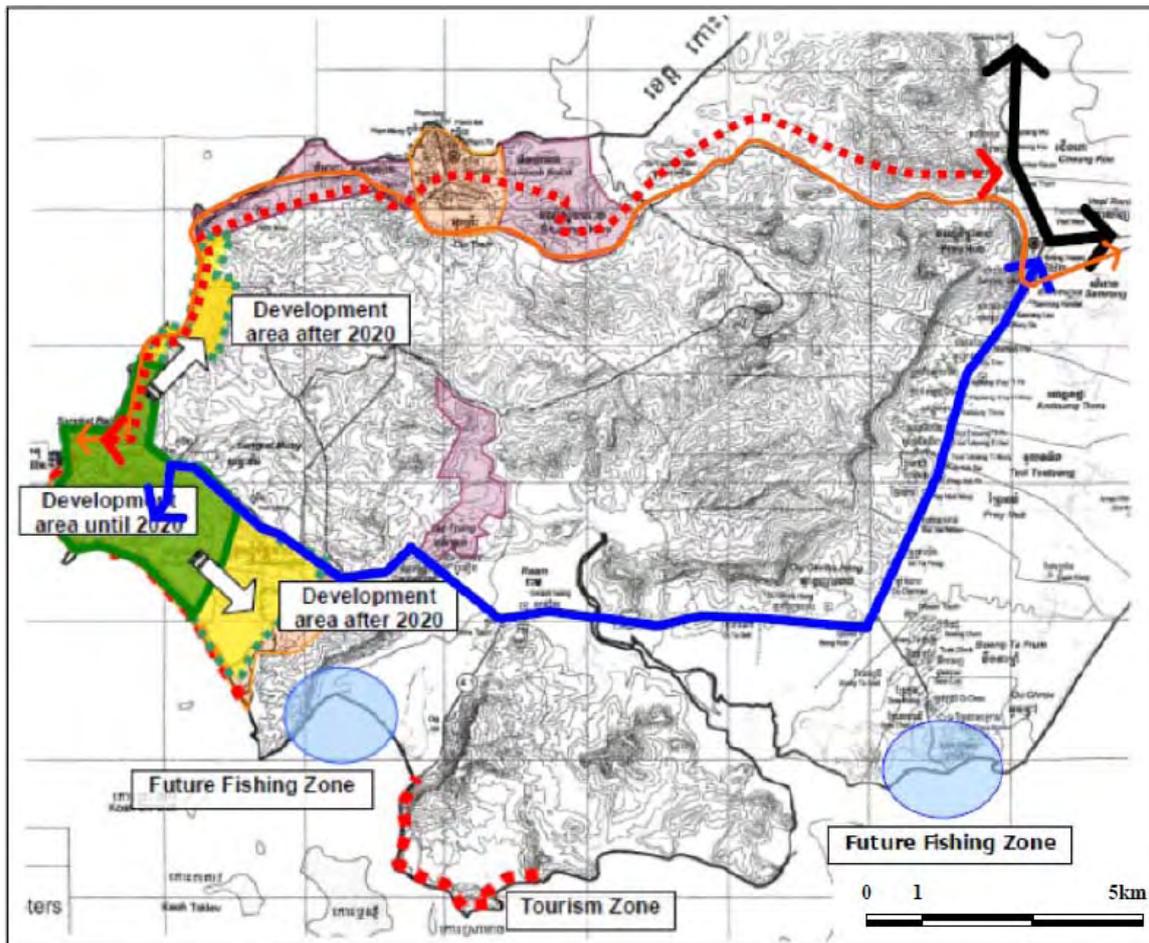
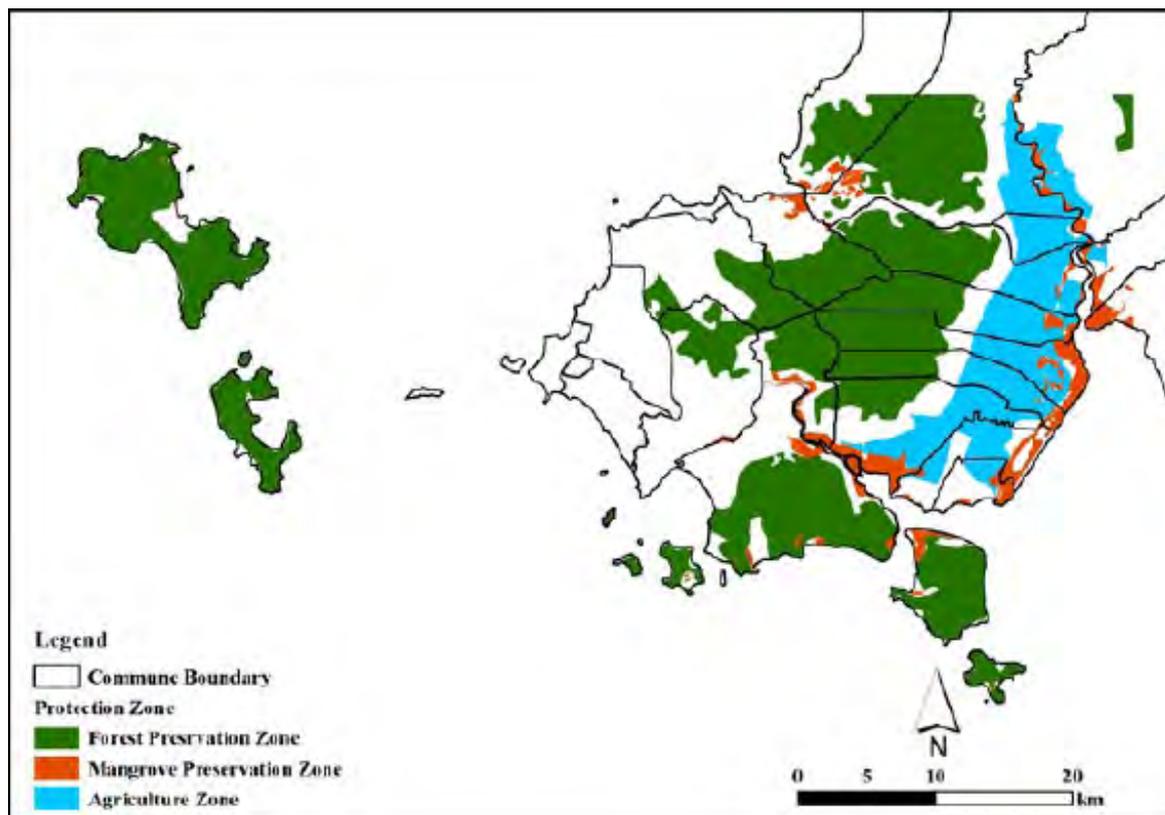


Figure S3.05 Target Area of M/P for Preah Sihanouk

<Land Use Zoning for Environmental Protection in Target Area>

3.15 Zones were determined with the combination of four categories and degrees of importance, and three most important zones for preserving the ecosystem; which are i) forest preservation zone for dense forest, ii) mangrove preservation zone for mangrove forest, and iii) agricultural zone for paddy fields. The result of zoning is shown in FigureS3.06.



Source: JICA Study Team

Figure S3.06 Zoning Map in and surrounding of Sihanouk City

3.16 Necessary measures in order to protect the important areas are presented below:

Ream national park and islands

These areas must be basically protected from development activities. Adequate scale of sustainable use such as ecotourism could be introduced. Although several investors have got QIP by the name of ecotourism, the ecotourism is almost mass tourism that destructs the forest, habitat of wildlife and natural landscape. Their plans must be reviewed by the process of EIA, and the destructions should be restricted. Present condition of islands and encompassing sea is still good, and population of local people is very small. Special treatment is not necessary, and it is only necessary to avoid large scale development.

Mangrove forest

Basic conservation policy is same as that of above zone. Furthermore this area is deemed to prevent Sihanouk city from natural disaster. As there are some inhabitants in this zone, environmental education and livelihood improvement with ecosystem services should be proceeded. Mangrove forest is still remained around the river mouth of Preaek Tuek Sab. This mangrove forest must be strictly protected.

Kbal Chhay protection forest and dense forest

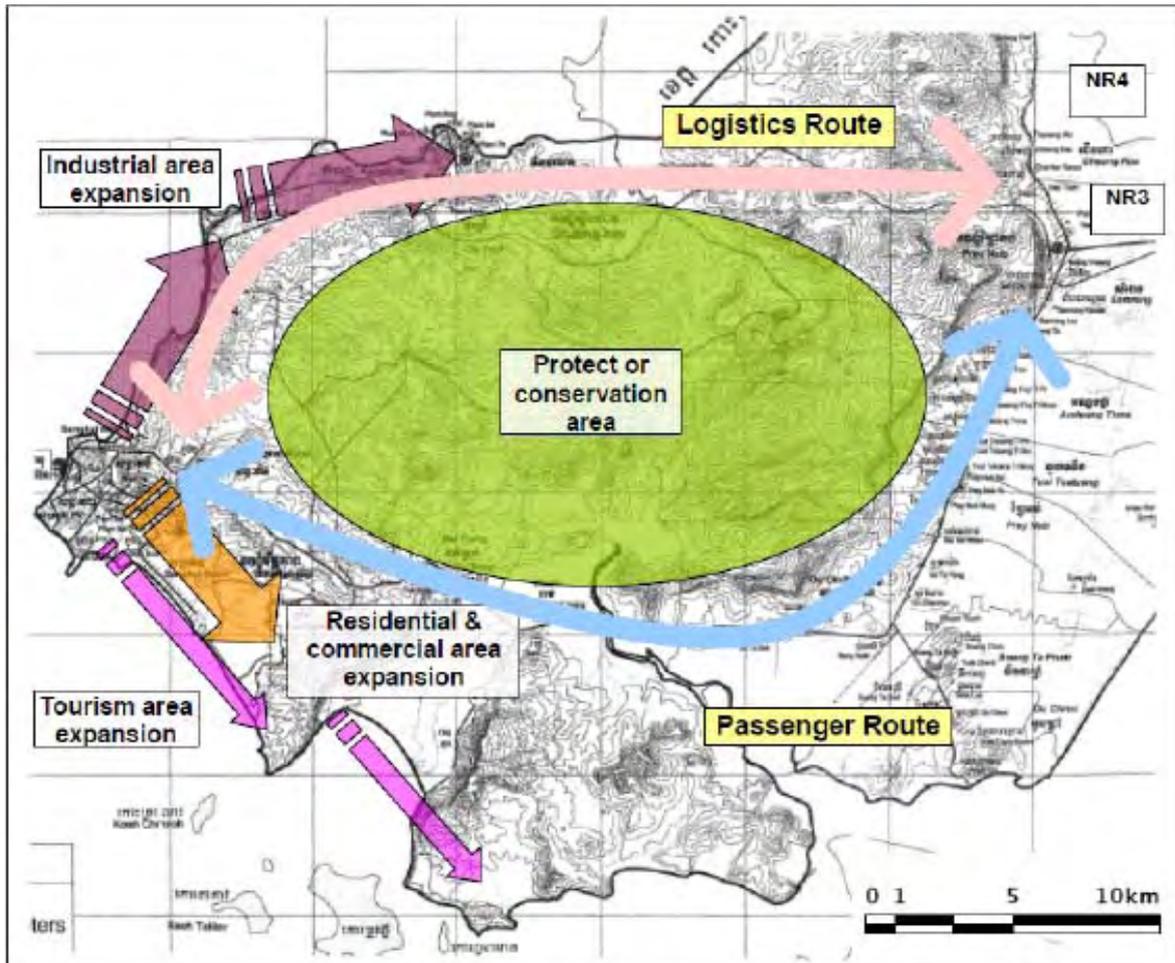
Compared with the expansion of industry and population, water resources are limited. This zone comprises a watershed and it is only one large scale water source for Sihanouk city. As it is close to the residential areas and small scale industries that use wood for energy, illegal logging is common. In order to protect the forest in the watershed, control by FoA, environmental education, and reforestation are necessary.

<Land Use Plan for Urban Area in Target Area>

3.17 In consideration of the analysis of the current status of the urban area in Preah Sihanouk City, the following issues were considered as the constraints for urban growth :

- Sparse urban structure: As the urban area of Sihanouk is sparse and scattered, it is extremely difficult to identify the centre of urban area.. There should be clear urban center, which should be strengthened in future to provide various urban and administrative services with commercial areas to the city residents.
- Sprawling of Urban Area: Sihanouk city is spreading rapidly along the urban fringes without any provision of infrastructure services and other facilities. This development pressure at fringe area may continue in future too. However, from urban management point of view, urbanized area should be compact to reduce investment on infrastructure such as on road, piped water supply and sewage network.
- Mixed traffic and inconvenient road network: The road network in Sihanouk is mainly dependent on NR4. Large volume of mixed traffic including heavy tracks/trailers for industries, buses and cars for residents and tourists vehicles uses this road. There are settlements along NR4, which always poses a danger of occurrence of any traffic accidents. Also, due to the incomplete network, the routes to the beaches need to take a detour from NR 4..
- Environmental Protection: In Sihanouk city, clean water supply is a crucial issue. From the perspective of urban landuse planning, it is very important to conserve the existing two water reservoirs. In addition, their catchments area should also need to be protected from any future development or any activity arising from the existing living conditions.
- Weak Control of Development: Development activities are not in stringent control. Urbanization promotion area and urbanized control area should be divided clearly to conserve environment. And also industrialize area should be separated from residential & commercial area and tourism development area.
- Informal settlements: There are a few informal settlements in Sihanouk scattered in and around the urban area. In particular, an informal settlement within the port area of PAS, where many people are engage in fishery for their livelihood, is causing a potential risk for port operation due to the mixing of large ocean-going vessels and small fishery boats. .

3.18 Basic Land Use Structure: Residential and commercial land use should be limited south of NR4 and expand to south-east direction. Industrial land use should be developed along “Logistics Route” toward north, not in south of NR4. This area should include residential land use that can accommodates labor force working in this area. The area surrounded by NR4 and northern route should be environmental protection area or water resource conservation area.



Source: JICA Study Team

Figure S3.07 Basic Land Use Vision

3.19 **Urbanization Control Area:** In principle, the urbanization control area is the area where the urbanization will not be allowed.

Table S3.03 Proposed Urbanization Control Areas

Name of Area	Description
Ream National Park	National Parks provide important habitats to wildlife, which includes threatened species, and need to be protected properly with scientific research and strict law enforcement. Ream National Park has well reserved river line mangrove forests, partially utilized for nature trips.
Kbal Chhay protection forest (Water catchment area)	This area consists of about 6,000 ha and is the catchments of Kbal Chay river that provides water supply to Sihanouk city. It is strictly protected from pollution and contamination as a reserve forest. FoA is doing patrol and reforestation to maintain the good condition of the area.
Water catchment area for water reservoir of Municipal Water Authority	This water reservoir is under the operation of Municipal Water Authority, which is located in the north end of the Independence beach. The catchments area of this reservoir should be protected from any development activities to tap the good quality of water.
Conservation Area for Mangrove Forest Fostering	The forest in the watershed of Preaek Tuek Sab river should be protected and reforested for the fostering of mangrove forest. On-going development projects should be regulated to avoid any harm or damage caused by waster water to the mangrove forest
Open Space	Open space are to be conserved in order to protect and keep the balance of urban development with the environment and also to preserve the landscape for recreational purposes.

3.20 **Urbanization Promotion Area:** Urbanization Promotion Area should be developed in a well-planned manner and should be limited to protect natural environment for the future generation. Detailed land use plan is described in the later part.

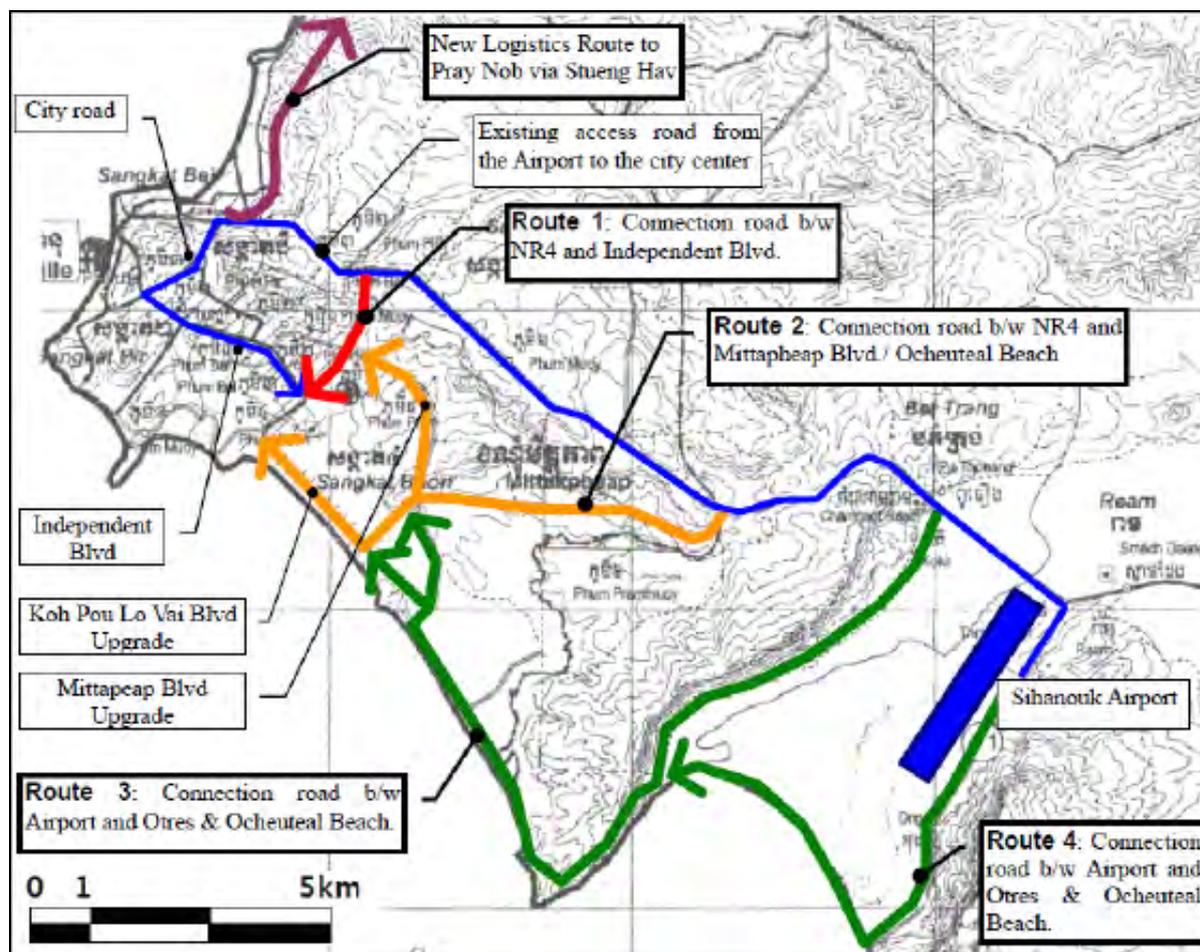
Table S3.04 Proposed Urbanization Promotion Areas

Name of Area	Description
Tourism Zone	Tourism zone includes islands in Praeh Sihanouk Province. The Zone is to be secured for tourism development purpose such as hotels, restaurants, tourist services, and so forth. And beaches in this zone should be open for the public
Commercial and Residential Zone	This area will accommodate commercial activity and increasing urban population in Sihanouk. Detailed Land Use Zoning will be defined along with time frame and population forecast in Sihanouk City.
Industrial Zone	This Industrial Zone accommodates the industrial investment in this region.
Future Fishing Zone	New location for fishery settlement has to be secured for safe and convenient operation near the main fishing site off the coast of Ream. Though fishing port development is normally undertaken by the private sector in Cambodia, public sector intervention for new fishing port development in the future fishing zone may be considered

3.21 The existing road access to the city center of Sihanouk is heavily dependent on NR4, City road and Independent blvd, and involves a substantial detour. To improve the access between the city center and Sihanoukville Airport, the Study Team proposes three alternative routes to the city center. The first, Route 1 with wide width road will connect NR4 with the corner of Independent Blvd. and the main street of the city center. The second alternative route, Route 2 will connect a saddle portion of NR4 and the junction of Mittapheap Blvd and Otres Road. Third alternative route, Route 3 will connect the Airport to Ocheuteal Beach via seashore. These options as shown in Figure S3.08 will be studied further in the next step.

3.22 The residential area is expected to expand to southeast area of Preah Sihanouk in proportion to the increase of the population. However, the road network of this area has not been provided yet. In addition to the industrial and logistic route development in industrial area in north, it is required to

develop passenger route for residential and tourism purposes in south for the establishment of safety traffic system.



Source: JICA Study Team

Figure S3.08 Access Road from Sihanouk Airport

<Designated Urban Area in the Target Area of M/P for Preah Sihanouk>

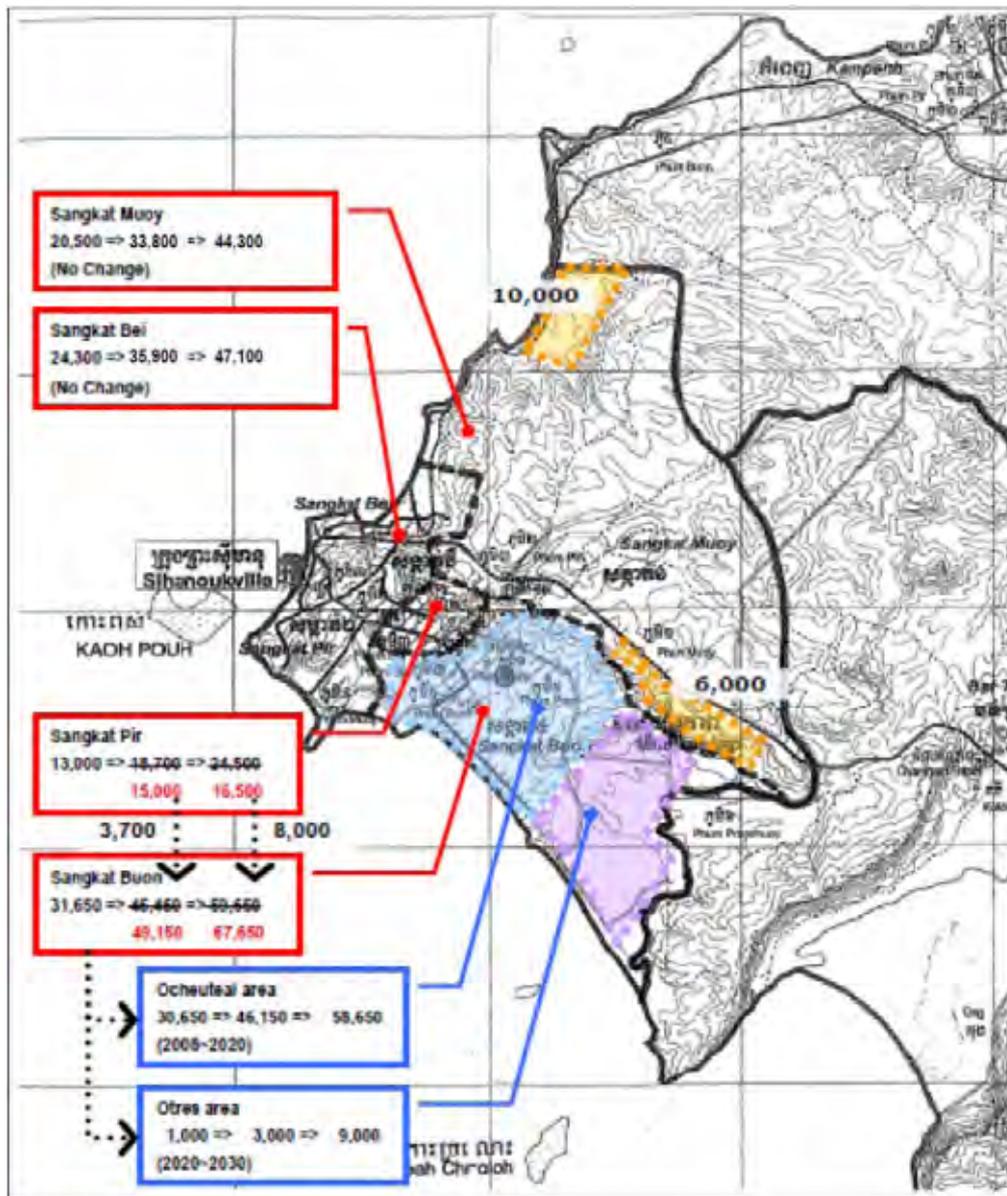
3.23 Finally, the designated urban area where the detailed land use plan is prepared was selected. As, MLMUPC has already prepared the draft land use plan of the Stueng Hav district, the future urbanization area, the existing urban center of Preah Sihanouk city, which covers four (4) communes; i.e. *Sangkat Muoy*, *Sangkat Pir*, *Sangkat Bei*, and *Sangkat Buon*, was selected as the designated urban area, and the detailed land use plan was drawn as following Figure S3.10.

3.24 As various development projects including the Sihanoukville Port SEZ have been or proposed to be implemented, the future population growth of the area is assumed to be higher than that of the provincial level. On the other hand, the current land use condition must be considered for estimating each the commune leveled population projection. Finally, based upon the proposed development projects and the land use analysis, the population projection of each commune was prepared, as shown in Table S3.05.

Table S3.05 Population Projection and Annual Growth Rate for each Commune in the Urban Area

	2008*	2010		2020		2030	
		No.	G/R(%)	No.	G/R(%)	No.	G/R(%)
Sangkat Muoy	20,492	21,700	2.9	33,800	4.5	44,300	2.7
Sangkat Pir	13,041	13,800	2.9	15,000	0.8	16,500	1.0
Sangkat Bei	24,276	25,750	3.0	35,900	3.4	47,100	2.8
Sangkat Buon	31,638	33,550	3.0	49,150	3.9	67,650	3.2
Urban Area	89,447	94,800	3.0	133,850	3.5	175,550	2.7

Note: *Final results for Census 2008.
 Source: JICA Study Team



Source: JICA Study Team

Figure S3.09 Shift of the Population among the Four Communes

3.25 The proposed land use master plan is shown below. This Plan has not discussed in detail with DLMUPCC in Preah Sihanouk Province. And some land use is not included in this table, which are administration, public facility, religious, security, and so forth.

Table S3.06 Proposed Zoning Categories

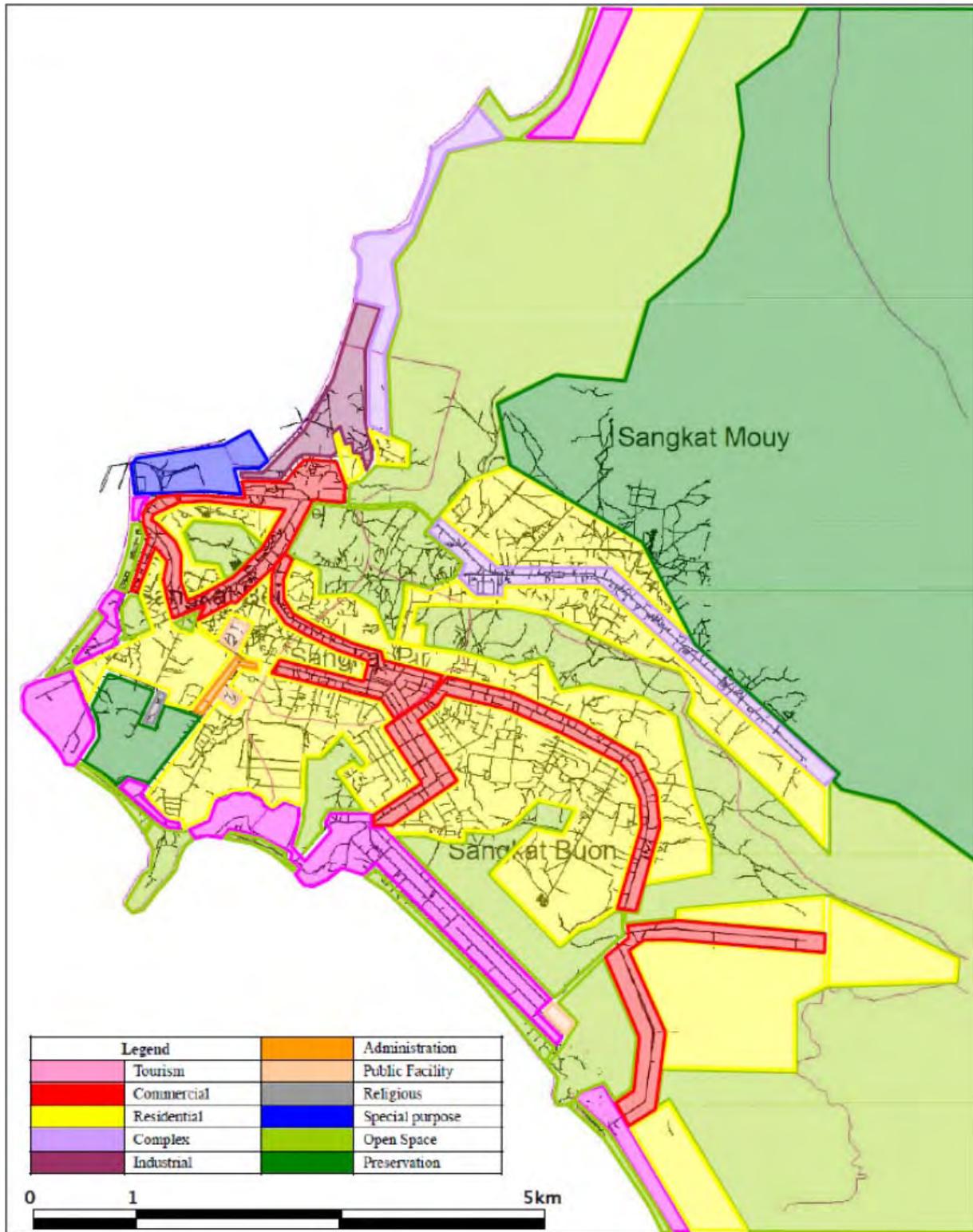
Land Use Zoning	Description
Tourism Area	This area should be concentrated for promotion of tourism and resort development.
Commercial Mixed Area	This area support city commercial activities (shops, offices, and so on) and middle to low range of tourist accommodation such as guest house and serviced apartment . This area located along major road with higher population density which is about 120 people/ha.
Residential Area	Basically, Residential Area should be kept in quiet and safe environment. However Preah Sihanouk City should be developed as a tourism and resort city of Cambodia. So that Residential Area in the city could include some commercial activities such as restaurant & café, small shops for tourist.
Complex Area	Complex Area is mainly located along NR4 and north of Sihanoukville Port. These areas are already developed mixed with industry land use.
Industrial Area	Industrial Area is mainly defined for SEZ areas. Greening and environment protection guideline for industrial will be discussed in later stage.
Open Space	Open Area is defined for conservation of existing woodland and promotion of recreational activities for tourism development such as golf course or outdoor activities. In this area, spatial and lush greenery detached house can be allowed to build.
Preservation Area	Preservation Area is defined for the purpose of protection for the water catchments area of the water reservoirs in the city. Existing land use activities are allowed to continue to use, but new development activity or any change of land use is prohibited to keep the environment of the catchments.

Source: JICA Study Team prepared based on the Japanese regulations and guidelines such as;
 "Guideline for Visual Evaluation by Quantity of Green for Industrial Location",
 "Evaluation Guideline for Activity in National Parks",
 "Standard of Green Space Ratio for Promotion Area for Industrial Location",
 "Standard for District of Green Space Ratio"

Table S3.07 Proposed land Use Area Rules

Index		Hotel	Resort Mansion & Apartment	Guest House	Mansion & Apartment	Retouched Residence	Commercial	Small Shop (ex. Mini Mart)	Other Service Business	Restaurant	Bar & karaoke	Business Office	Car & Bike Maintenance	Small Scale Industry	Light Industry	Heavy Industry	Recreational facility	
		Tourism Area	○	○	○				○		○	○						
Commercial Mixed Area				○	○		○			○	○	○	○					
Residential Area					○	○		○										
Complexed Area				○	○			○				○	○	○				
Industrial Area								○	○	○		○			○	△		
Open Space						○				○								○
Preservation Area																		○

*△: with condition.



Source: JICA Study Team

Figure S3.10 Proposed Zoning Scheme for Preah Sihanouk City

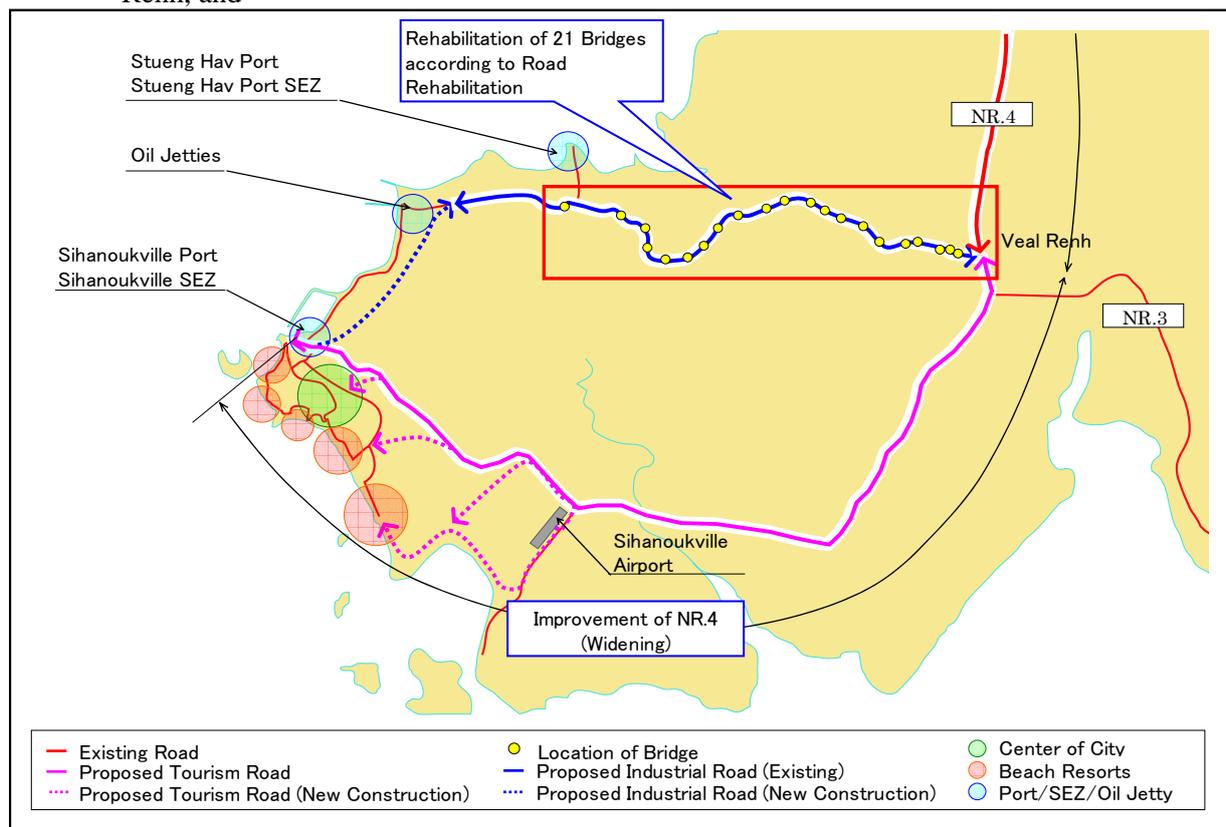
<Road>

3.26 The NR4 is the only available access route to Preah Sihanouk for the use of habitants and tourists. The present road network condition is also poor. For the establishment of an efficient road network in Preah Sihanouk that can meet the current and growing demand in future, the following aspects need to be considered:

- Population growth of Preah Sihanouk,
- Growth of industry and tourism in Preah Sihanouk,
- Situation of traffic congestion, and
- Increase in the number of traffic accidents.

3.27 Considering above, the following development plan for the establishment of efficient road network is proposed:.

- Provision of the access road from NR4/Sihanoukville Airport to beach resorts/the center of the city,
- Development of industrial road from Sihanoukville Port via Stueng Hav to Veal Renh,
- Rehabilitation of 21 bridges located along with the existing road from Stueng Hav to Veal Renh, and



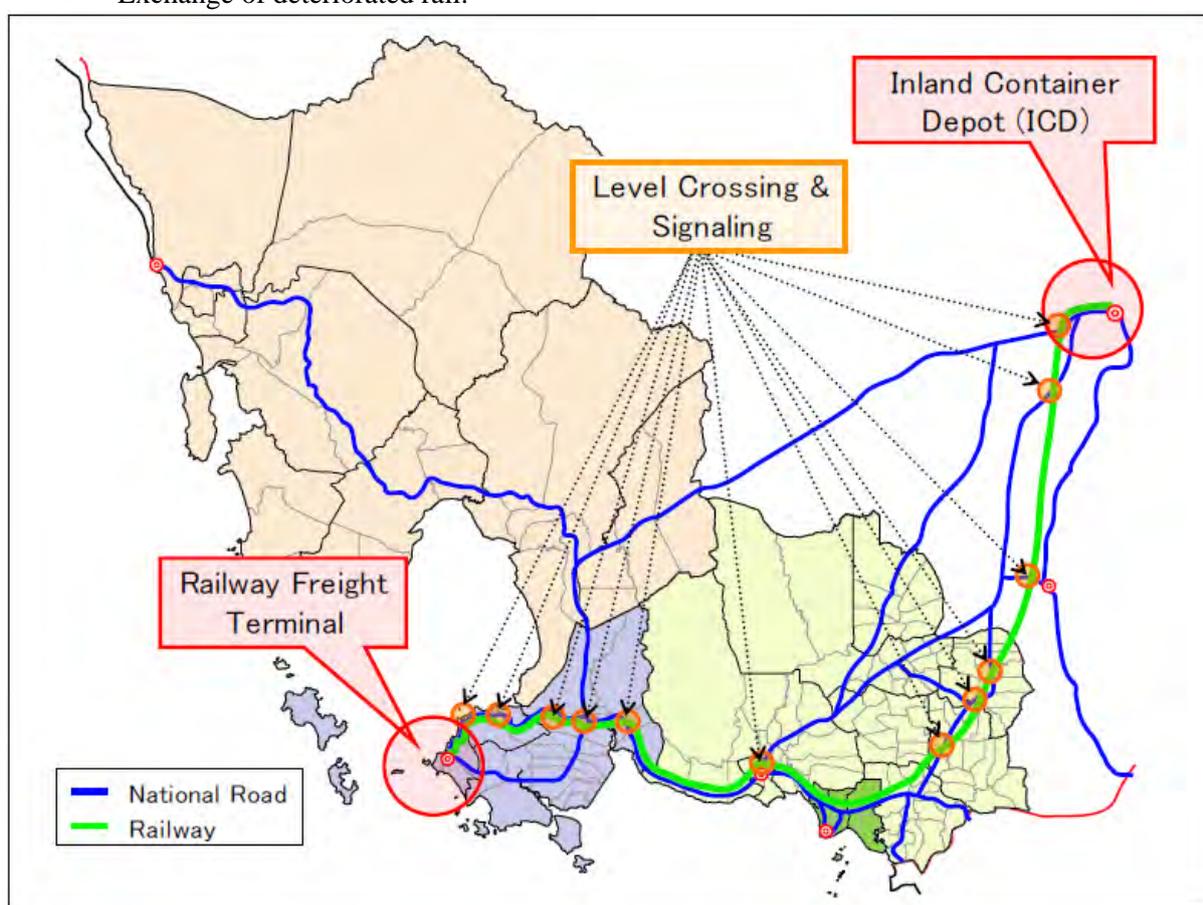
Source: JICA Study Team

Figure S3.11 Proposed Development Plan of Road Network

<Railway>

3.31 The development plan of the railway freight terminal has not yet been prepared. However, the track work, which covers the length of 500m, will be implemented under the rehabilitation railway project funded by ADB. It is to be noted that the important facilities like signaling system and a crossing to establish safe and reliable railway system are not included in the rehabilitation project of railway. Considering that Toll Company is the concessionaire to operate the railway system, it is considered that it will operate the railway freight terminal. Based on above, the proposed development plan for the railway facilities in Preah Sihanouk is as follows.

- Development of the railway freight terminal based on the mutual understanding between PAS and Toll company,
- Provision of signaling system and crossing, and
- Exchange of deteriorated rail.
- Exchange of deteriorated rail.



Source: JICA Study Team

* The development of the ICD already has planned and will be implemented by ADB.

Figure S3.12 Proposed Development Plan related to Railway

<Water Supply >

3.29 Condition: Water demands based on the existing and future conditions have been estimated and are as shown in Table S3.08.

Table S3.08 Water demands for existing and future conditions

	Existing Conditions		Future Conditions		Future Conditions	
	2008		2020		2030	
Population	23,450		57,200		117,016	
Domestic Demand	122	lpcd	140	lpcd	150	lpcd
	2,858	m ³ /day	8,008	m ³ /day	17,552	m ³ /day
Tourism/commercial demand	Future Demand Factor : 0.25					
	-		2,002	m ³ /day	4,388	m ³ /day
Large consumers	1,263	m ³ /day	3,450	m ³ /day	4,600	m ³ /day
Leakage	16%		20%		20%	
	643	m ³ /day	2,692	m ³ /day	5,308	m ³ /day
	198	m ³ /hour	673	m ³ /hour	1,327	m ³ /hour
Maximum Day Demand	Peaking Factor: 1.25					
	5,954	m ³ /day	20,190	m ³ /day	39,811	m ³ /day
Total Annual Demand	1.74	million m ³	5.90	million m ³	11.62	million m ³

3.30 Conclusion and Recommendation: Preah Sihanouk has enough treatment capacity to meet the maximum day demand until the year 2016. To meet the demand beyond 2016, additional treatment capacity can be added at Kbal Chhay. The demand forecast indicates an annual water resources requirement of 12 MCM by the year 2030. This is about half of the estimated safe dry season yield of Kbal Chhay and therefore it can be concluded that there are sufficient number of water resources available to meet the current and future demand.

3.31 The City currently has a lack of water storage facilities, which will lead to shortages especially during the peak demand periods. The current deficit is about 8,000m³ and it has been estimated that the total of about 20,000 m³ will be required by 2020. To meet these shortages, it is recommended to construct additional water storage facilities as soon as possible. It is suggested that depending on site availability and funding constraints, the City should construct one 10,000 m³ reservoir now and another 10,000 m³ reservoir in future.

3.32 The City's water distribution system includes approximately 9,500 meters of ductile iron (DI) pipe. This pipes were installed long way back in 1958 at the time of establishment of water system in city. Currently, most of these pipes are not in good conditions and showing signs of deterioration. In addition, most of these trunk pipes due to small diameter sizes are not suitable to manage the current and future demand flow. Thus, it is recommended to replace these pipes especially trunk mains with larger diameter pipes.

< Sewerage >

3.33 Condition: The existing wastewater disposal system is designed to serve a population of 89,000 at full capacity. However, the number of households currently connected to the system is unknown, as there is no flow measurement to indicate the amount of wastewater reaching to treatment plant. The Study estimated that in the sewer network area, the population of about 8200 (2008) only are serviced by the current sewerage system.

Table S3.09 Existing Service Area and Design Flows

Area	Design Population	Average Daily Wastewater Flow m ³ /day
Initial service area	59,891	13,482
Expanded Service Area	29,127	6,861
Total	89,018	20,343

Note: Design flows for the initial service area include 1600 m³/day from Cambrew.

3.34 Based on the natural topography, the City areas generating wastewater are sub-divided into various drainage catchments area. This will assist in effective utilization of natural slope and minimize pumping. The analyzed drainage catchments area and the existing sewer serviced area are shown in Figure S3.13

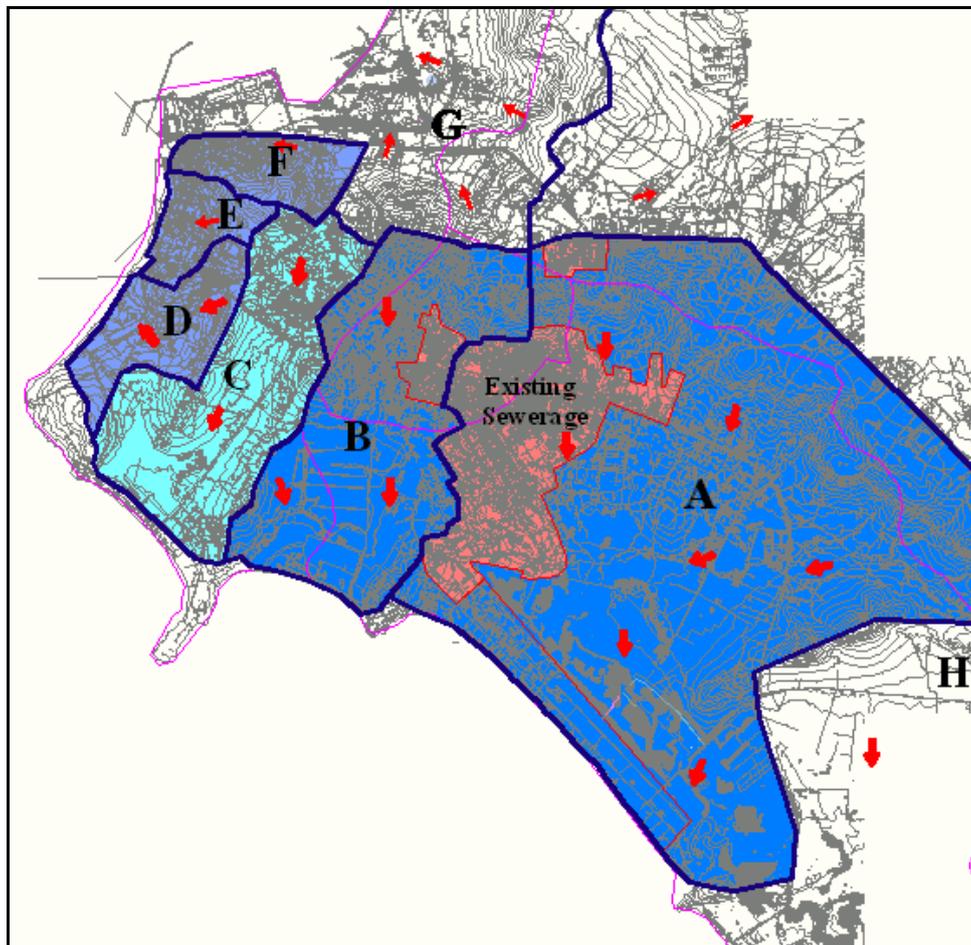


Figure S3.13 Drainage Catchments

3.35 The estimated average daily wastewater flow in each catchment area (A to H) are shown in Table S3.10.

Table S3.10 Average Daily Wastewater Flow

Drainage Catchments	2008 m ³ /day	2020 m ³ /day	2030 m ³ /day
A	1,777	5,974	10,234
B	731	1,904	2,739
C	325	1,516	2,674
D	92	598	1,250
E	108	423	592
F	101	394	551
G	-	386	541
H	73	924	2,218
Total	3,207	12,119	20,798

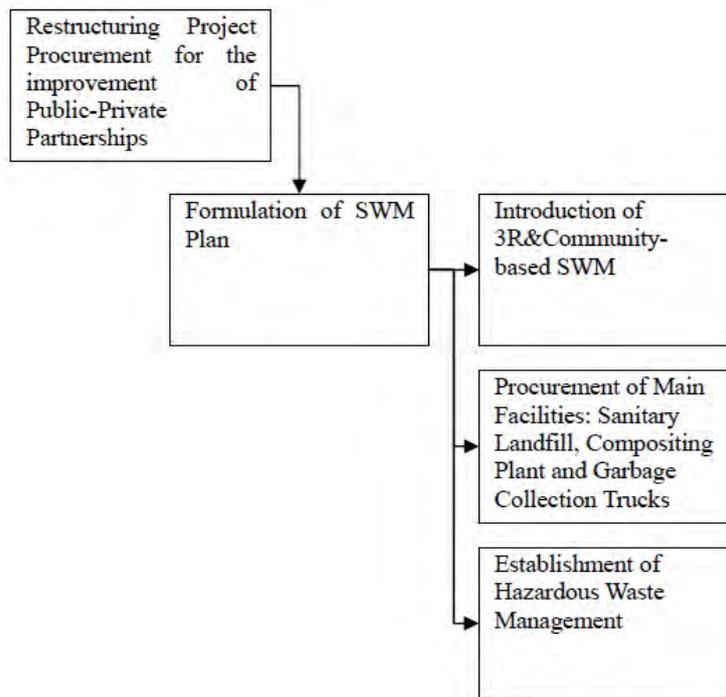
Source: JICA Study Team

3.36 **Conclusion and Recommendation:** Additional treatment capacity would be required before 2020 if the services are to be extended to growth areas in catchments A and B as originally planned. The capacity of the treatment plant can easily be doubled to approximately 13,800 m³/day. This additional capacity will be able to meet the growing demand until year 2027 or so.

3.37 The hilly topography makes it impossible to direct the sewage from the catchments area by means of gravity to one centralized treatment plant. Considering this and to minimize the pumping and other involved cost, a decentralized approach is recommended for other catchments area. With this approach each drainage catchments area will have it's own collection system and treatment plant. However, considering the cost-efficiency and other issues, the two drainage catchments areas may be combined and can be served by one (1) treatment plant. A decentralized approach will also allow a more gradual implementation of sewerage system on a priority area basis. Different alternatives will be evaluated at the next stage of the Study.

<Solid Waste Management >

3.38 In order to establish and efficiently utilize the existing infrastructures for Solid Waste Management (SWM) in Preah Sihanouk, the following framework and components are proposed as shown in Figure S3.14. It is proposed to first formulate the Solid Waste Management (SWM) Plan, which is to be followed by an introduction of 3R concept, Community-based SWM, procurement of main facilities and establishment of hazardous waste management.



Source: JICA Study Team

Figure S3.14 Framework and Components of Infrastructural Development Plan in Sihanouk

4: DEVELOPMENT STRATEGY FOR KAMPOT

<Population>

4.01 The target area for the Development Strategy for Kampot City covers five (5) communes, which are categorized as urban area. Based upon the provincial population growth prospects and migration factors from surrounding rural communes, population projection for the urban area was prepared, as shown in Table S4.01.

Table S4.01 Population Projection and Annual Growth Rate for each Commune in the Urban Area

	2008*	2010		2020		2030	
		No.	G/R (%)	No.	G/R (%)	No.	G/R (%)
Kampong Kandal	8,285	8,550	1.6%	10,500	2.1%	12,550	1.8%
Kampong Ampil	4,632	4,800	1.8%	5,950	2.2%	7,100	1.8%
Kampong Bay	6,376	6,600	1.7%	8,100	2.1%	9,650	1.8%
Andoung Khmaer	10,923	11,250	1.5%	13,800	2.1%	16,550	1.8%
Traeuy Kaoh	6,151	6,350	1.6%	7,850	2.1%	9,400	1.8%
Study Area	36,367	37,550	1.6%	46,200	2.1%	55,250	1.8%

Note: *Final results for Census 2008.

Source: JICA Study Team

<Urban Planning and Land Use>

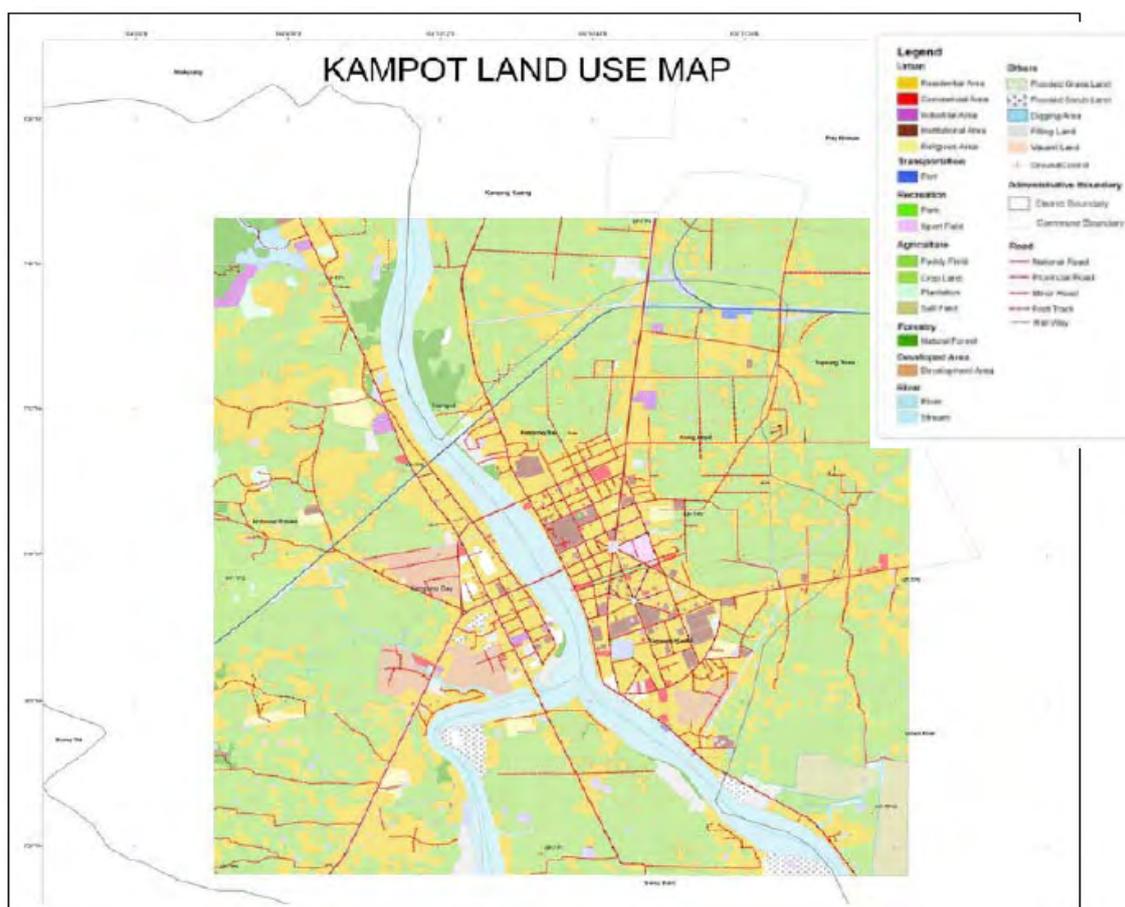
4.02 Existing Land Use: The existing land use map shown as Figure S4.01 was developed using GIS along with combination of a series of information such as the aerial photo interpretations and ground surveys for confirmation. Relevant geographical information such as the road network, administrative boundaries has also been laid out.

4.03 Land Use Area by Commune: Kampong Kandal, Krang Ampil and Kampong Bay Communes covers the existing urbanized area located on the eastern bank of the Kampot river. Andoung Khmaer Commune is located on the western bank of the river.

4.04 Urban Land Use Expansion: The expansion of the urban land use in the central part of Kampot Province was estimated based on the commune base population forecast and planned population density.

4.05 The existing residential land use including commercial area in urban communes are about 97 ha in Kampong Kandal, 87 ha in Krang Ampil, 71 ha in Kampong Bay and 282 ha in Andoung Khmaer Commune.

4.06 The calculated expansion areas are 53 ha in Kampong Kandal, 30 ha in Krang Ampil, 30 ha in Kampong Bay and 68 ha in Andoung Khmaer Commune. From the result of rough estimate, all of the four communes have not enough habitable land area.



Source: JICA Study Team

Figure S4.01 Kampot Land Use Map

4.07 Issues to be concerned on urban land use is as shown below:

Table S4.02 Issues to be concerned on urban land use

Issue	Considerations
Weak road network	Old city area located on the eastern bank of the Kampot river is expanding on the outskirts, and beyond the river to the western bank of the river. However, only two existing bridges connect them. One is newly constructed but the other is quite old and cannot be used by heavy vehicles. Thus, strengthening the road network is an important issue in the urban planning of Kampot city. Another issue is of a large volume of mixed traffic through the city center of Kampot, which consist traffic (from/to) from Phnom Penh, Preah Sihanouk, Kep and Kampong Trach. New route of NR3 is passing next to the city market and traffic (to/fro) from NR33 also mixes with the city centre traffic. Detour route is necessary to improve the traffic safety in the city.
Conservation of historical building	Historical architecture of the colonial era characterizes the townscape of the city. Conservation and utilization of the historical buildings is essential for tourism development in the city.
Not enough vacant land in city center	In the existing city center, the habitable land area is not enough to accommodate the increasing population in Kampot city. Thus, urban area expansion and population density in the city center should be carefully considered in the land use planning.
Prevent flooding	Flooding at the city center is a regular event. DLMUPCC is considering that the Ring Road should be designed as a dyke for flooding. However, it is not simple to control flooding. It is thus necessary to conduct a continuous survey and study for flooding system in the city and then accordingly, design an appropriate protection system.

<Land Use Concept>

4.08 The target year of the existing Development Master Plan of the province is 2015. However, due to the slow urbanization growth and development rate, a large portion of proposed urbanization area is still not yet been developed and waiting for urbanization. Based on the Study Team’s analysis on population projection, proposed urbanization area can accommodate the population increase until 2030.

4.09 The Team recommends the concept of “Compact City” for Kampot City, which will facilitate in investment and tourism development. Concentrated development and investment in infrastructure such as water supply; sewerage etc. will improve the city attractiveness and promote tourism in the city centre.

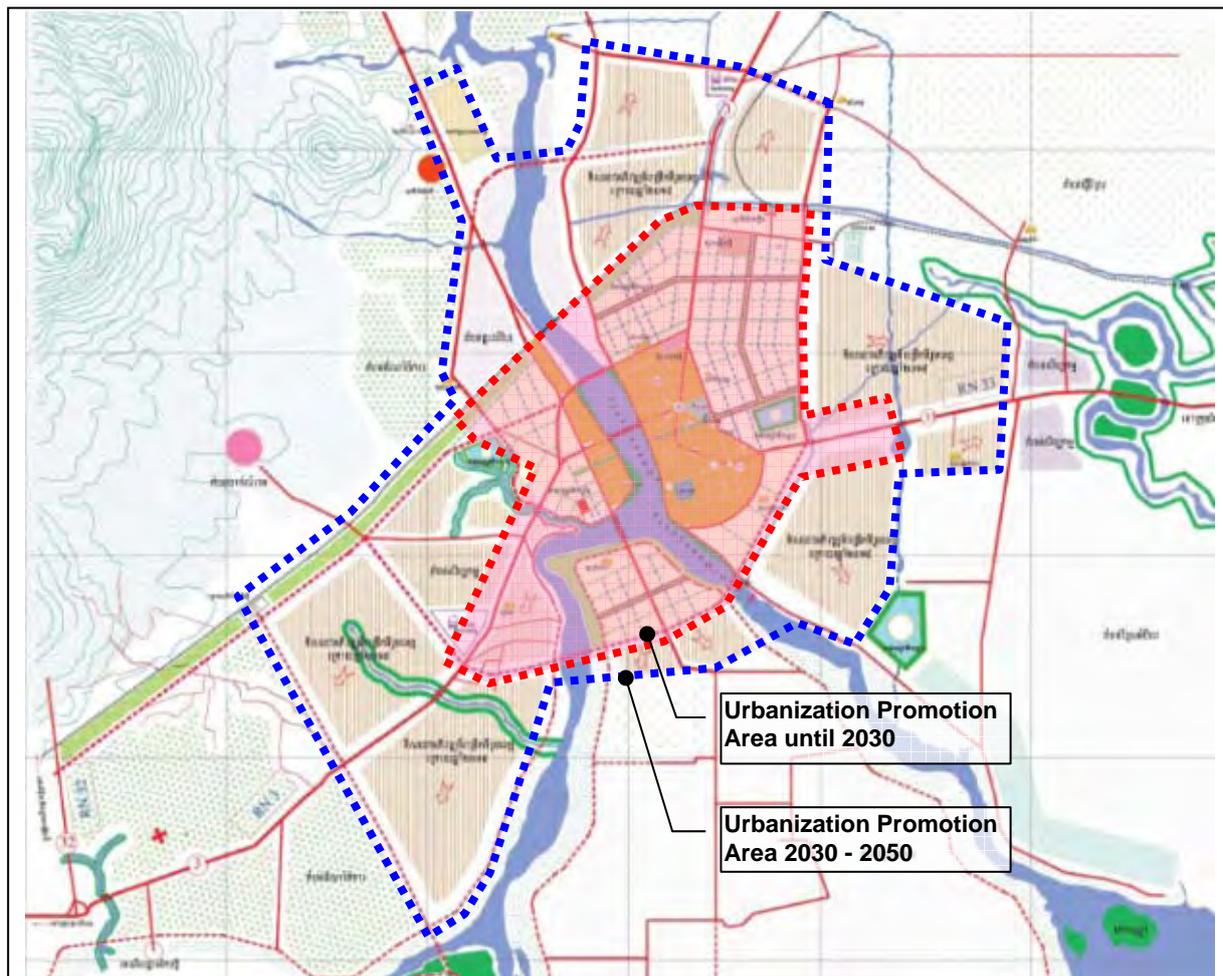


Figure S4.02 Urbanization Promotion Area

<Road>

4.10 New Outer Ring Road: To avoid mix traffic in the city center and traffic accidents along the existing NR3 and NR33, new detour route called “New Outer Ring Road” should be planned and constructed in the future.

4.11 Approval of Planned Road Network: For securing the land for Planned Road Network, the alignment and width of the Planned Road Network should be approved by provincial and central government. The Planned Road Network contains “arterial road” and “collector road”. Arterial roads formulate urban structure and major road network of the city. Collector roads tend to lead traffic from local roads or sections of neighborhoods or activity areas within communities to arterial roads.

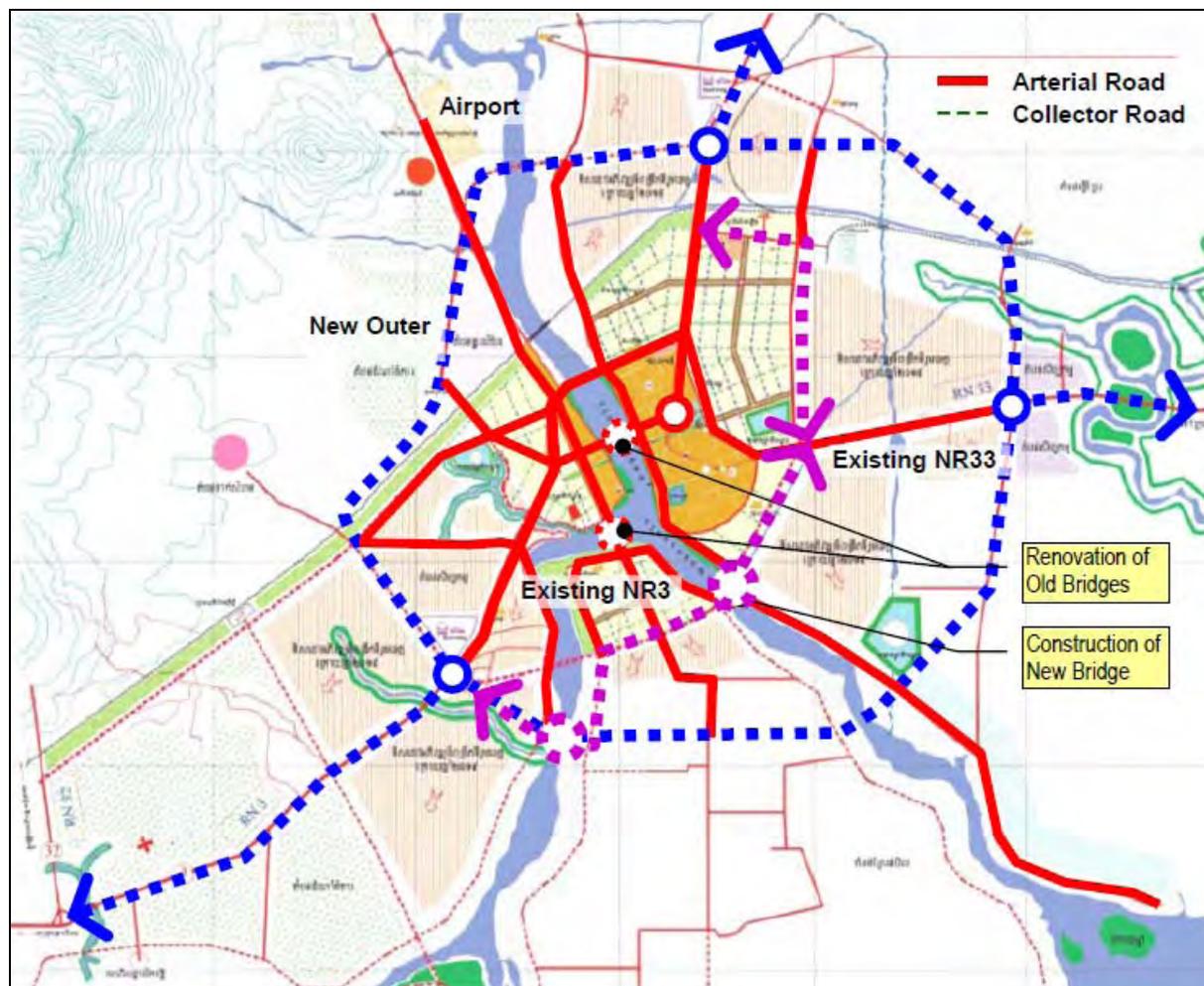


Figure S4.03 Proposed New Outer Ring Road

4.12 In Kampot province, a few road rehabilitation projects have been implemented and planned. However, the progress of these rehabilitation projects has been slow. Projects are delayed and running behind schedule. The rehabilitation of a part of NR3, NR31 and NR33 has been delayed, as a result the road surface has deteriorated. However, they have commenced in this year and planned for completion in 2011.

4.13 Despite the frequent movement of heavy vehicles, currently the access road to Kampot port is unpaved. The road is very narrow and truck parking is too less. In addition, the road network from Kampot port to national road is also not been developed. Sugar is the main commodity dealt in Kampot port. Heavy vehicles frequently visit Kampot port in order to transfer sugar and other foods

items to the border of Vietnam. Considering the present road condition around Kampot port, the improvement of the access road is needed.

<Railway>

4.14 Though a signaling system and a crossing are indispensable facilities for a safe railway system, the provision of these facilities has not yet been planned in any development project. In addition, the existing rail has been deteriorated and cracked. Even after the completion of the rehabilitation project, the issues of provision of the safety facilities (signal system and crossing) and deteriorating rail conditions will remain. It is needed that the procurement of signaling system and new rail should be discussed and implemented.

<Water Supply >

4.15 Kampot's current water supply will meet the maximum day demand until the year 2015. Kampot will need an additional 8,000 m³/day to meet the maximum day demand in the year 2030. It is recommended that 5,000 m³/day of additional treatment capacity be provided by 2015. This will be able to meet the maximum day demand until the year 2020 and will provide some reserve capacity beyond 2020.

4.16 The demand forecast indicates an annual water resources requirement of about 4 MCM by the year 2030. This study assumes that the river can supply this amount with sufficient reliability. However, a hydropower development in the upstream catchments may affect the available amounts especially in the dry season. It is recommended that prior to proceeding with any further investments in water supply infrastructure; Kampot City should carry out a study to determine the safe yield of the Tek Chhou River and the impact of the hydropower development on water supply.

4.17 The City currently has a shortage of water storage facilities. The current storage deficit is about 4,500m³. As the population and the water demand in Kampot is continue to grow, it is projected that in the year 2020 the City will need to have a water storage facilities for about 8,000 m³. It is thus recommended that the City should construct additional reservoir storage as soon as possible.

4.18 The City's water distribution system includes approximately 14,500 meters of asbestos cement (AC) pipe also known as transit pipe. These pipes were installed long time back at the time of construction of water system in 1958. As these pipes are brittle, it is difficult to repair and connect to taps for new service connections. AC pipe may also poses potential health risks. Most of these pipes are trunk mains and will have to be enlarged to meet the growing demands in future. It is thus recommended to replace these pipes with larger diameters.

<Sewerage>

4.19 Treatment: Planning in this study is based on WSP technology because it provides a good level of treatment at the lowest possible operating cost. In addition, it is simple to operate and can provide natural disinfection without any use of chemicals. Ponds also offer a large potential for re-use of the treated effluent in irrigation.

4.20 The major disadvantage of WSP technology is that it requires significant areas of land are needed for treatment and therefore the initial capital costs may be quite high. This study assumes a land requirement of 2.5 ha per 1,000 m³ of wastewater treatment as a typical requirement for stabilization ponds.

< Solid Waste Management >

4.21 As mentioned in the Master Plan of Preah Sihanouk, it is essential to establish and utilize effective infrastructures of Solid Waste Management (SWM) in Kampot. Formulation of a SWM plan should be followed by introduction of 3R concept, Community-based SWM, procurement of main facilities, and establishment of hazardous waste management.

5: IMPLEMENTATION OF MASTER PLAN FOR PREAH SIHANOUK

<Institutionalization of the Master Plan of Preah Sihanouk>

5.01 It is legally stipulated that the respective local governments shall draft the provincial/city master plan and its land use plan, and the draft plans shall be evaluated by the National Committee for Land Management, Urban Planning and Construction, which is the inter-ministerial committee. The law has been enacted in 1994, but it is fact that none of master plans and/or land use plans have been authorized based on such a mechanism since the law was enacted, although a number of draft plans have been presented to the ministry by provincial government.

5.02 The process of institutionalization needs to be refined to be more practical, based on the existing legal framework. Figure S5.01 shows a stream of the institutionalization process of provincial/city master plan and land use plan as has been those are drafted by Department of Land Management, Urban Planning, Construction and Cadastre (DLMUPCC). This stream is based on the current legal framework. In order to functionalize this stream, the important role of “provincial committee” should be noted under the on-going decentralization process.

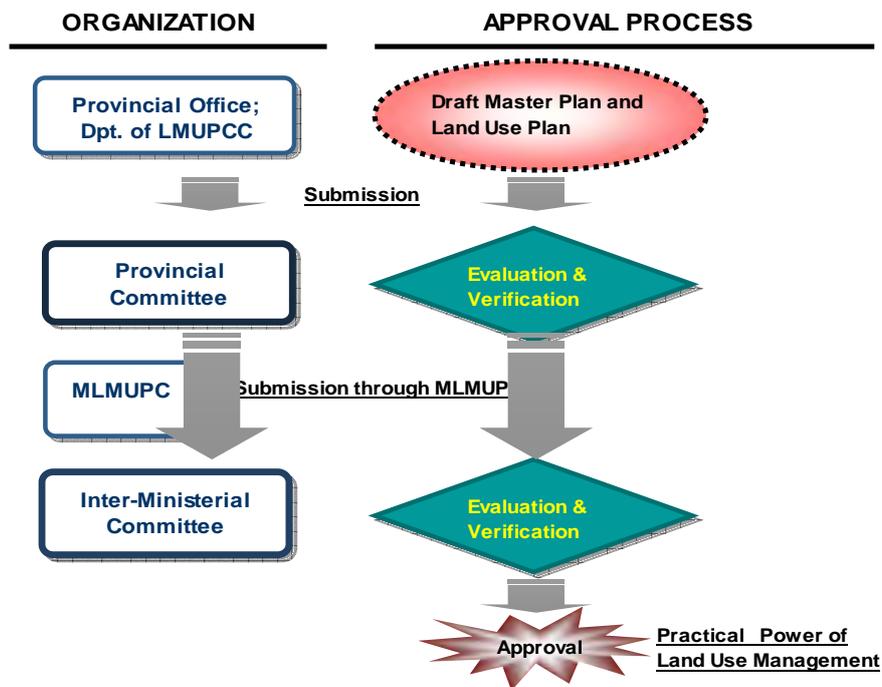


Figure S5.01 Institutionalization Process for Provincial/City Master Plans and Land Use Plans

<Financing Capacity of Provincial Government of Preah Sihanouk>

5.03 Currently, the financial capacity of the provincial government is too limited to implement the infrastructure projects as suggested in the M/P. As a result, majority of the infrastructure development and public service provisions projects at the provincial level are greatly dependant on the central government. Under the on-going decentralization process, it is likely that the budgetary capacity of the

provincial governments will be strengthened. This issue is crucial and of prime importance to structure a national development mechanism over the country..

5.04 Provincial Revenue of Preah Sihanouk: The total revenue of Preah Sihanouk Province in 2009 was recorded at about 7.27 billion Riels (or USD 1.82 million) in the actual term, instead of 4.24 billion Riels (or USD1.06 million) in the nominal term based on the Financial Law.

5.05 The tax-based revenues share 88.1% of the total revenue in the actual term. Major sources of tax revenues are: i) Stamp duty for inheritance tax (54.4% of the total); ii) Tax on transportation and vehicles (15.6%); iii) Tax on undeveloped land (9.3%); and iv) Tax on accommodation (4.1%). While, non-tax revenue shares 11.9% of the total revenue. Thus, the provincial government revenue of Preah Sihanouk depends largely on the stamp duty of inheritance tax, and not necessarily on the taxes on land and properties. Although in many other countries, the local government revenue is commonly dependant on taxes from immovable properties i.e. land.

5.06 Provincial Expenditure of Preah Sihanouk: The total expenditure of Preah Sihanouk Province was recorded at about 6.65 billion Riels (or USD 1.66 million) in the actual term, instead of 4.24 billion Riels (or USD1.06 million) in the nominal term based on the Financial Law. The total expenditure amounted about 92% of the actual revenue.

5.07 Out of the total expenditure, about 47.3% was appropriated for recurrent expenditures, whereas, the investment expenditure or cashing for fixed assets shared 52.7% of the total expenditure. In terms of the per capita expenditure for public investment, only USD3.86 per person were allocated for public investment. With this meager allocation or investment on the public services from the total budget, it is even extremely difficult to provide basic services.

<Strengthening of Financial Capacity for the Provincial Government>

5.09 Under the currently on-going decentralization reform, strengthening of local governments' funding capacity will be a crucial political concern. This issue may includes: i) devolution of some tax-sources from the state government to the local government; ii) liberalization for local governments to regulate new tax-revenue sources as well as generate non-tax revenues; iii) local governments' access to international donors' external resources; iv) innovative approach to issuance of development bonds for special cost-recovery projects; and so on.

5.10 As Preah Sihanouk is endowed with a plenty of development potentials, therefore it will likely receive actual economic investments in forthcoming years. This will bring socioeconomic benefits to Preah Sihanouk. However, at the same time, this shall also impose a strict financial burden on Preah Sihanouk to provide necessary infrastructures and utilities services to avoid any deterioration of living and natural environment. Thus, to maintain the balance between socioeconomic benefits with living environment, it is vital to enhance the financial capacity of the local government's financial capacity. In the absence of strong financial capacity, the socioeconomic benefits accruing from the development could not be gained by the local people.

<Priority Projects>

5.11 In total eleven (11) priority projects were selected from the identified projects as mentioned in the Integrated Development Strategy for Coastal area (Book I). Except a few projects, these priority projects are mainly targeted to be implemented in Preah Sihanouk and/ or Kampot. Therefore, these priority projects are quite important to materialize the development strategies as proposed in the

M/P of Preah Sihanouk and Strategy for Kampot and for the sustainable socio-economic development in the Study area.

Table S.5.01 Priority Projects: at-a-glance

No.	Type	Title of Project	Location	Executing Agency	Main Component of Project
UD-01	Urban Planning	National spatial grand design: land use planning project	Phnom Penh (whole country)	MLMUPC	Reinforcement of legal framework, laws and regulations related to land and spatial management. Capacity development for MLMUPC at the central level to enhance their ability to enforce and manage development and planning..
UD-02	Urban Planning	Urban Development Master Plan for the Coastal Area	Four (4) coastal provinces	MLMUPC	Capacity development for drawing up detailed land use planning, circulation system, and development project plan for the city center of Coastal provinces. During short-term, a follow-up study to finalize master plan of Preah Sihanouk and Kampot proposed through CiCaDs and its process for final approval..
EV-01	Environment	Strengthening EIA implementation capacity project	Phnom Penh (whole country)	MOE	Capacity development of the staff in EIA department to enforce the laws and regulations related to EIA and environmental monitoring..
EV-02	Solid Waste	Establishment of PPP and development of infrastructure for SWM for sustainable environmental protection and development in Coastal area	Four (4) coastal provinces (mainly SHV and Kampot)	MOE (Provincial Government)	T/A for the preparation of SWM master plan and implementation of 3R concept. Procurement of equipments and other required facilities for SWM through Grant aid or Loan.
T-01	Logistics	Study on Comprehensive Logistics Development between Preah Sihanouk and Phnom Penh	Phnom Penh – Preah Sihanouk	MPWT	Proposal of an efficient international logistics and customs clearance system including: logistic marketing survey, logistics terminal development plan, logistics information system, rail transport and related facilities, and development plan of Sihanoukville port
WS-01	Water Supply	Water supply system development project in Preah Sihanouk	Preah Sihanouk	MIME	Construction of storage facilities, a system of feeder mains and facilities for the transmission of treated water from Kbal Chay, and rehabilitation and improvement of distribution system.
WS-02	Water Supply	Water supply system development project in Kampot	Kampot	MIME	Construction of new treatment plant, treated water pipeline, storage facilities, and a system of feeder mains, and improvement of distribution system.
WS-03	Sewage	Sewage system development project in Preah Sihanouk	Preah Sihanouk	MPWT	Expansion of treatment facility and making service connections mandatory over the ocheuteal beach.
WS-04	Sewage	Sewage system development project in Kampot	Kampot	MPWT	Construction of treatment plant and sewage distribution system.
T-01	Transportation	Road network construction and improvement project in Preah Sihanouk	Preah Sihanouk	MPWT	Construction of access roads i) between NR4 and Preah Sihanouk city and ii) between Sihanoukville Port and Stueng Hav, improvement of Stueng Hav - Veal Renh road and rehabilitation of existing bridges (21 bridges).
T-02	Transportation	Road Network Construction and Old bridge rehabilitation project in Kampot	Kampot	MPWT	Construction of new Ring Road and bridges and rehabilitation of the existing old bridge located in the center of the Kampot city.

Source: JICA Study Team

6: RECOMMENDATIONS

6.01 The following are the recommendations for sustainable development of Preah Sihanouk.

6.02 Preah Sihanouk is often referred to as the head of the dragon. The dragon, meaning Cambodia, needs to lift the head, Preah Sihanouk, first when it starts to fly. Thus setting an appropriate goal for Preah Sihanouk is important for the Coastal area as well as to the nation.

6.03 The goal for Preah Sihanouk has been considered in an proactive procedure between the Study Team, MLMUPC and the Province in workshops and stakeholder meetings. The goal thus proposed consists of five pillars; i) Function as the National Gateway of international trade, economies, human resource and technologies; ii) Be a National Growth Center with diversified economic activities and urban services; iii) Be the National Logistic Center linked with World Markets; iv) Be an Industrial Center with modern & non-traditional manufactures and agro-industries; and v) Be an internationally reputable Marine Resort, harmonized with most livable environment.

6.04 For the industrial development, promotion of export industries, resource-based industries, such as processing of fishery and agricultural products, and tourism utilizing the area's gifted natural and resort resources is crucial for Preah Sihanouk Province.

6.05 At present, there are six approved SEZs in Preah Sihanouk Province, but in actual the number of industries/firms located within SEZs is In order to promote location of export-oriented industries, various policies need to be implemented including i) Improving and strengthening the SEZ scheme such as enactment of SEZ law and related structural improvements in SEZ administration; and ii) Utilizing the National Agency for Occupations and Labor for mobilizing labor to rectify the issue of labor shortage.

6.06 With regard to urban planning of Preah Sihanouk, six (6) major issues are identified which includes i) ii) Sprawling of Urban Area; iii) Mixed traffic and inconvenient road network; iv) Environmental Protection for sustainable development; v) Uncontrolled Concessions; and vi) Informal settlements.

6.07 The present road network is mixed for industrial, and touristic/residential all on NR 4, causing danger for traffic accidents. The road network to/from Sihanouk should be divided into two routes; namely passenger and logistics to improve road safety. The passenger route uses NR4 to connect the beaches and the administrative area with the downtown, Sihanouk Airport and NR3 & NR4. Logistics route shall pass along the coastal line connects Sihanoukville Port, Sihanoukville Railway Station, Sihanoukville Port SEZ, three Bulk Oil Terminals, Stung Hav Industrial area and NR3 & 4. The latter route needs to be improved to cater to heavy trailers and trucks.

6.08 Control of urbanization needs to be considered in some delineated areas in Preah Sihanouk, including i) Ream National Park; ii) Kbal Chhay protection forest (Water catchment area); iii) Water catchment area for water reservoir of Municipal Water Authority; iv) Conservation Area for Mangrove Forest Fostering; and v) Open Space. The level of control of urbanization has to be considered and legal framework should be formulated by MLMUPC.

6.09 Urbanization promotion area, where urbanization is to be promoted, shall be designated in the central part of Preah Sihanouk and along the costal line to the north up to Stung Huv area. The area includes i) Tourism Zone; ii) Commercial and Residential Zone; and iii) Industrial Zone.

6.10 Based on the above, a detailed land use zoning scheme and draft development guidelines are proposed for the central part of Preah Sihanouk. These proposed plans need to be further discussed with the stakeholders for final adoption, following the Law on Land Management, Urban Planning and Construction by MLMUPC and Province. Donor organizations, including JICA, are encouraged to assist this process to establish the first approved urban master plan in Cambodia.

6.11 Sustainable and reliable water supply to cater the demand of rapidly expanding Preah Sihanouk will be given serious considerations. Water demand in Preah Sihanouk has been estimated to about 12.2 MCM in 2030. As per the capacity estimates, the potential water source can be the Kbal Chay, which has the capacity to supply about two times to its current capacity (although such estimates are not well documented). The Kbal Chay reservoir, which was developed under private concessionaire, is currently facing a serious challenge of 'low quality construction' and other technical problems that need to be addressed as soon as possible. It is suggested to conduct a reliable technical study to determine the potential yield of the Kbal Chay and its capacity to meet the future demand of Preah Sihanouk. Other than this study, the treatment, transmission capacity and distribution systems need to be improved. An additional new treatment plant along with laying of transmission pipes to the existing public treatment plan needs to be implemented by 2014

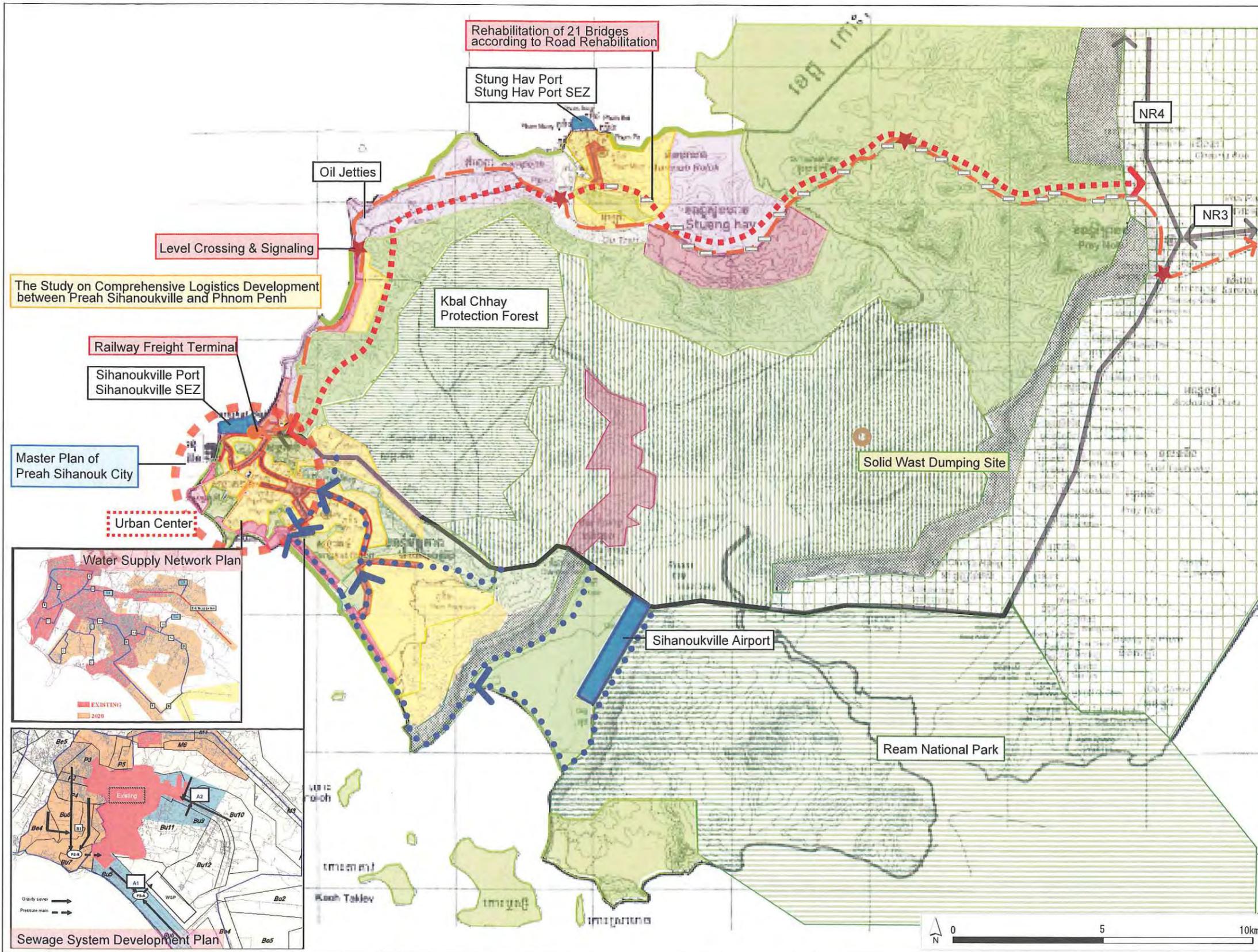
6.12 Proper wastewater disposal will be crucial to Preah Sihanouk, which is expected to grow as an international beach resort, but the connection to the present sewerage system is limited. For the existing service area covering the Downtown needs to be expanded to its surrounding areas including the Ochheutal beach area so as to protect the most favored beach in Preah Sihanouk.

6.13 Solid Waste Management (SWM) for Preah Sihanouk is entrusted to a private firm, but there is still an issue of insufficient collection service and poor management. The suggestions to enhance the SWM and to overcome the current issues are : i) Establishment of a new sanitary landfill site on an urgent basis to receive and treat the current waste and future demand from urban area; ii) Enhance administration of private concessionaire in order to achieve proper level of service; and iii) Introduction of community-based SWM and promotion of 3R concept in other ar

6.14 Solid Waste Management (SWM) for Preah Sihanouk is entrusted to a private firm, but there is an issue of insufficient collection service. The issues in SWM includes i) Establishment of a new sanitary landfill site to receive waste from urban area is urgent in consideration of increase in the amount of waste in future; ii) Enhance administration of private concessionaire in order to achieve proper level of service; and iii) Introducing community-based SWM to other areas in harmony with 3R concept.

6.15 Recommendation on the approval of the M/P of Preah Sihanouk has been acknowledged by the RGC and the minutes of meetings, which stipulate that the M/P of Preah Sihanouk be approved by June/ July of 2011, was.

6.16 The above recommendation on the approval of the M/P of Preah Sihanouk has been acknowledged by the RGC and the minutes of meetings, which stipulate that the M/P of Preah Sihanouk be approved by June/ July of 2011, was signed between the JICA Study Team and the Cambodian Steering Committee of this Project, on May 27th 2010.



The Study on Comprehensive Logistics Development between Preah Sihanoukville and Phnom Penh

Level Crossing & Signaling

Rehabilitation of 21 Bridges according to Road Rehabilitation

Stung Hav Port
Stung Hav Port SEZ

Oil Jetties

Kbal Chhay
Protection Forest

Railway Freight Terminal

Sihanoukville Port
Sihanoukville SEZ

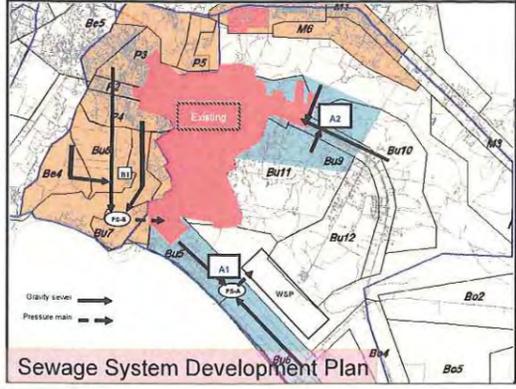
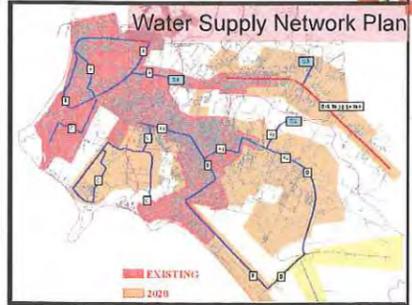
Master Plan of
Preah Sihanouk City

Urban Center

Solid Waste Dumping Site

Sihanoukville Airport

Ream National Park



LAND USE	
Urbanization Promotion Area	
[Pink]	Tourism
[Red]	Commercial
[Yellow]	Residential
[Purple]	Complex
[Dark Purple]	Industrial
[Orange]	Administration
[Light Orange]	Public Facility
[Light Green]	Religious
[Blue]	Sea port & Air port
Urbanization Control Area	
[Light Green]	Open Space
[Dark Green]	National Park or Reservoir
[Green with vertical lines]	Preservation forest
[Green with horizontal lines]	Scenic Green
[Green with diagonal lines]	Agriculture Area
Infrastructure	
[Black double arrow]	Existing National Road
[Red double arrow]	Trail way
[Red dashed arrow]	Proposed Logistic Road
[Blue dashed arrow]	Proposed Passenger Access Road
<MP Programs>	
[Light Blue]	Urban Planning and Program
[Light Green]	Environmental Management Program
[Yellow]	Industrial Promotion and Logistics Development Program
[Pink]	Urban Infrastructure Development Program

Master Plan of Urban Area in Preah Sihanouk

The Study on National Integrated Strategy of Coastal Area and Master Plan of Sihanoukville for Sustainable Development

