The Kingdom of Cambodia
Ministry of Public Works and Transport

The Kingdom of Cambodia

Data Collection Survey on the Road and Bridge Sector in the Southern Economic Corridor

Final Report

February 2025

Japan International Cooperation Agency (JICA)

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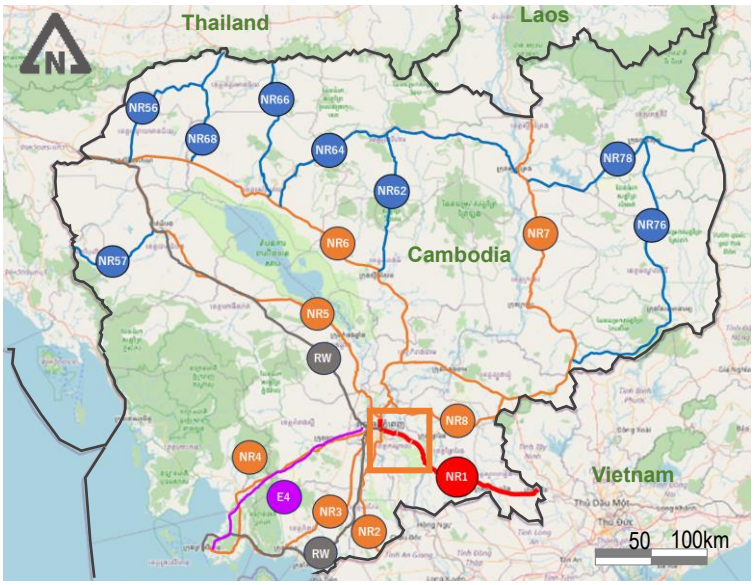
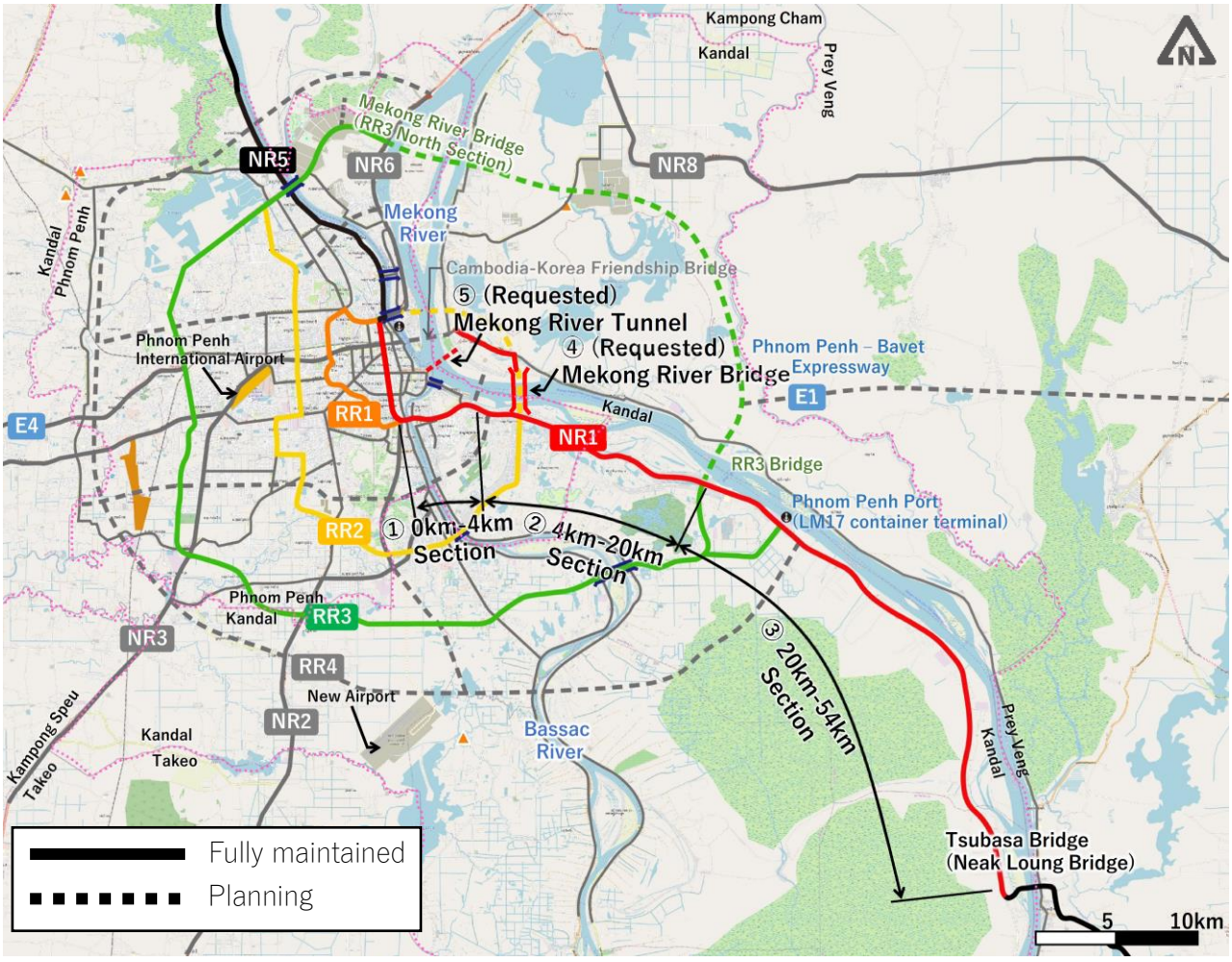
【Location Map of Target Area】

Legend :
- : Target area
- NR1: National Road 1
- NR: National Road (1-digit)
- NR: National Road (2-digit)
- E: Expressway
- RW: Railway





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Abbreviations	English
AC	Asphalt Concrete
ADB	Asian Development Bank
AFTA	ASEAN Free Trade Area
AH	Asia Highway Network
AKC	Akreiy Ksatr City
ASEAN	Association of Southeast Asian Nations
BCR	Benefit Cost Ratio
BRP	Basic Resettlement Plan
CAIC	Cambodia Airport Investment Co., Ltd
CDC	Council for the Development of Cambodia
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CITL-MP	Comprehensive Master Plan on Cambodia Intermodal Transport and Logistics System 2023-2033
CMAC	Cambodian Mine Action Centre
CMT	Cut, Make and Trim
CPA	Complementary Package of Activity
CPI	Consumer Price Index
DBST	Double Bituminous Surface Treatment
DEIA	Department of Environmental Impact Assessment
DHRW	Department of Hydrology and Rivers
DIMDM	Department of Internal Monitoring and Data Management
DOM	Department of Meteorology
DPWT	Department of Public Works and Transport
DRP	Detaild Resettlement Plan
EDCF	Korea Economic Development Co-operation Fund
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EMA	External Monitoring Agency
EMC	Environmental Management Contract
EXMID	Expressway, Mega Bridge and Investment Department
FESIA	Full Environmental Social Impact Assessment
GDP	Gross Domestic Product
GDR	General Department of Resettlement
GMS	Greater Mekong Subregion
HIV/AIDS	Human Immunodeficiency Virus / Acquired Immunodeficiency Syndrome
HV	Heavy Vehicle
IBA	Important Bird and Biodiversity Area
IDP	Industrial Development Policy
IEISAR	Initial Environmental and Social Impact Assessment Report
IFC	International Finance Corporation
IRC	Inter-Ministerial Resettlement Committee
IRI	International Roughness Index
IUCN	International Union for Conservation of Nature
JICA	Japan International Cooperation Agency
JICA GL	JICA Guideline
JSSS	JICA Standard Safety Specification

Abbreviations	English
KBA	Key Biodiversity Area
KCC	Khmer Cold Chain
KHR	Khmer Riel
LCC	Life Cycle Cost
LV	Light Vehicle
MEF	Ministry of Economy and Finance
MLMUPC	Ministry of Land Management, Urban Planning and Construction
MOWRAM	Ministry of Water Resources and Meteorology
MOE	Ministry of Environment
MPAC	ASEAN Connectivity Master Plan
MPWT	Ministry of Public Works and Transport
MRD	Ministry of Rural Development
MSL	Mean Sea Level
NCDM	National Committee for Disaster Management
NGO	Non-Governmental Organization
NR	National Road
NSDP	National Strategic Development Plan
NPV	Net Present Value
OCIC	Overseas Cambodian Investment Company
OD	Origin - Destination
ODA	Official Development Assistance
PC	Prestressed Concrete
PCU	Passenger Car Unit
PDE	Provincial Department of Environment
PE	Polyetylene
PP	Phnom Penh
PPAP	Phnom Penh Autonomous Port
PRSC	Provincial Resettlement Sub-Committee
PRW	Provisional Road Width
PS	Pentagonal Strategy
RAP	Resettlement Action Plan
RCEP	Regional Comprehensive Economic Partnership
RGC	Royal Government of Cambodia
RGKSEZ	Royal Group Kandal Special Economic Zone
RID	Road Infrastructure Department
ROW	Right of Way
RR	Ring Road
RS	Rectangular Strategy
SCF	Standard Conversion Factor
SEC	Southern Economic Corridor
SEZ	Special Economic Zone
SME	Small & Medium Sized Enterprise
SOP	Standard Operating Procedures
SPSP	Steel Pipe Sheet Pile
SSCA	State Secretariat of Civil Aviation
TOR	Terms of Reference

Abbreviations	English
TTC	Travel Time Cost
UNDRR	United Nations Office for Disaster Risk Reduction
UXO	UneXploded Ordinance
VCR	Vehicle Capacity Ratio
VOC	Vehicle Operation Cost

CHAPTER 1 INTRODUCTION

1.1 Background

The Kingdom of Cambodia ("Cambodia") is located in the center of the Southern Economic Corridor linking the Mekong region, with the capital city of Phnom Penh in the center, the National Road 5 ("NR5") leading west to Thailand, and the National Road 1 ("NR1") leading east to Vietnam, forming a corridor supporting transportation and logistics, and is expected to be a distribution hub for international trade with neighboring countries such as Thailand and Vietnam. Although overland transportation accounts for 90% of domestic transportation in Cambodia, the pavement rate of national and provincial roads is low at about 56%, and the length of major national roads with four or more lanes is less than 10%, which means that the delay in road infrastructure development is hindering smooth logistics in response to the increasing traffic volume in recent years.

The Government of Cambodia has integrated plans and master plans supported by multiple development partners, including JICA, into the Comprehensive Master Plan on Cambodia Intermodal Transport and Logistics System 2023-2033 (CITL-MP), which was approved in August 2023 as a comprehensive plan for the transport and logistics sector. In the CITL-MP, the development of multiple national roads and rehabilitation projects are given top priority, with the aim of improving connectivity with the surrounding countries, especially Phnom Penh Capital. The CITL-MP also proposes the development of ring roads and radial roads to facilitate traffic around Phnom Penh, which is located on the Southern Economic Corridor. In addition, the ASEAN Connectivity Master Plan 2025 (MPAC 2025), approved at the ASEAN Summit, also sets connectivity enhancement as one of its goals, with the development of economic corridors as an indicator. Meanwhile, Cambodia held national elections in July 2023, resulting in a new government led by Prime Minister Hun Manet. In the new development strategy (Pentagon Strategy) formulated by the new government, improving regional connectivity is identified as a priority sector, and the need for transportation and transport infrastructure development is expected to increase even further.

JICA has been supporting the improvement of regional connectivity with neighboring countries and connectivity along the Southern Economic Corridor, which will contribute to strengthening the domestic economic infrastructure. In particular, JICA has been implementing the rehabilitation of NR5 under an ODA (Official Development Assistance) loan project since 2013, and expected to be completed in the near future. However, there are sections of the Southern Economic Corridor that require rehabilitation. In particular, urban areas are affected by increased traffic volume, which has become a bottleneck hindering connectivity in the Mekong region. In some sections, large trucks, cars, and motorcycles are traveling together on a single-lane road, posing a serious traffic safety issue.

In Phnom Penh, traffic congestion caused by the rapid growth of the urban area and population is a serious issue, and in order to cope with the further increase in traffic in the future, it is necessary to promote the use of public transportation as well as to improve and widen the road network including ring roads. In addition, the Government of Cambodia intends to develop the opposite bank area of the Mekong River from Phnom Penh in anticipation of further development of the Phnom Penh metropolitan area in the future, and the development of road and bridge networks is an urgent issue.

1.2 Survey Outline

The objective of the survey is to study the current situation and issues on the national roads around the central area of Phnom Penh and its vicinity, which are bottlenecks in the Southern Economic Corridor. The primary focus and the goal to collect and analyze necessary information to develop strategic support policies, with a view on formation of Japanese ODA loan projects in the road and bridge sector in Cambodia.

The road and bridge improvement projects listed in the table below ("Requested Projects") for which the Ministry of Public Works and Transport (MPWT) of Cambodia intends to utilize ODA loans, through the two steps described below.

STEP 1: Select projects with necessity and validity from the requested projects (5 projects)

STEP 2: Identify candidate ODA loan projects from the projects selected in STEP 1

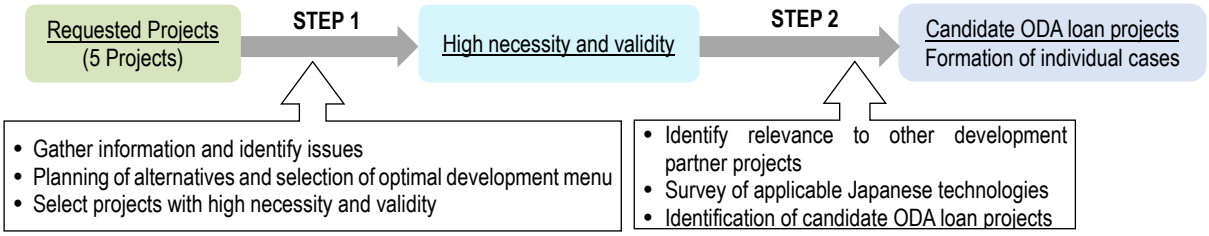


Figure 1.2-1 Key Selection Steps in This Survey

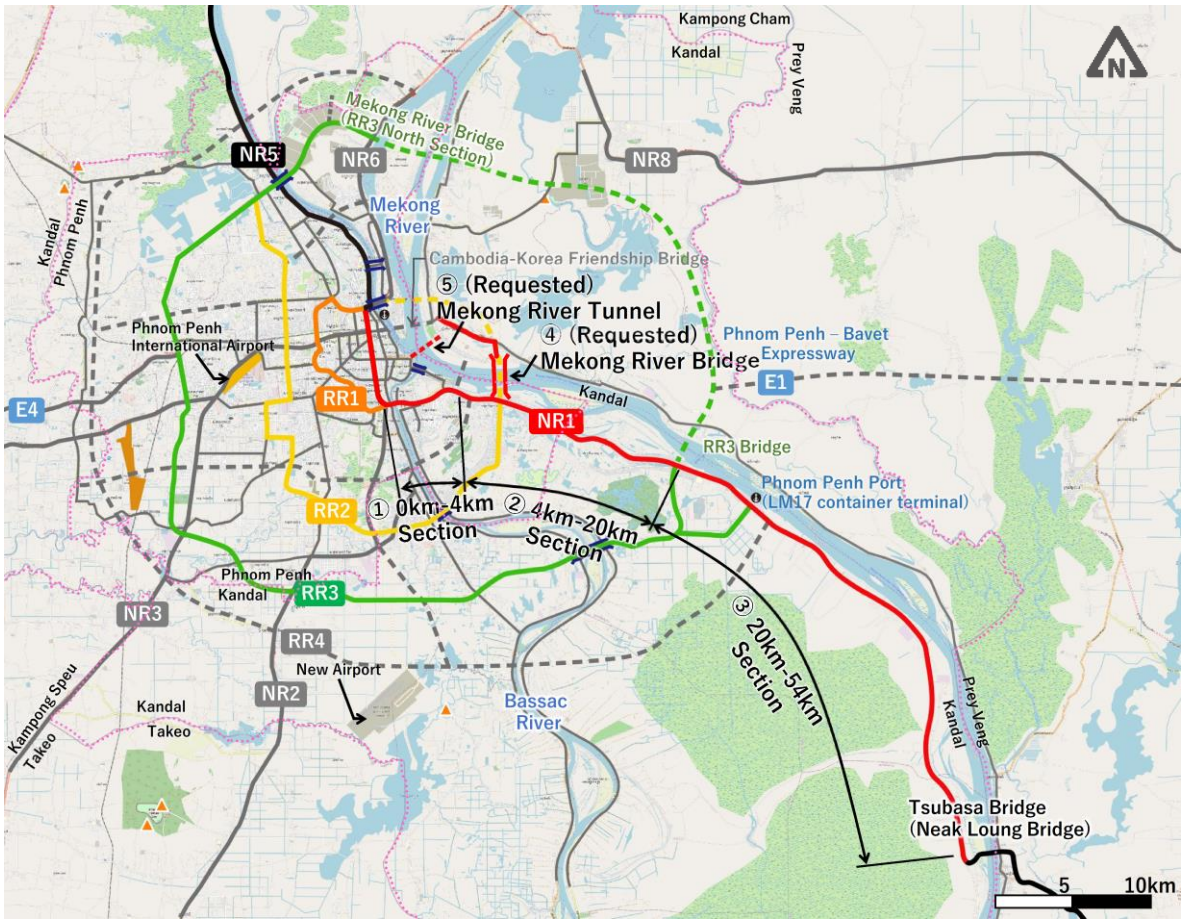


Figure 1.2-2 Location of the Requested 5 Projects

Table 1.2-1 Road and Bridge Development Projects for which MPWT Intends to Utilize ODA Loans

	Project Summary	Abbreviations in this report
1)	Construction of a viaduct (2 lanes on each side) at a section of approximately 4.5 km of NR1 from the Monivong intersection	NR1 viaduct (0-4km)
2)	Widening of NR1 in the approximately 20km section from the 4km point mentioned above to Phnom Penh New Port (LM17 Container Terminal) (3 lanes on each side)	NR1 6-lanes widening (4-20km)
3)	Widening of NR1 in the approximately 30km section from Phnom Penh New Port to Tsubasa Bridge (2 lanes on each side)	NR1 4-lanes widening (20-54km)
4)	Construction of an approximately 2.6km bridge spanning the	The Mekong River Bridge

	Project Summary	Abbreviations in this report
	other side area of the Mekong River from the intersection of RR2 and NR1	
5)	Construction of an approximately 3.5km tunnel connecting the area around Sihanouk Street in Phnom Penh and the other side area of the Mekong River.	The Mekong River Tunnel

1.3 Survey Team and Implementation Schedule

Survey team member list is shown below.

Table 1.3-1 Survey Team Member List

Responsibility	Name
Team Leader / Road and Bridge Planning	Masato Watanabe
Deputy Team Leader / Road and Bridge Planning	Keisuke Takeda
Traffic Survey/Analysis, Development Effect 1	Masahiro Takahashi
Traffic Survey/Analysis, Development Effect 2	Tatsuya Akiguchi
Urban Planning and Land Use Planning	Hideo Kurimura
Regional Economic and Industrial Analysis	Kazuo Yumita
Road Design 1	Takahiko Sato
Road Design 2 / Project Coordinator	Keiko Hama
Bridge Design	Mitsuhiro Oyama
Environmental and Social Considerations	Taiji Tanoguchi
Procurement, Cost Estimation, Construction Plan	Hiroshi Watanabe
Transportation and Logistics Planning	Local staff
Land Use, Urban and Development Planning	Local staff
Road & Bridge Design	Local staff

Implementation schedule is shown below.

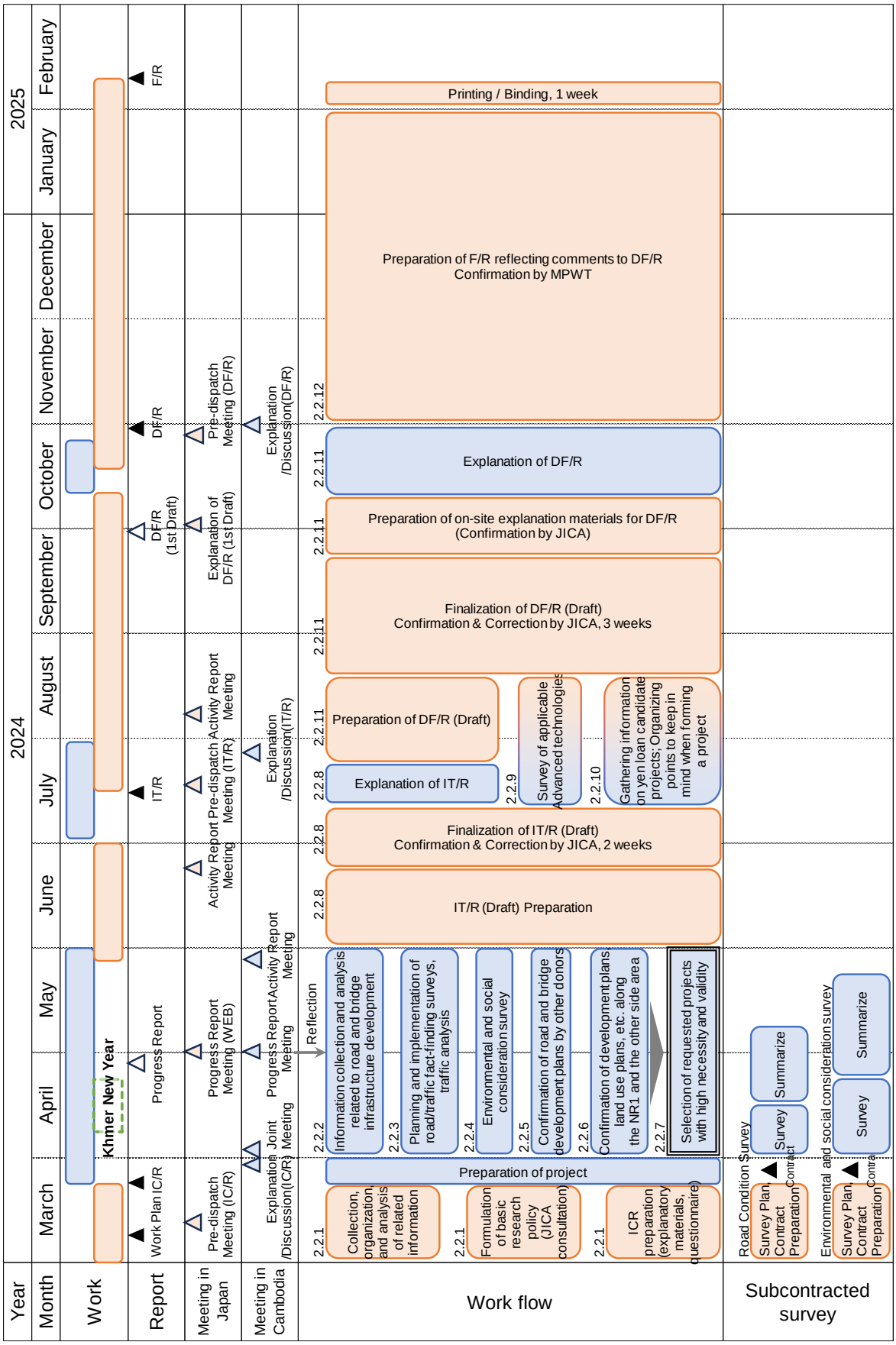


Figure 1.3-1 Implementation Schedule

1.4 Structure of the Report

The chapters of this report are organized as follows.

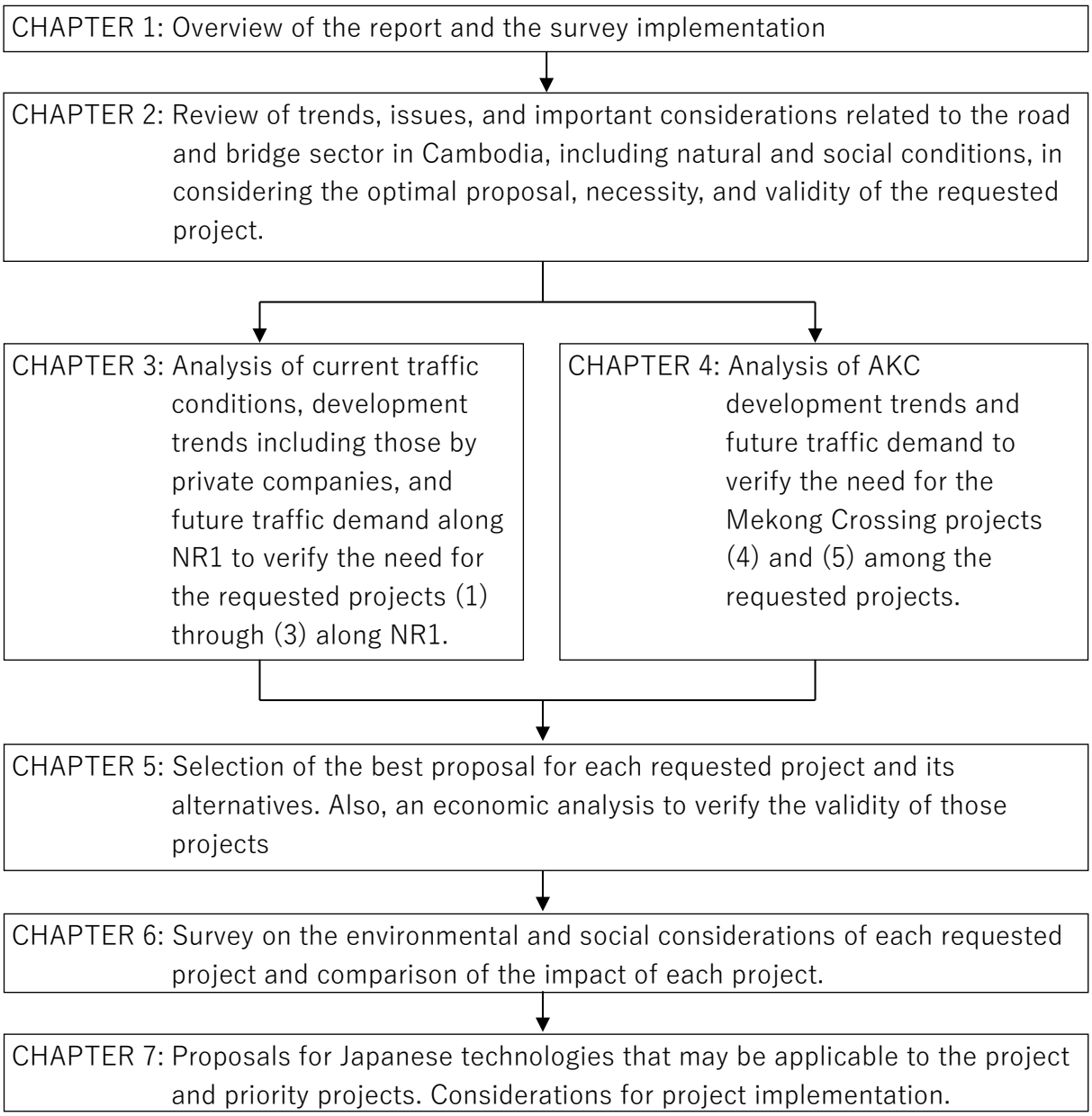


Figure 1.4-1 Structure of the Report

CHAPTER 2 OVERVIEW OF ROAD AND BRIDGE SECTORS

2.1 Profile of Country and Survey Area

2.1.1 Development Policies and Related Plans

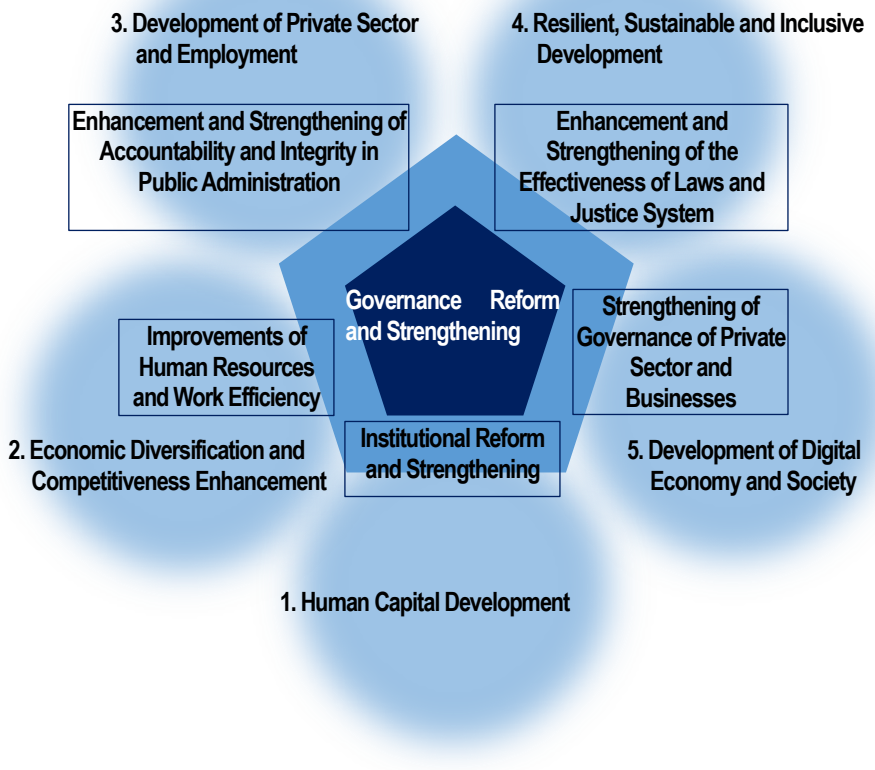
Below are four of Cambodia's high level plans for the road and bridge sector. (1) covers strengthening the connectivity of the road network and revising the road law to diversify the economy and enhance competitiveness; (2) covers transportation infrastructure development goals for the MPWT to promote public works; (3) covers infrastructure and logistics-related goals to be implemented by the MPWT to strengthen development in the industrial sector; and finally, (4) covers further improvement and development goals for the transportation and traffic sector for intermodal transportation.

(1) Pentagonal Strategy-Phase I

The Pentagonal Strategy-Phase I was developed in August 2023 to ensure economic growth, create more job, achieve the poverty reduction, continue to strengthen capacity, governance, and improve the quality of public institutions, and ensure sustainable socio-economic development. The five key priorities, namely people, road, water, electricity, and technology.

The Royal Government of Cambodia successfully implemented the Triangular Strategy and the Rectangular Strategy in four distinct phases. These achievements have resulted in commendable progress in all sectors, including politics, society, and economy enabling Cambodia to proudly renew its image.

Overall, the Triangular Strategy and the Four-Phase Rectangular Strategy have played a prominent role as Cambodia’s socio-economic development policy agenda. Cambodia’s nation-building process is currently entering a new phase in an increasingly changing, difficult and uncertain world. Cambodia will face new challenges in its endeavors to transition to a high-income country and regularly needs to adapt to changing global trends. As shown in the chart below, the Pentagonal Strategy-Phase I has five priority areas (i.e., 1. Human Capital Development, 2. Economic Diversification and Competitiveness Enhancement, 3. Development of Private Sector and Employment, 4. Resilient, Sustainable and Inclusive Development, and 5. Development of Digital Economy and Society) that includes five tasks to be accomplished for each priority area, all while aiming to improve the governance reform and strengthening.



Source: Pentagonal Strategy

Figure 2.1-1 Five Priority Areas in the Pentagonal Strategy-Phase I

Table 2.1-1 Five Tasks to be Accomplished in Five Priority Areas in the Pentagonal Strategy-Phase I

1. Human Capital Development
1) Enhancement of Quality of Education, Sports, Science, and Technology
2) Technical Skills Training
3) Improvements of People's Health and Well-being
4) Strengthening of Social Protection System and Food System
5) Strengthening of Quality of Citizenship of a Highly Civilized Society with Morality, Equity, and Inclusiveness
2. Economic Diversification and Competitiveness Enhancement
1) Innovation of Financing Mechanisms and Financial Products to Support Investment
2) Development of Key Sectors and New Sources of Economic Growth
3) Enhancement of Connectivity and Efficiency in Transport and Logistics, Energy, Water Supply and Digital Sectors
4) Improvements of Business and Investment Environment
5) Strengthening of Efficiency and Attractiveness of Special Economic Zones, including Industrial Parks, Agro-Industrial Parks, and Domestic Free-Trade Zones
3. Development of Private Sector and Employment
1) Promotion of Competition
2) Strengthening of Banking System and Non-Bank Financial Sector
3) Development of Labor Market
4) Promotion of Micro, Small, and Medium Enterprises, Startups, Entrepreneurship and Development of

Informal Economy
5) Strengthening of Public-Private Partnerships
4. Resilient, Sustainable and Inclusive Development
1) Optimization of Demographic Dividends, Strengthening of Demographic Resilience and Promotion of Gender Equality
2) Sustainable Management of Natural Resources, Cultural Heritages, and Tourism
3) Promotion of Agriculture and Rural Development
4) Strengthening of Urban Management and Modernization
5) Ensuring Environmental Sustainability and Readiness for Responding to Climate Changes, as well as Promotion of Green Economy
5. Development of Digital Economy and Society
1) Development of Digital Economy, Digital Business, e-Commerce, and Digital Innovation System
2) Building and Development of Digital Infrastructure
3) Trustworthiness Building in Digital System
4) Development of Financial Technology
5) Building Digital Government and Digital Citizens

Of the five priority areas shown above, "2. Economic Diversification and Competitiveness Enhancement" is relevant to this survey. In the "Enhancement of Connectivity and Efficiency in Transport and Logistics, Energy, Water Supply and Digital Sectors" section of the "2. Economic Diversification and Competitiveness Enhancement" agenda, the problems faced by Cambodia, including the development of connectivity roads and the amendment the law on roads.

(2) National Strategic Development Plan 2019-2023

The National Strategic Development Plan 2019-2023 (hereafter referred to as NSDP) is a development vision that has focused on Cambodia's issues, such as poverty reduction and economic growth. In November 2019, a new national strategic development plan, NSDP 2019-2023, was released covering the period 2019-2023, setting priority policies for the entire government based on the Rectangular Strategy IV, and drawing on the issues and achievements of previous NSDPs, while also aligning its structure to the Rectangular Strategy IV.

The objective of the NSDP 2019-2023 is to maintain the economic growth achieved in the NSDP 2014-2018 and to turn Cambodia into an upper-middle income country. In order to implement its objectives, the Rectangular Strategy IV has set forth strategies to realize its goals in the four priority areas of: "1. Human Resource Development", "2. Economic Diversification", "3. Private Sector and Job Development", and "4. Inclusive and Sustainable Development".

MPWT, which has jurisdiction over the roads covered by this survey, states that transport infrastructure development will be undertaken to promote the public works.

The actions that MPWT will undertake in the development of transport infrastructure are as follows:

- Continuing to rehabilitate and construct road infrastructure at least 3,000 kilometers further.
- Continuing to rehabilitate, construct and expand the national roads Grade 1 from 2 lane paved road, to 4-lane AC Linking to the development zones and key municipalities around 700km.

- Continuing to rehabilitate and construct the national roads, provincial roads linking to the new development zones of industry, agriculture, Agri-industry and tourism which were established and along the border.
- Continuing to strengthen the quality of maintenance, repair and construction work and ensure the flow of national budget on the routine maintenance and periodic maintenance of the network road network.
- Increasing traffic safety signs on national roads and urban areas and setting up cameras for monitoring the over-speed along the national roads.
- Promoting the study of the construction of highways and major bridges with development partners, in particular Phnom Penh-Bavet and Phnom Penh-Siem Reap-Poipet according to the Master Plan of Highway Development in Cambodia.

(3) Industrial Development Policy (IDP)

The Industrial Development Plan states that for Cambodia to achieve further economic development, it is necessary to consider improving socioeconomic infrastructure, energy supply, expanding transportation infrastructure and developing logistics, as well as promoting technical and scientific education along with strengthening institutions. The background for the formulation of the policy is that the Rectangular Strategy-Phase III defined in 2013 mentioned strengthening the development of the industrial sector as the main driver of economic growth for Cambodia to reach the level of a middle-income country. Therefore, Cambodia has developed IDP in line with the Rectangular Strategy-Phase III as a guideline to promote the development of the country's industrial sector, which can contribute to sustainable and inclusive economic growth.

To realize the plan set out under The Cambodia Industrial Development Policy 2015 – 2025, Ministry of Public Works and Transport and relevant Ministries is set to;

- Develop and implement a master plan for transport and logistics system development with the aim of creating an integrated and highly effective multimodal transport and logistics system, focusing on connecting the major economic poles and the three economic corridors – Phnom Penh – Sihanoukville, Phnom Penh – Bavet and Phnom Penh – Poipet – to become key national economic corridors through the construction of internationally standards highways and the setup of an effective logistics system;
- Continue expanding and maintaining major road networks that service transport of goods such as widening the national roads to improve connection to Thailand and Vietnam, the Phnom Penh–Siem Reap corridor and the Phnom Penh–Sihanoukville corridor while conducting a long-term feasibility study for transforming important national roads into highways in order to reinforce the logistical capacity between Cambodia and Thailand and Vietnam;
- Develop waterway transport networks which have potential to reduce logistics cost especially for transporting agricultural products through the development of peripheral ports along the Mekong River for ease of loading and unloading. The upgrading of new ports in Phnom Penh and Sihanoukville will also

help facilitate larger volume of shipping;

(4) Comprehensive Master Plan on Cambodia Intermodal Transport and Logistics System 2023-2033 (CITL-MP)

In August 2023, Cambodia announced "Comprehensive Master Plan on Cambodia Intermodal Transport and Logistics System 2023-2033 (CITL-MP)", a top-level plan for the transportation and logistics sector.

With a vision to further improve and develop the transportation system and logistics with a focus on promoting infrastructure construction, this master plan has set out four main goals as follows:

1) Expand and improve the scope and capacity of the transport infrastructure system,
2) Improve the efficiency and effectiveness of transport services and infrastructure,
3) Push and improve transport infrastructure to support national development policies, and
4) Strengthen service efficiency and logistics costs.

This CITL-MP has identified 174 priority projects, including 94 road projects, 8 railway projects, 23 river transport projects, 20 sea transport projects, 10 air transport projects, 15 logistics projects and 4 additional projects. These projects include projects connecting one mode of transportation to other means of transportation and to logistics centers, as well as 90 short- and medium-term projects and a number of long-term projects.

2.1.2 Natural Conditions

(1) Climate/Water

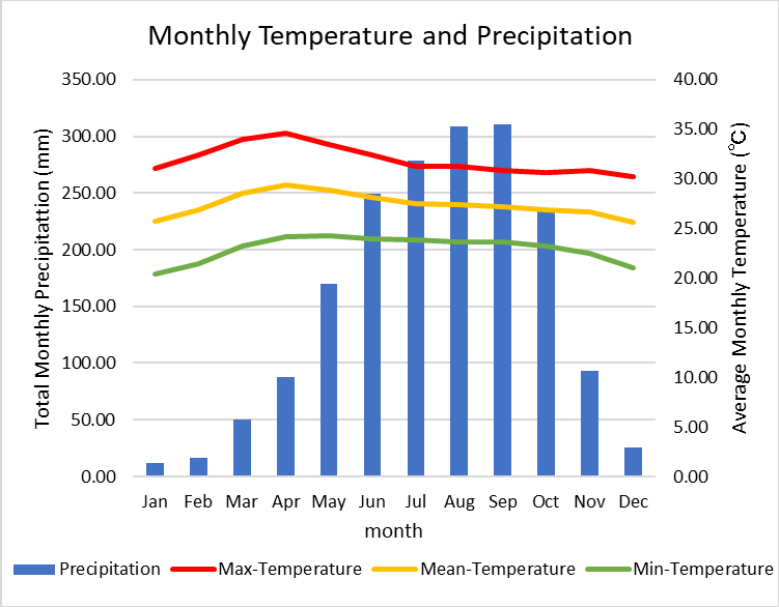
Cambodia is in the tropical monsoon climate zone, with high temperatures and seasons divided into wet and dry periods. During the rainy season from May to October, Southwestern winds account for 80% to 90% of the annual precipitation. On the other hand, during the dry season from November to April, there is little precipitation and temperatures are lower than in the rainy season.

Regarding average temperatures, there is relatively little difference in average temperatures across the country. The maximum temperature can exceed 40°C in April while minimum temperatures drop below 20°C in January. The temperature ranges from 25°C to 27° C throughout the year.

In terms of precipitation, the rainy season from May to November brings heavy rainfall to the Southeastern and Northwestern parts of the country. The average annual precipitation is 1,400-2,000 mm, which is higher in the coastal and highland areas than in the inland areas. The average monthly precipitation at the end of the rainy season from September to October is about 250mm to 260 mm. On the other hand, in January, during the dry season, the average monthly precipitation is about 10 mm.

Annual climate change is greatly influenced by the El Niño phenomenon, in which the sea surface temperature rises, and the La Niña phenomenon, in which the sea surface temperature decreases. There is a risk of drought due to rising temperatures and reduced precipitation due to the El Niño phenomenon. Conversely, La Niña causes

temperature drops, poor crop growth due to heavy rainfall, and flooding. Either way, disasters and economic losses will occur. Figure 2.1-2 shows the nationwide average monthly temperature and precipitation for a period of 30 years ranging from 1991 to 2020.



Source: World Bank "Climate Change Knowledge Portal for Development Practitioners and Policy Makers"

Figure 2.1-2 Monthly Average Temperature and Precipitation Nationwide (1991-2020)

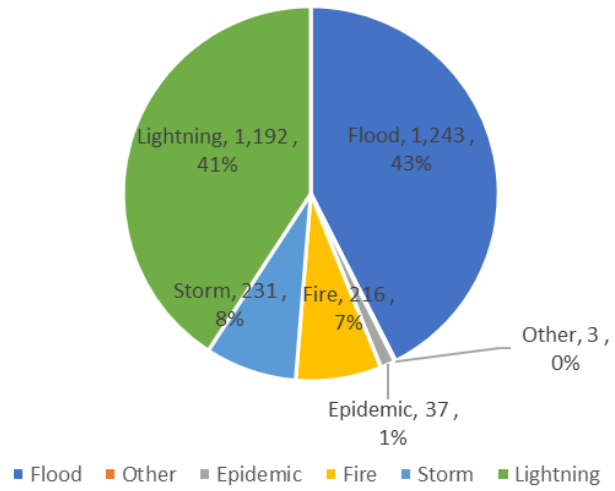
(2) Natural Disaster

Cambodia's major natural disasters are floods, droughts, and storms. From these major natural disasters, the scale of damage is larger during floods. Although forest fires are frequent, damages caused by them are insignificant. Moreover, there are no earthquakes.

Figure 2.1-3 and Figure 2.1-4 show the number of deaths and figures of directly affected damages caused by natural disasters over the last 30 years, based on data from the National Committee for Disaster Management (NCDM). From this data, it is clear that most of the deaths caused by natural disasters are due to lightning.

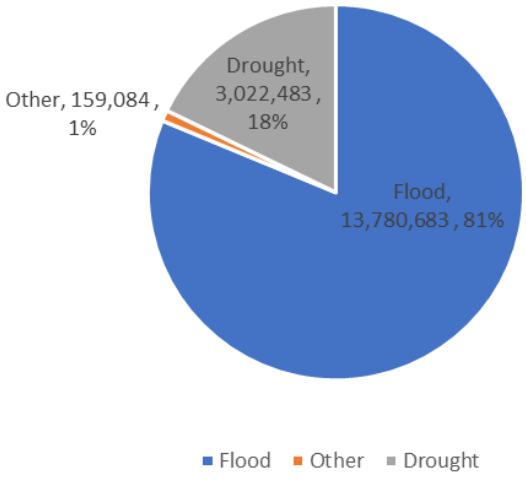
Floods often occur along the Mekong River and Tonle Sap Lake, remarkably about 75% of the country is within the flood area of the Tonle Sap Lake. Floods also occur in the lower Mekong and Bassac plains during the rainy season.

Droughts have recently become more frequent due to the decrease in flow of the Mekong River and occurrence of El Niño phenomenon. The impact of droughts is significant if it occurs continuously for periods of 2-3 years, since years of poor harvests not only weaken livelihoods, but also lead to life-threatening diseases, chronic malnutrition, and other undesirable side effects. Droughts occur frequently in the Eastern, Western, and Northwestern regions, significantly impacting these regions. Additionally, in mountainous areas such as the Kravan Mountains in Battambang and Pursat provinces, torrential rains cause landslides and debris flows during the rainy season.



Source: UNDRR "Cambodia Disaster Damage & Loss Information System (CamDi)"

Figure 2.1-3 Ratio of Fatalities by Disaster (1996-2022)



Source: UNDRR "Cambodia Disaster Damage & Loss Information System (CamDi)"

Figure 2.1-4 Ratio of Damage Cases by Disaster (Directly and Indirectly) (1996-2022)

Table 2.1-2 shows an overview of major disasters in the last 10 years.

Table 2.1-2 Summary of Major Disasters in the Last 10 Years

Period	Disaster Type	Overview
13 October 2022	Flood	Since May 2022, Cambodia has experienced low to heavy rainfall across much of the country. From 1 September 2022 - 6 October 2022, an estimated 55,189 households in 13 provinces were reported to be affected by floods, with houses, infrastructure (roads, schools, health centres) and agricultural land inundated.
October 2020	Flood	Since 1 October, Cambodia has experienced heavy rainfall across much of the country due to the combination of tropical storms and cold air, which triggered extensive flooding.
11 September 2019	Flood	Continuous flooding has affected several provinces in Cambodia along the Mekong River resulting in 12 fatalities, according to media reports.
25 July 2017	Tropical Depression	After battered by heavy rain that brought by the Tropical Storm Sonca, flood occurred in Preah Vihear, Oddar Meanchey, Stung Treng and Kampot Provinces, Cambodia. Two persons were killed and 550 families were affected.

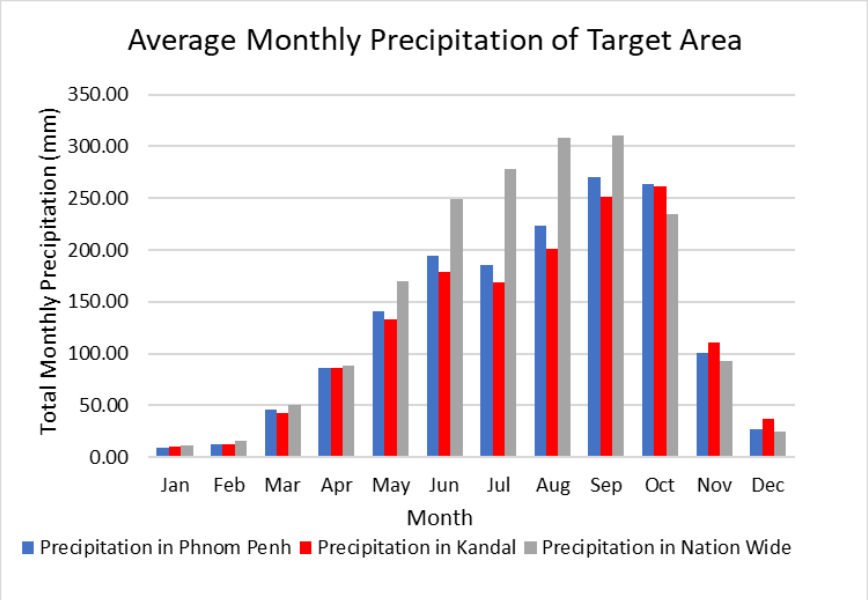
Source: Asia Disaster Reduction Center (ADRC)

(3) Hydrology

The Department of Meteorology (DOM) from the Ministry of Water Resources and Meteorology (MOWRAM) has precipitation and water level observatories in the target area, while the Department of Hydrology and Rivers (DHRW) and provinces have also their own precipitation observatories.

1) Precipitation Conditions in the Target Area

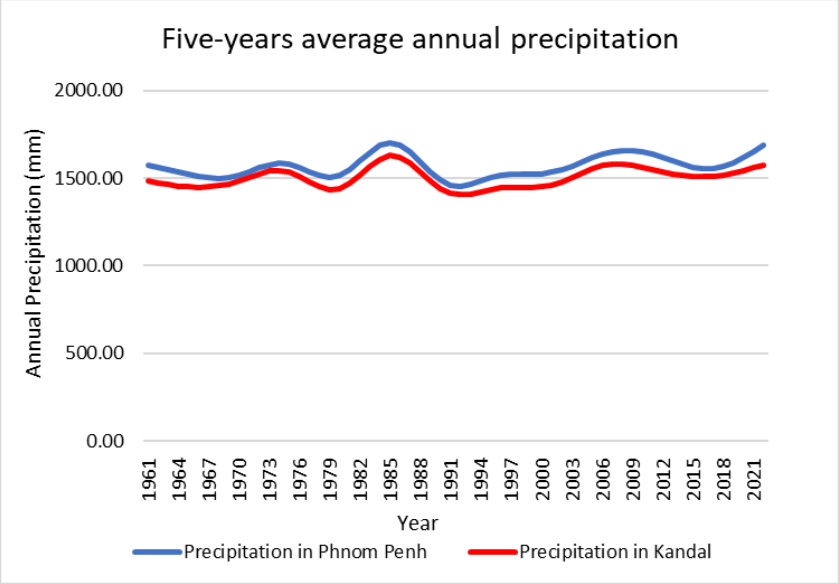
Figure 2.1-5 shows the monthly average precipitation in the target area of Phnom Penh and Kandal over the last 30 years. Precipitation during the rainy season in the target area was found lower than nationwide average.



Source: World Bank "Climate Change Knowledge Portal for Development Practitioners and Policy Makers"

Figure 2.1-5 Monthly Average Precipitation in Target Area (1991-2020)

Figure 2.1-6 shows the five-year average annual precipitation over the past 60 years. In the target area, the average annual precipitation is slightly higher in Phnom Penh than in Kandal, but almost the same. In addition, overall, there is an increasing trend.

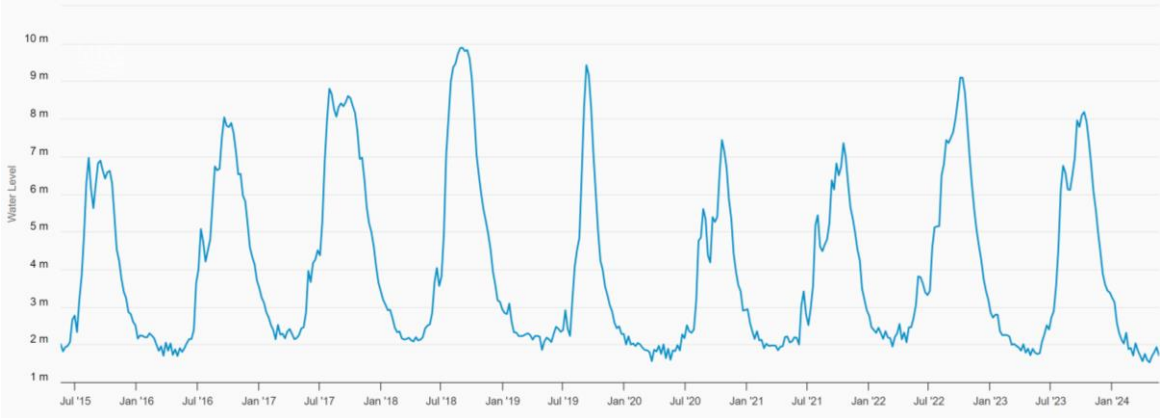


Source: World Bank "Climate Change Knowledge Portal for Development Practitioners and Policy Makers"

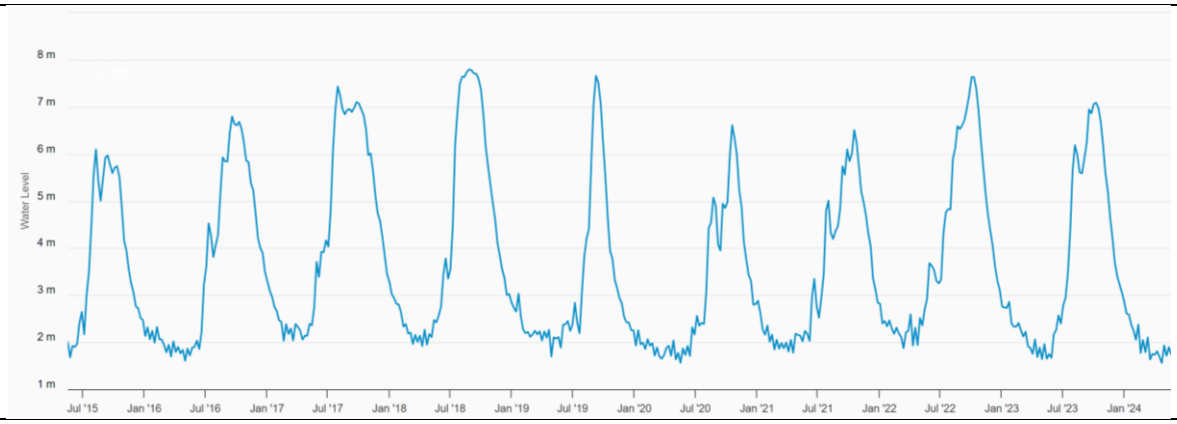
Figure 2.1-6 Monthly Average Precipitation in Target Area (1961-2022)

2) Water Level

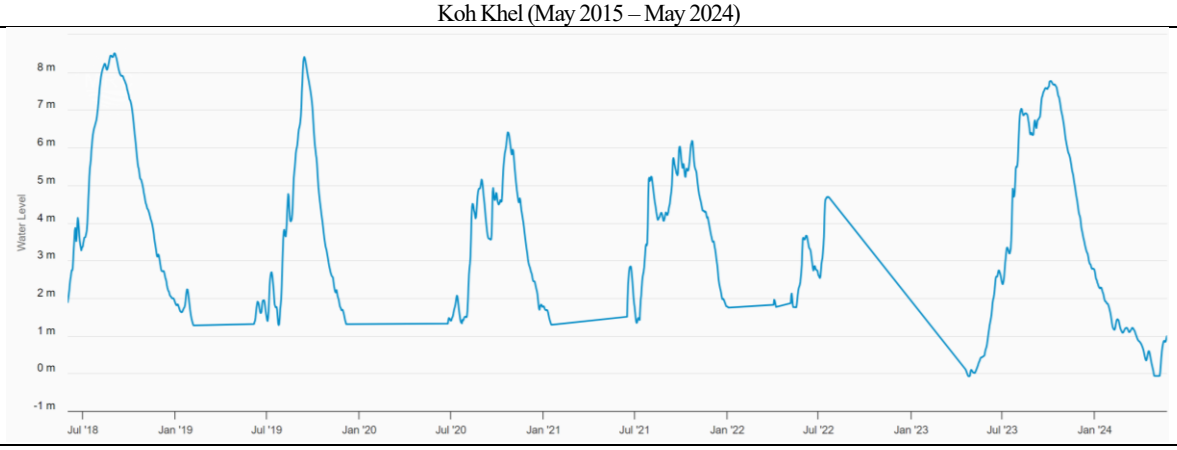
Figure 2.1-7 shows the water levels over the last 10 years recorded by the Chaktomuk, the Kog Khel and the Neak Luong, and the last 7 years recorded by the Kampong Ampil located around the target area.



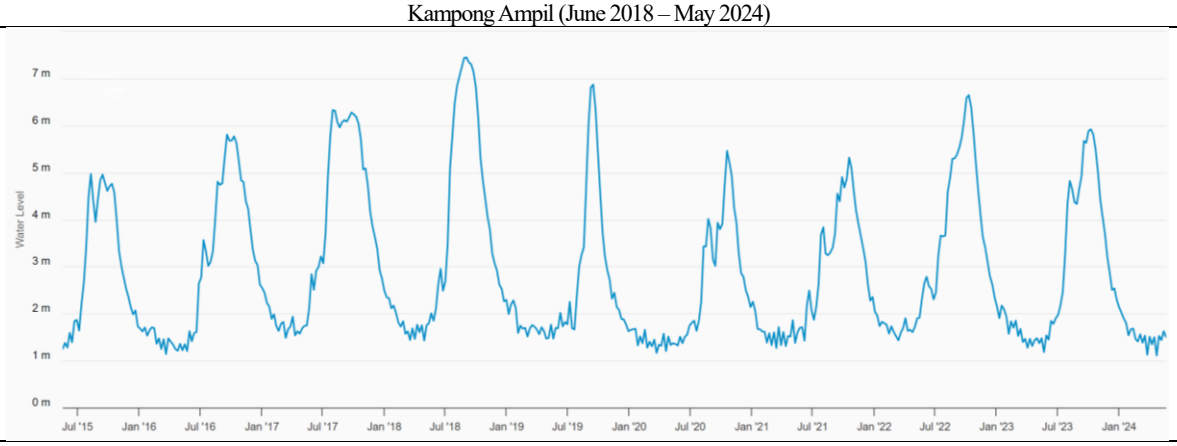
Chaktomuk (May 2015 – May 2024)



Koh Khel (May 2015 – May 2024)



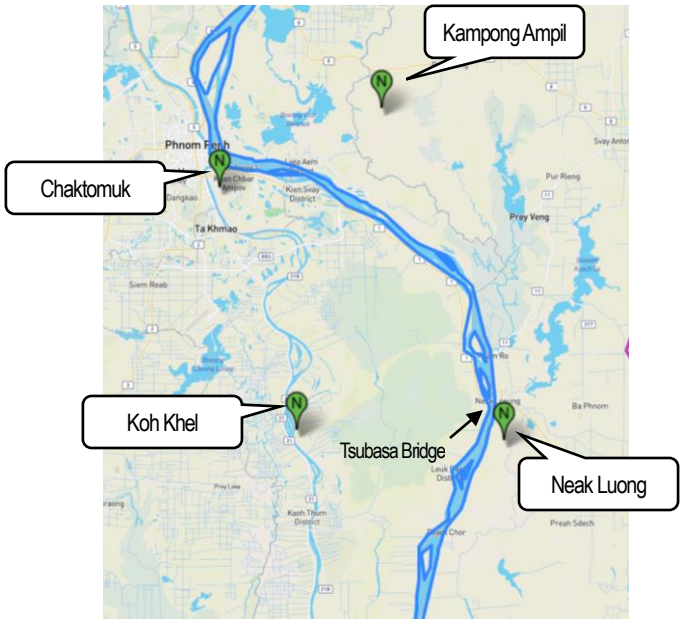
Kampong Ampil (June 2018 – May 2024)



Neak Luong (May 2015 – May 2024)

Source: Mekong River Commission "Data Catalogue"

Figure 2.1-7 Water Level at Chaktomuk, Koh Khel, Kampong Ampil and Neak Luong (2015-2024)



Source: Mekong River Commission

Figure 2.1-8 The Location of Water Level Station around the Target Area

During the rainy season, which extends from early June to approximately September each year, the water level of the Mekong River rises significantly. This increase in water level frequently leads to flooding in flood-prone areas. The disparity in water levels between the dry and rainy seasons can reach up to approximately 8 meters in the Chaktomuk. While flooding in the river basin causes considerable damage, it also has the beneficial effect of enriching the soil in agricultural lands.

Table 2.1-3 Flood Warning Level

Station Name	Flood Warning Water Level (MSL+)	Flood Water Level (MSL+)
Chaktomuk	10.50m	12.00m
Koh Khel	7.90m	8.41m
Kampong Ampil	-	-
Neak Luong	7.50m	8.00m

Source: Mekong River Commission

In recent years, water level of the Mekong River has been decreasing despite the increasing rainfall. This is thought to be due to the impact of dam development in the Mekong River Basin.

3) Flood Conditions in the Target Area

No flood damage has been confirmed at this time as the area along NR1, which is the target area for this project, has been improved in the past with JICA assistance and the pavement surface has been installed above the flood level by raising the road. Therefore, if the road is built at or above the level of the existing road, it is an indicator that flood damage will in general be excused. However, there are some concerns, such as unusual weather conditions in recent years and the impact of dam development upstream on the Mekong River, which need to be confirmed in the preparatory survey.

Another target area, the area on the other side of the Mekong River, also has extended wetlands, and urban areas along the Mekong River have flood damage. Especially recently constructed roads are often paved with concrete, and some of the surrounding residences are also raised floors, and interviews with local residents confirmed that flooding occurs every year.

Figure 2.1-9 Conditions on the other side of Mekong River

(4) Topography and Geology

1) Topography

Cambodia's topography can be divided into 3 distinct regions – the Central Plain, flat coastal areas, and mountain ranges with plateaus. The Central Plain forms 75% of the country and consists of the Mekong River and the alluvial plains of the Tonle Sap Basin.

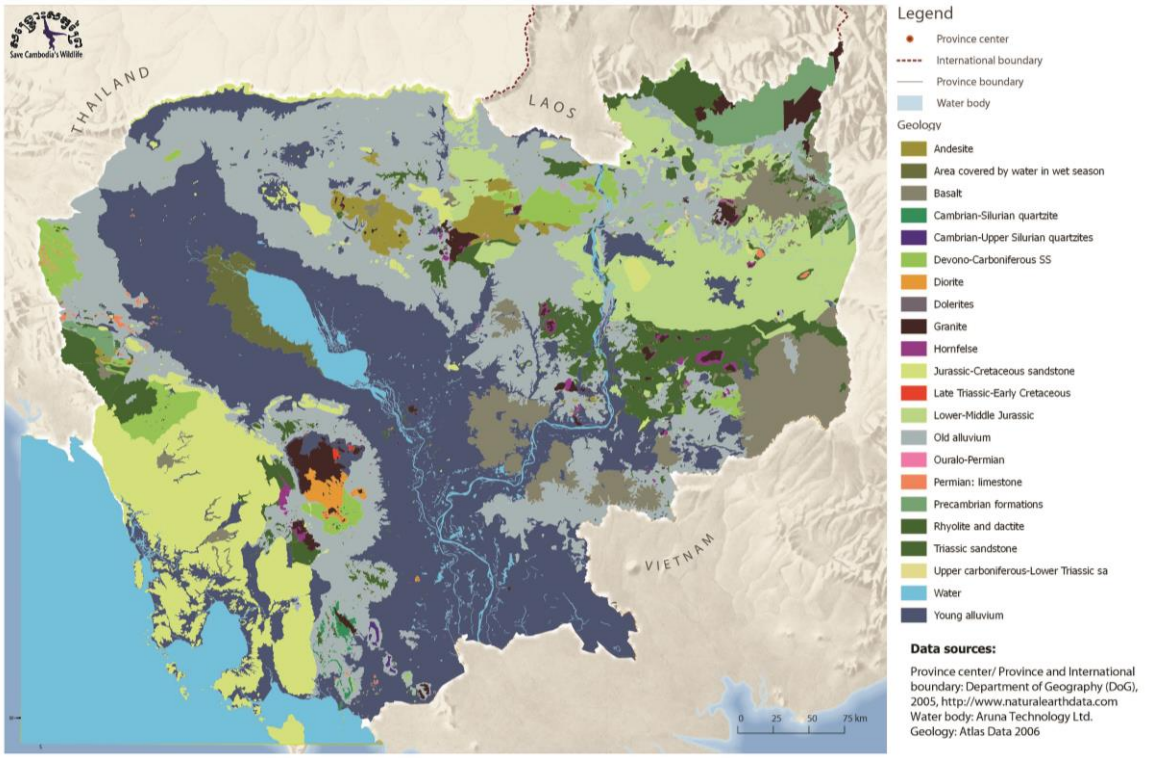
The target area is located on the right bank of the Mekong River along NR1, which connects Phnom Penh and the Tsubasa Bridge (Neak Luong Bridge). Urban areas extend along NR1, and the designated road connects these urban areas with RR2 and RR3. By linking to NR5 via these ring roads, this connectivity enhances the Southern Economic Corridor.

The target area is in the central plain, therefore most of the terrain is flat. Along National Highway 1 in the suburbs of Phnom Penh, expansive rice fields and wetlands are prevalent.

2) Geology

The geology of Cambodia is geologically composed of three distinct structures: Triassic, Jurassic-Cretaceous, and Quaternary. The Triassic is widespread in the East, while the Jurassic-Cretaceous forms an important upland in the West. In between, the Quaternary Basin occupies the entire central plain of the country.

The target areas are located along NR1 in the Central Plain and are distributed from the Quaternary Basin. Most of the target roads are laterite on the ground surface, and it is common to compact the existing laterite and use it as a subgrade.



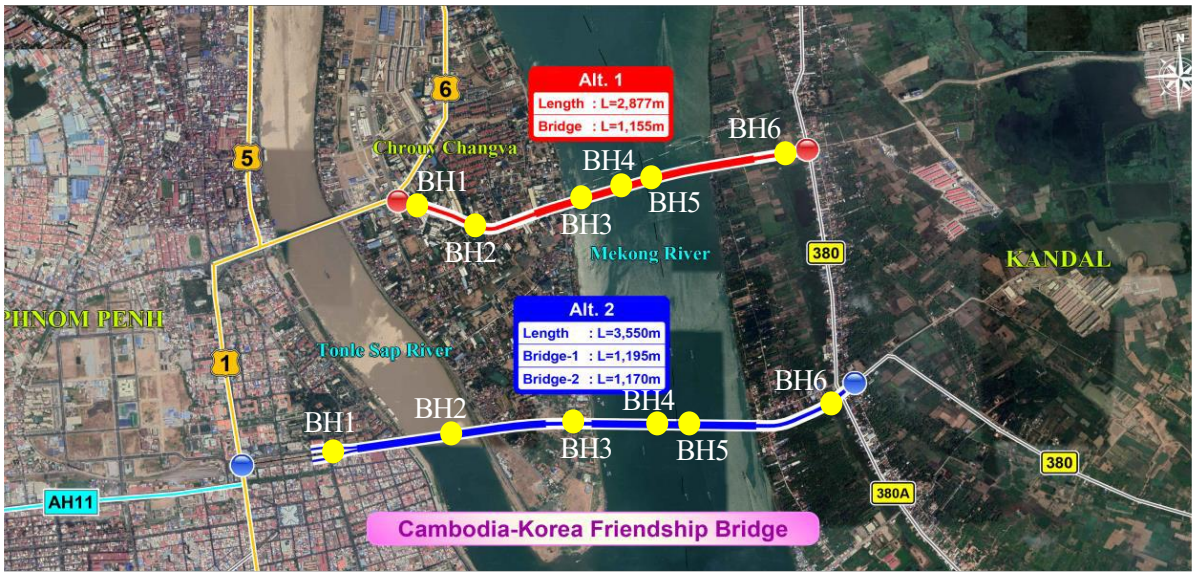
Source: Open Development Cambodia

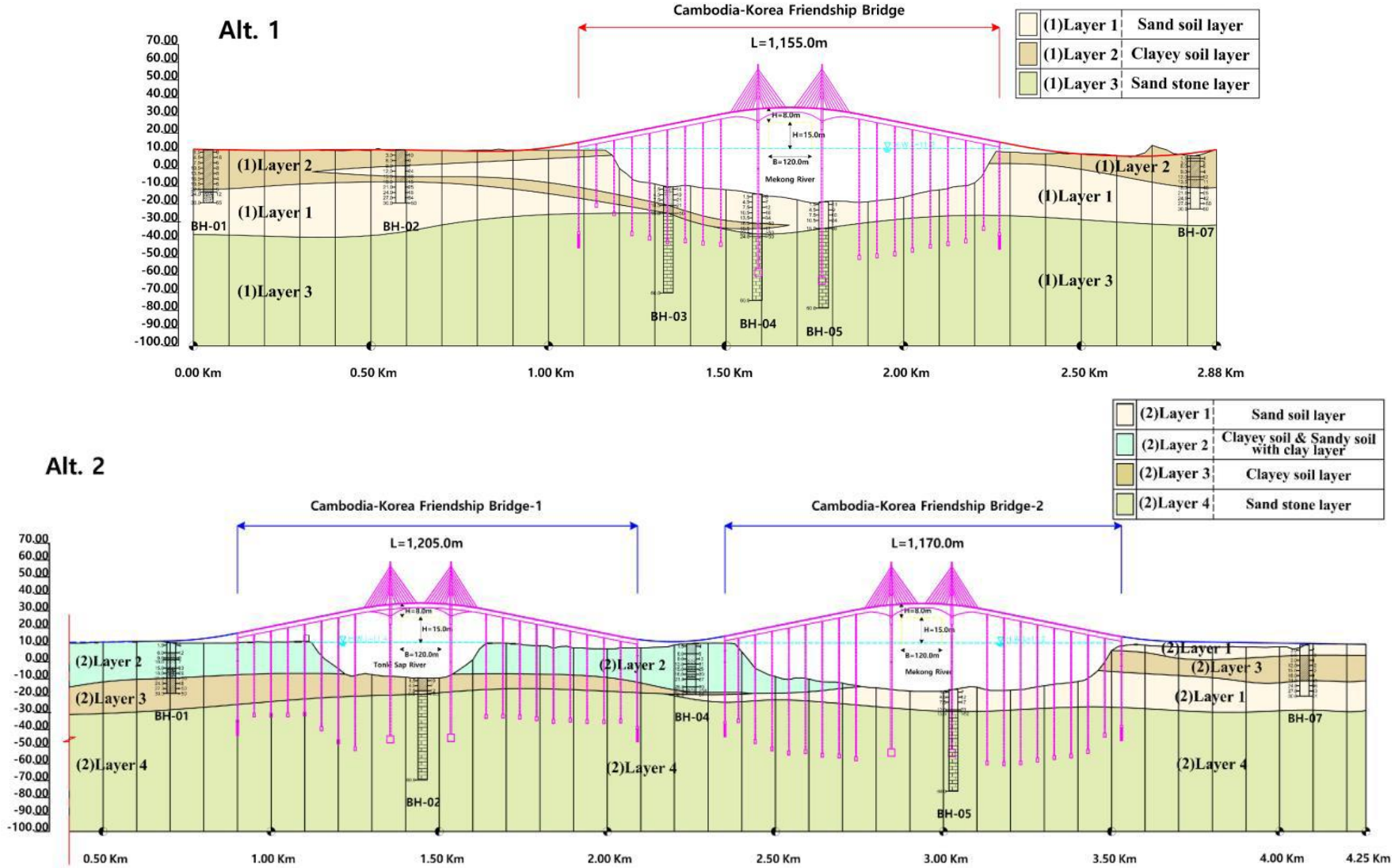
Figure 2.1-10 Geological Map in Cambodia

3) Geology near the proposed bridge and tunnel sites

One of the geotechnical investigations previously conducted in the vicinity of the proposed bridge and tunnel in the subject area is the "Cambodia-Korea Friendship Bridge FS". In this project, 12 borehole investigations were conducted and the geological distribution assumed on the project area is summarized in Figure 2.1-11.

The project route is located east of Phnom Penh and across reclaimed lands in Kandal Province, and the main soil types are estimated to be alluvial, saturated silty and sandy soils, with some podzol soils (acid soils) containing red-yellowish clay in some areas. Therefore, engineering troubles are not expected to occur in the general part of the site, although some soft ground reinforcement measures may be required in some parts.





Source: Feasibility Study for Cambodia-Korea Friendship Bridge Construction Project Final Report (April 2022)

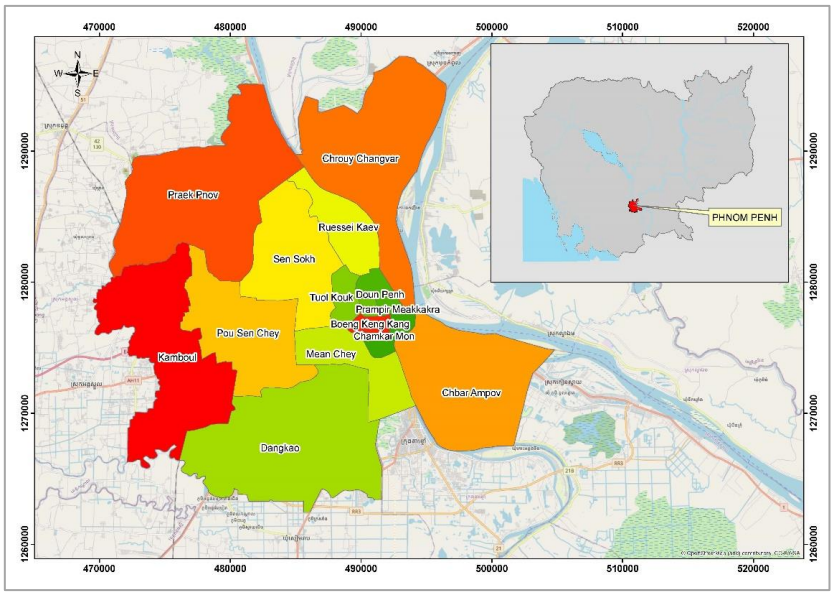
Figure 2.1-11 Geological distribution map on the Cambodia-Korea Friendship Bridge

2.1.3 Social Conditions

(1) Administrations

1) Phnom Penh

Phnom Penh Administration has been divided into 14 districts (Khan) with a total area of 678.46 square kilometers, as shown in Figure 2.1-12.

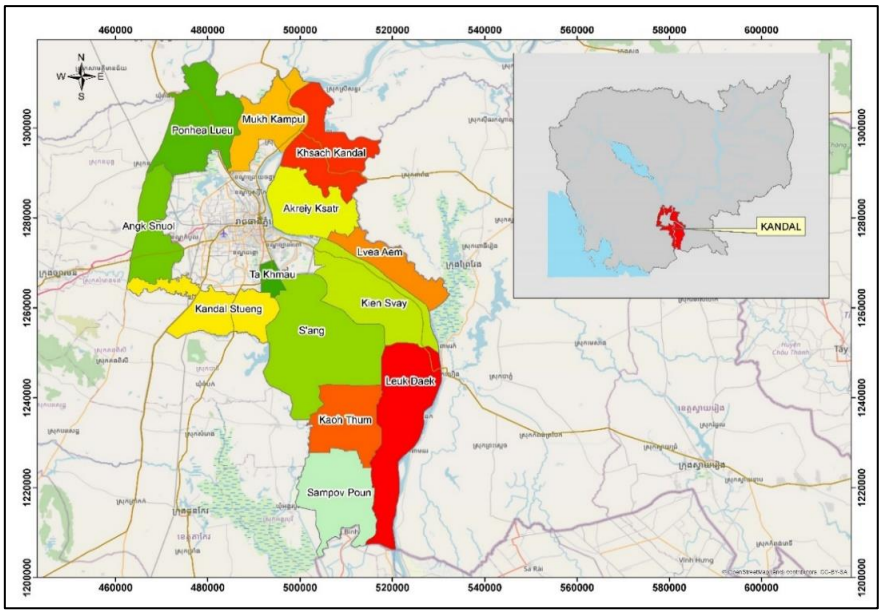


Source: JICA Survey Team

Figure 2.1-12 Phnom Penh Municipal Administration Map

2) Kandal

Kandal is one of the provinces in Cambodia and completely surrounded Phnom Penh Capital with area of 3,211.46 square kilometers. Kandal has been divided into 10 districts and 3 cities (Figure 2.1-13).

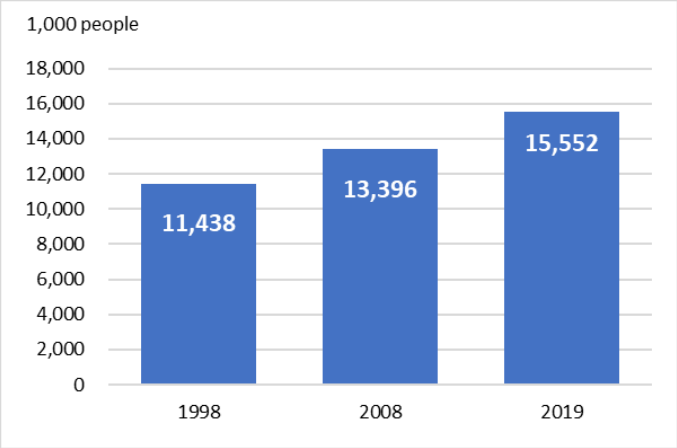


Source: JICA Survey Team

Figure 2.1-13 Location Map of Kandal Province

(2) Population

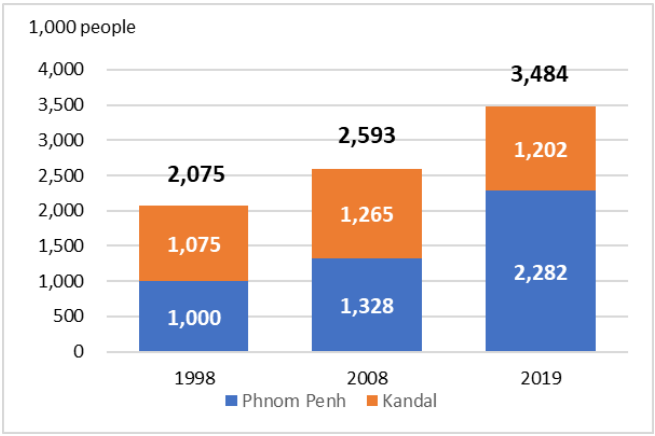
Population censuses were conducted in Cambodia in 1998, 2008, and 2019. Cambodia's population in 2019 was approximately 15.55 million, an increase of 2.16 million or 1.2 times from 2008. The average annual population growth rate is about 1.5%, and the population has been growing at a nearly constant rate since 1998.



Source: General Population Census 1998, 2008, 2019

Figure 2.1-14 Cambodia Population Trends

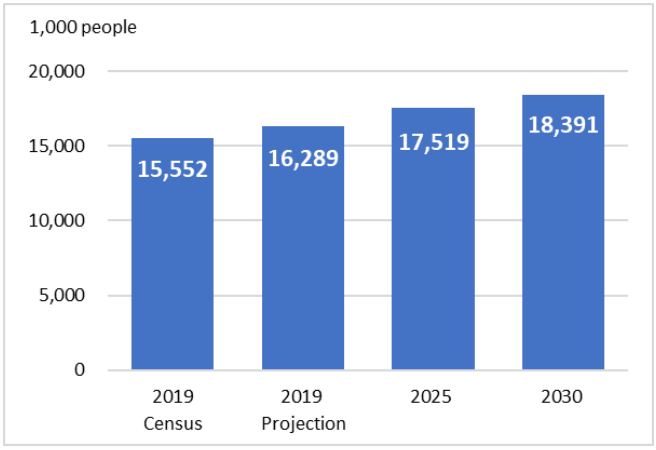
The target areas are consisted by Phnom Penh and Kandal. These target areas are home to 3.48 million people, or about 22% of Cambodia's population. The total population of the target areas in 2019 increased by about 891,000 people, or about 1.3 times, compared to 2008. The average annual population growth rate was about 4.9% in Phnom Penh and -0.5% in Kandal, which tends in Phnom Penh to be significantly higher than that of the Cambodian population as a whole (1.4%).



Source: General Population Census 1998, 2008, 2019

Figure 2.1-15 Population Trends in the Target Areas

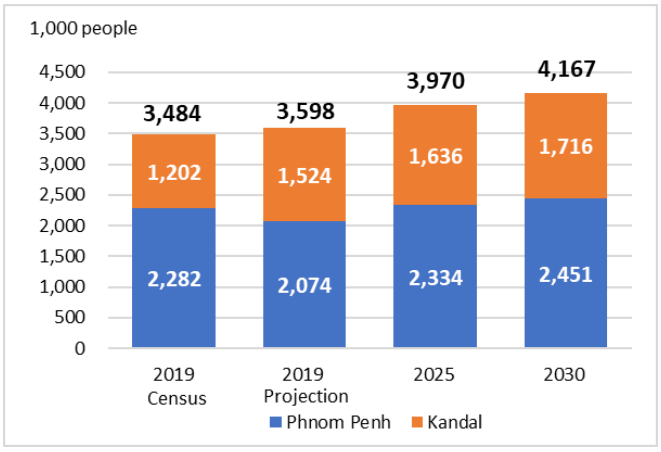
Cambodia's future population projections are based on the Population Projections for 2008-2030 from the 2008 Population Census. The report projects that Cambodia's future population will be 17.52 million in 2025 and 18.39 million in 2030. The average annual population growth rate is projected to be about 1.2% from 2019 to 2025 and 1.0% from 2026 to 2030, with the rate of growth decreasing each year. The population confirmed by the census in 2019 was about 5% (about 740,000 people) less than the report's projections.



Source: Population Projections for 2008-2030

Figure 2.1-16 Future Population Projections for Cambodia

The future population of the target area is projected to be 3.97 million in 2025 and 4.17 million in 2030. The average annual population growth rate is projected to be about 1.72% from 2019 to 2025 and about 1.02% from 2026 to 2030, with the population growing faster than Cambodia as a whole. A comparison of the 2019 Population Census with the report's projections reveals that the census population in Phnom Penh is about 10% (about 208,000 people) more, and in Kandal is about 21% (about 322,000 people) less than the population that had been projected.



Source: Population Projections for 2008-2030

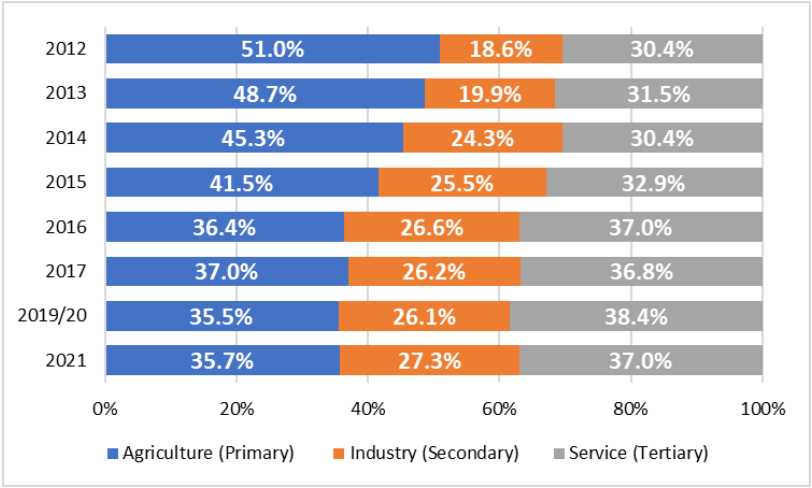
Figure 2.1-17 Population Trends in the Target Areas

(3) Industry

1) Current Situation

Agriculture has been the main industry in Cambodia for many years, but the share of agricultural workers has been declining in recent years. In 2019, the share of agricultural workers was 35.5%, down more than 20% from a decade ago. On the other hand, the share of secondary and tertiary industry workers has been increasing, and the share of tertiary workers in 2019-2020 was 38.4%, exceeding the share of primary industry workers for the first time.

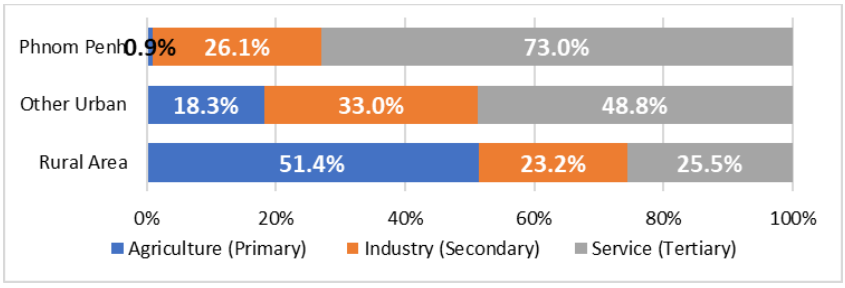
The following table shows the percentage of workers by industry in Cambodia.



Source: National Institute of Statistics "Cambodia Socio-Economic Survey 2012, 2013, 2014, 2015, 2016, 2017, 2019/20, 2021"

Figure 2.1-18 Percentage of Employed Population by Industry in Cambodia

By region, Phnom Penh and the major cities in Cambodia have a large percentage of tertiary industry workers. On the other hand, agriculture is the main industry in the rural areas, as more than half of the workers are engaged in the primary industry. Below are the percentages of employed population by industry (2019-2020) presented in the form of a comparison between Phnom Penh, other urban areas, and rural areas.



Source: Statistical Yearbook of Cambodia 2021

Figure 2.1-19 Percentage of Employed Population by Industry in Cambodia (2019/20): Comparison of Phnom Penh, Other Urban Areas, and Rural Areas

In accordance with Cambodian Industrial Development Policy 2015 – 2025 (IDP), before 2015, the Cambodian industry was categorized as weak as reflected by its simple structure, narrow base and low level of sophistication, while mostly concentrated in garment and food processing industries.

After 2015, following the long-term Vision for Cambodia for 2030 and as pointed out by the Rectangular Strategy Phase III, to the structural transformation of Cambodian economy in reaching a middle-income country status, the Royal Government of Cambodia (RGC) had considered the industrial sector as a key driver of its economic growth.

As shown in Table 2.1-4, one of the main goals of IDP as of 2015 was transforming and strengthening the industrial structure in the national economy, by increasing the GDP share of industrial sector to 30% in 2025 from 24.1% of GDP in 2013 with the manufacturing sector growing from 15.5% in 2013 to 20% in 2025.

Table 2.1-4 Targeted Distribution of GDP by Sector

Sector	2013	2015	2020	2025
Agriculture	31.6 %	29.0 %	25 %	23 %
Industry	24.1 %	26.2 %	28 %	30 %
- Manufacturing	15.5 %	16.0 %	18 %	20 %
Service	38.5 %	39.4 %	40 %	40 %
Taxes on products less subsidies	5.8 %	5.4 %	7 %	7 %

Source: Cambodia Industrial Development Policy (March, 2015)

In 2021, "Mid-term Review Report of the Cambodian Industrial Development Policy 2015 – 2025" was approved by Council of Ministers and published by the Councils of the Development of Cambodia (CDC) on the assessment of IDP target vs achievement. On the basis of the vision "the transformation and modernization of Cambodia's industrial structure from a labor-intensive industry to a skill-based industry by 2025," Cambodia had been partially achieved a target for linking with global value chains, integrating into regional production networks and developing clusters while strengthening competitiveness and improving the productivity of domestic industries and marching toward developing modern technology and knowledge-based industry.

The share in Industry sector grew quickly from 24.1% in 2013 to 27.7% in 2015 and reached 34.2% in 2019 with an annual average growth rate of 1.6% between 2015 and 2019, which allowed this indicator to achieve the target much earlier than planned. As a matter of fact, the target of 30% in 2025 was already achieved in 2019 (34.2%) and if this growth rate continues throughout 2025, Cambodia's industry share in GDP would reach 40%.

2) Issues and Analysis of Industry Sector in Cambodia

The adoption and implementation of IDP over the last nine years saw some noticeable progress and challenges, nine years after the launch of IDP infrastructure has been improved, both soft and hard, as evidenced by the development of the transportation and logistics system, the construction of expressways, the strengthening of the coverage and quality of electricity, etc., the adoption of laws and regulations and the launch of a digital framework and platforms. Similarly, the adoption and preparation of some laws, policies, and policy frameworks such as−the new Law on Investment, the PPP law, the five-year Strategic Plan 2019-2023 for the agriculture sector, the digital economy and society policy framework 2021-2035, the draft policy on digital government 2021-2030, the science, technology & innovation roadmap 2030(STI Roadmap 2030), and the draft policy on SMEs development 2021-2026, will also contribute to the realization of the IDP objectives.

The following issues mention content related to the Southern Economic Corridor and the transportation and transit sector, which are highly relevant to this survey.

<u>Sustainable Public and Private Investment in Infrastructure</u>

The infrastructure gap remains large which is increasing the cost of basic infrastructure services (transport, energy, urban, water) and constraining trade and regional connectivity. Gaps in domestic and regional transport connectivity impact the efficiency and resilience of supply chains and raise the cost of trade. Investments are needed to address specific infrastructure gaps in regional connectivity: to improve the Southern Economic corridor across Thailand, Cambodia, and Vietnam; to improve the inland waterway connection with Vietnam; and to improve the existing railway operations and infrastructure links with Thailand. It is also important to improve trade facilitation and logistics performance.

Promotion of Industrial Diversification and Responding to Uncertainties in the Global Economy

Assessing the overall performance of IDP in achieving expected changes in this intervention area requires a combination of multiple indicators to measure each dimension of industrial infrastructure including energy, transport and logistics system, and digital infrastructure.

On the other hand, the business environment (such as widespread corruption and lack of competitiveness in the domestic product market) is an issue that will be improved as soon as possible in order to become a global economy.

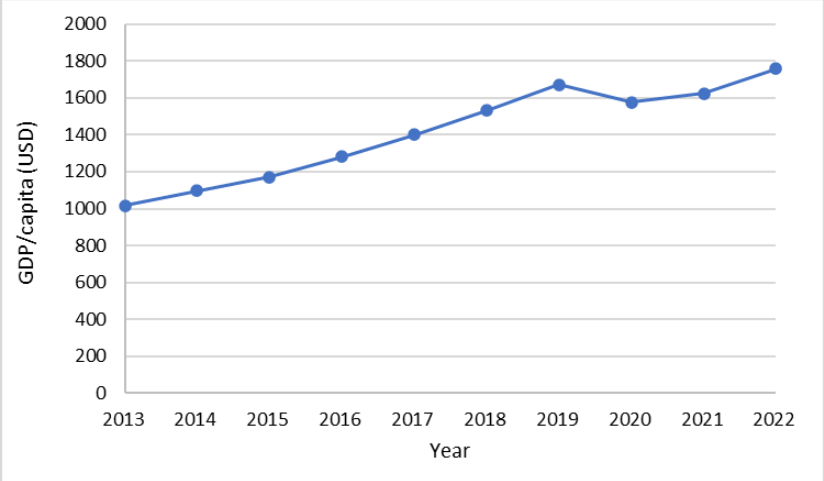
The Skill of the existing and future workforce

Raising learning outcomes is crucial to address skills shortages, develop a "future-ready" workforce, and drive future productivity growth. Firms are reporting growing skills shortages, and labor productivity growth has declined the past five years.

Therefore, in order to achieve the policy goals of the IDP, the government, the Strategic Plan for "Agriculture Sector 2019-2023" may have positive impacts on some IDP intervention areas including the promotion of agro-processing activities, the development of agro-processing zones, the adoption of new technology, and the development of human resources in the agricultural sector. And "Cambodia's Science Technology and Innovation Roadmap 2030" will also positively contribute to promoting human resources, technology transfer, and industrial innovation.

(4) Income Level

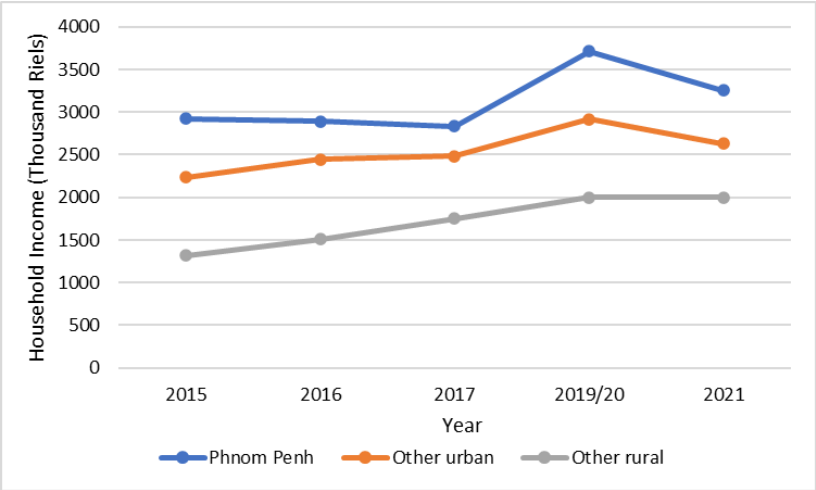
Figure 2.1-20 shows Cambodia's gross domestic product (GDP) per capita, which as of 2022 was 1,760 USD. Although GDP per capita decreased in 2020 due to COVID-19, it increased 1.7 times in 2022 compared to 2013.



Source: The World Bank

Figure 2.1-20 Gross Domestic Product Per Capita

Figure 2.1-21 shows trends in household income per month by region. Household incomes in the capital, urban, and rural areas are rising; however, comparing the capital (Phnom Penh) to the rural areas, the income disparity is about 1.6 times as large.

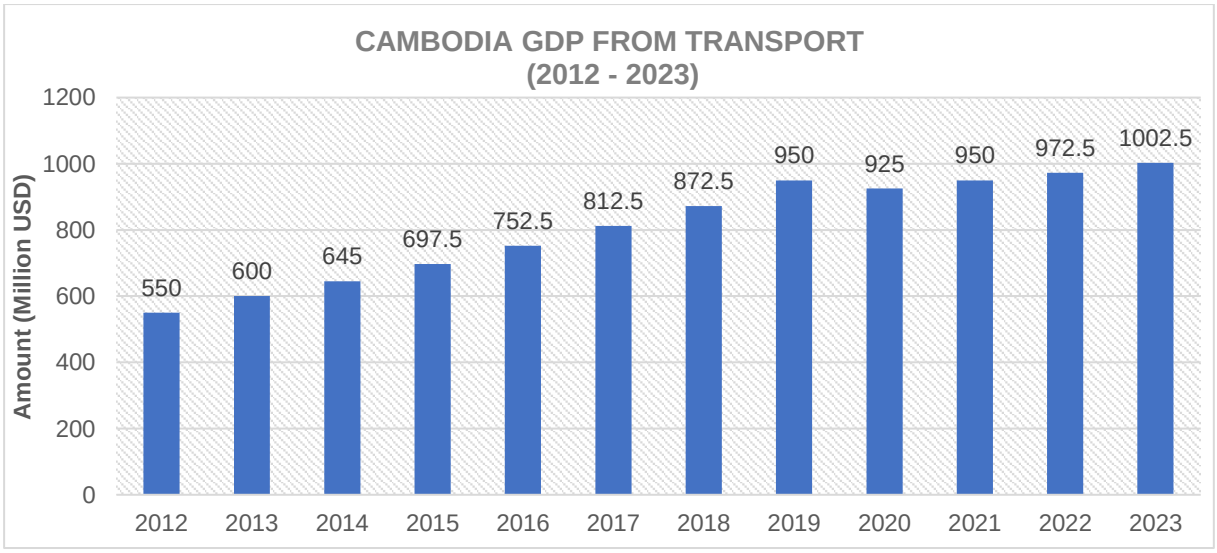


Source: National Institute of Statistics "Cambodia Socio-Economic Survey 2021"

Figure 2.1-21 Household Income Per Month

Cambodia is the linchpin in the Southern Economic Corridor (SEC) development project, connecting Myanmar, Thailand and Vietnam. Phnom Penh is central to the pathway connecting Bangkok and Ho Chi Minh City.

According to Asian Development Bank (ADB) Report, Cambodia GDP from Transport in Cambodia increased to 3,889.50 KHR Billion in 2022 (equivalent to 972.5 million USD) from 3,803.40 KHR Billion (equivalent to 950 million USD) in 2021.



Source : https://tradingeconomics.com/cambodia/gdp-from-transport

Figure 2.1-22 Cambodia GDP from Transport Sector (2012 - 2023)

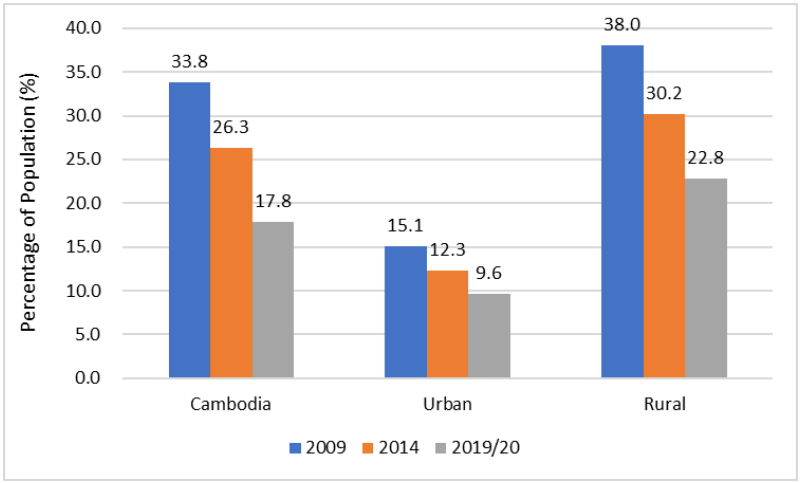
(5) Poverty Rate

The poverty rate is defined as proportion of population living below the National Poverty Line, which is each person having the income and resources to consume 2,000 kilocalories per day, based on daily consumption of food, non-food items, and water. The government defines the amount of that poverty line as shown in Table 2.1-5. In the new poverty line and poverty rate for Cambodia for 2019-2020 published by the Ministry of Planning, the poverty line for Cambodia is set at 10,951 KHR/day.

Table 2.1-5 Comparison of Poverty Rates by Region (KHR/day)

Area	1997	2009	2019
Phnom Penh	4,185	6,327	10,951
Other urban areas	3,438	4,352	9,571
Rural areas	3,213	3,503	8,908
Cambodia	3,332	3,871	10,951

Source: Ministry of Planning "Poverty in Cambodia – a New Approach, Redefining the Poverty Line, 2013"
Source: Ministry of Planning "Declaration No. 0909 on new poverty line and poverty rate in Cambodia 2019-2020, 2021"



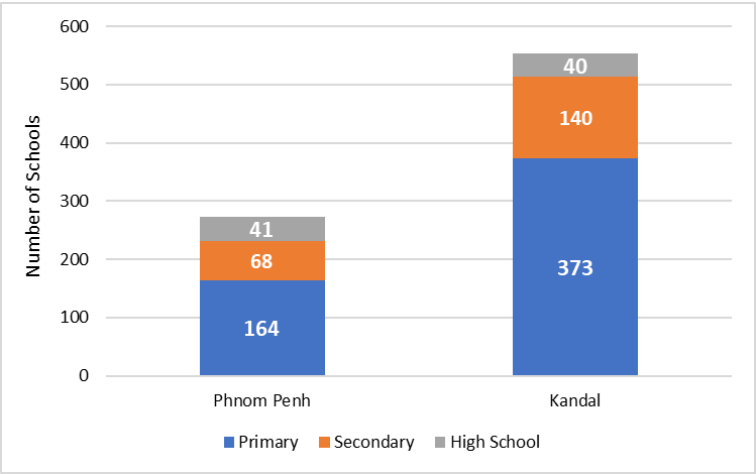
Source: The World Bank "Cambodia Poverty Assessment, 2022"

Figure 2.1-23 Poverty Trends, 2009-2019

(6) Educational Environment

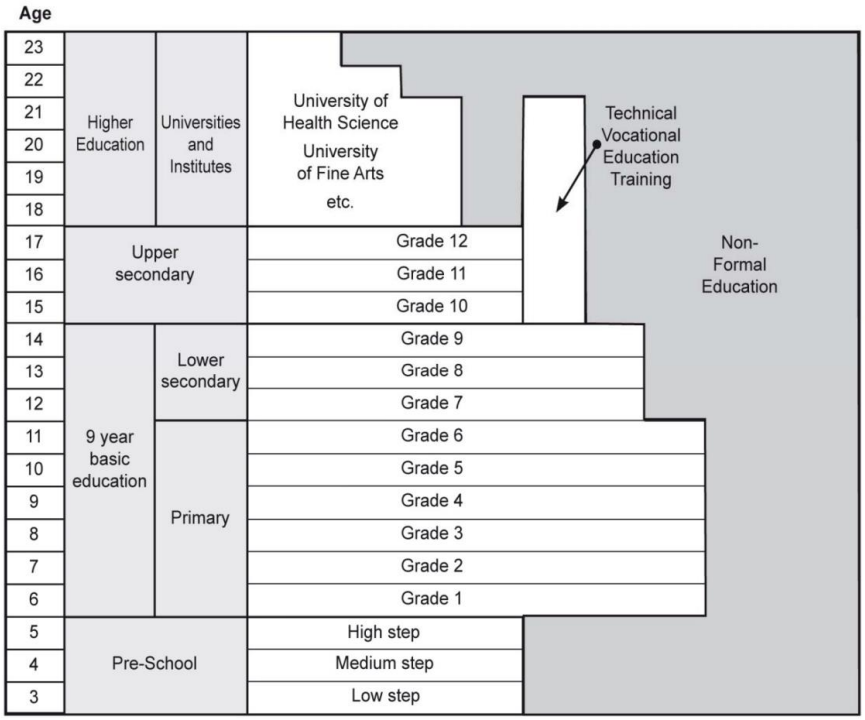
Since many educational facilities are located along NR1, the characteristics of the educational environment in the target area were surveyed.

The education system in Cambodia consists of six years of primary school, three years of secondary school (lower secondary school), and three years of high school (upper secondary school), with primary and secondary school education being compulsory. Figure 2.1-24 shows the number of schools in the target area.



Source: Ministry of Education, Youth and Sport "Public Education Statics & Indicators, 2021-2022"

Figure 2.1-24 Number of Schools



Source: National Institute of Statics "Report of Cambodia Socio-Economic Survey 2021"

Figure 2.1-25 Education System in Cambodia

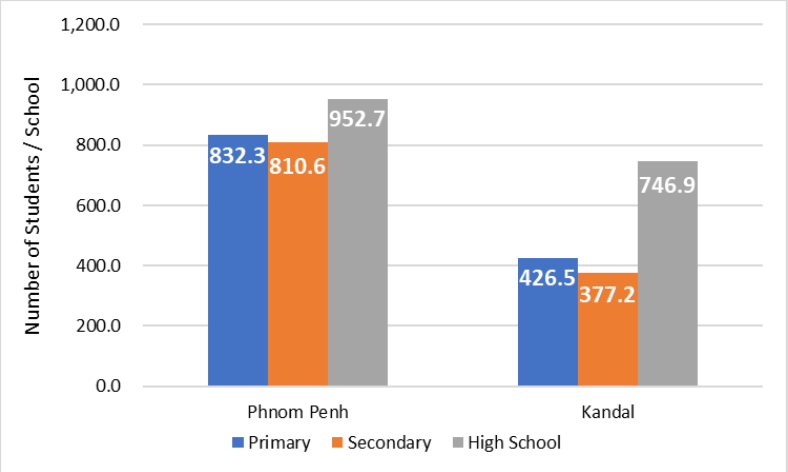
As shown in Table 2.1-6, the coverage area per school tends to be larger in Kandal for both primary, secondary and high schools.

Table 2.1-6 Coverage Area per School (km²/school)

	Area (km²)	Primary school km²/school	Secondary school km²/school	High school km²/school
Phnom Penh	692.46	4.2	10.2	16.9
Kandal	3,255.00	8.7	23.3	81.4

Source: Phnom Penh Capital Hall
Source: Economic Census of Cambodia 2011 Provincial Report 08 Kandal Province, 2013

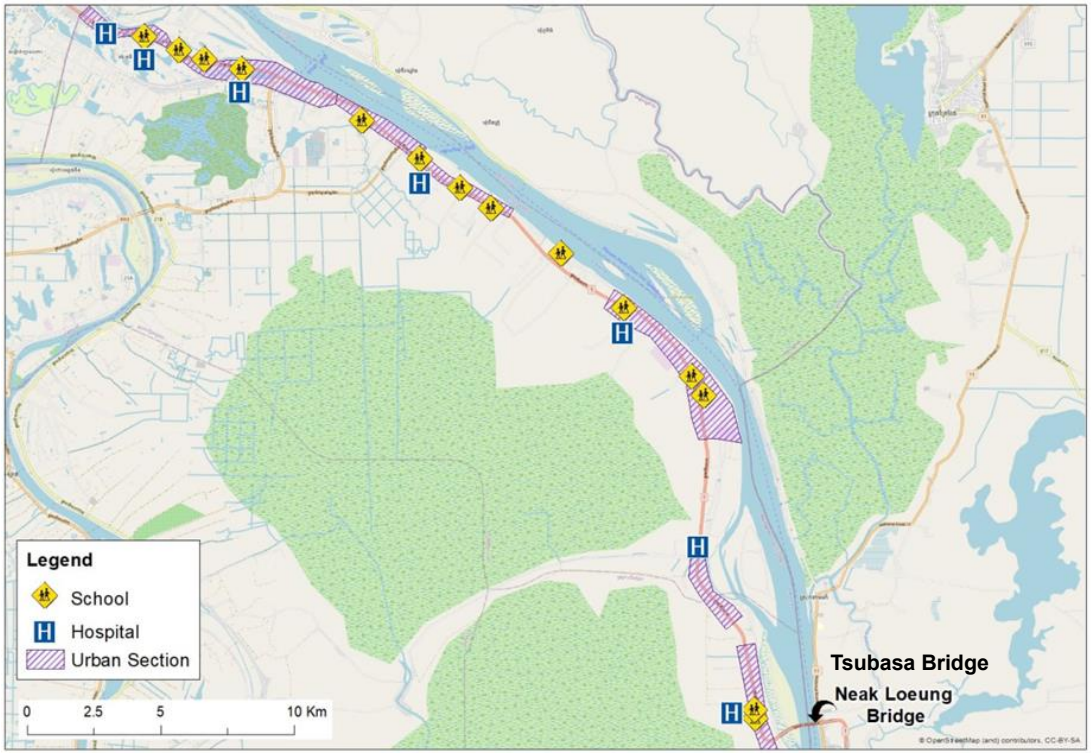
Figure 2.1-26 shows the number of primary school students per school. Students in Phnom Penh tend to be larger than those in Kandal.



Source: Ministry of Education, Youth and Sport "Public Education Statics & Indicators, 2021-2022"

Figure 2.1-26 Number of Students Per School

The figure below shows the locations of schools and health centers along the line, as provided by the DPWT Kandal.



Source: Department of Public Works and Transport of Kandal Province

Figure 2.1-27 Location Map of School, Health Center and Urban Section in Kandal Province

Table 2.1-7 List of School along NR1

No.	School Name	From KP	To KP	Length (m)
1	Koki Secondary School	19+500	19+700	200
2	Hun Sen Slakaet Primary School	20+880	21+000	120
3	Hun Sen Wat Koh Primary School	21+900	22+060	160
4	Jayavarman 7 Highschool	23+100	23+700	600
5	Hun Sen Sdao Kanlaeng Primary School	26+160	26+280	120
6	Banteay Daek Secondary School	31+100	31+200	100
7	Hun Sen Por Preok Primary School	33+000	33+100	100
8	Chey Utdom Primary School	34+360	34+460	100
9	Samrong Thom Primary-Highschool	40+660	40+960	200
10	Hun Sen Preak Treng Primary School	44+420	44+500	80
11	Hun Sen Dei Dos Primary School	45+200	45+280	80
12	Hun Sen Kampong Phnom Primary School	57+600	57+660	60
13	Hun Sen Kampong Phnom Highschool	57+880	58+100	220

Source: Department of Public Works and Transport of Kandal Province

(7) Medical Insurance

Since many healthcare facilities are located along NR1, the characteristics of the healthcare environment in the target area were surveyed.

Medical facilities in Cambodia are classified into national hospitals, referral hospitals (provincial/county hospitals), health centers, and health posts. Health centers and health posts are mainly for rural residents and provide primary diagnosis, first aid, treatment of chronic diseases, maternal and child health care, and vaccinations. On the other hand, referral hospitals provide medical care to patients who cannot be cared for by health centers or health posts, and the services provided by referral hospitals are called

Complementary Package of Activity (CPA), which are divided into three classes: CPA1, CPA2, and CPA3.

Following the above classification, CPA1 includes hospitals that cannot handle major surgeries requiring general anesthesia, CPA2 refers to hospitals that can handle major surgeries requiring urgent care and anesthesia, and CPA3 includes hospitals that can handle major surgeries requiring urgent care and anesthesia and that have a larger number of beds than the ones provided by CPA2 hospitals. The table below shows the number of public medical facilities in the target areas.

Table 2.1-8 Number of Public Health Care Facilities in Target Areas

	National and provincial hospital	District referral hospital	Health center	Health post	Total
Phnom Penh	1	7	43	7	58
Kandal	1	10	99	2	112

Source: National Institute of Statistics "Statistical Yearbook 2021"

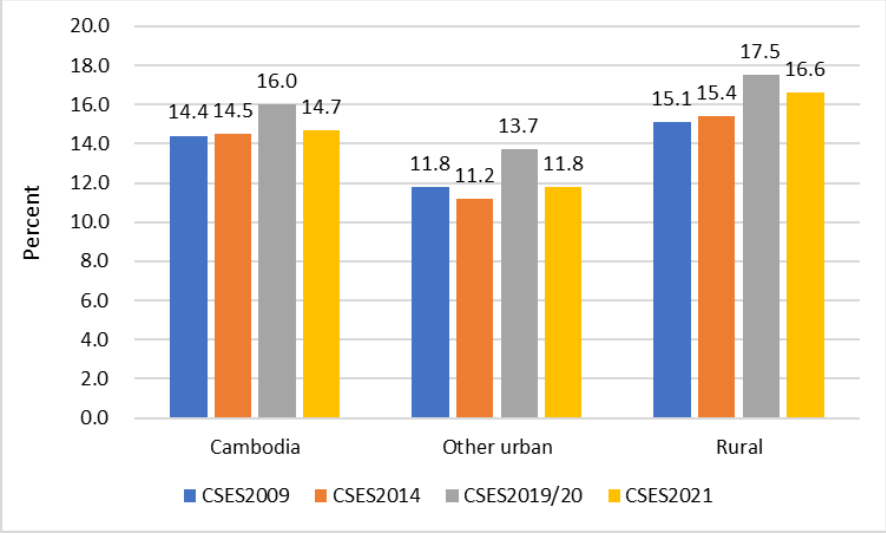
Table 2.1-9 shows the covered population per medical facility and the covered area per medical facility in the target areas. In Phnom Penh, a single medical facility serves approximately 40,000 people, resulting in an exceptionally high population coverage per medical facility.

Table 2.1-9 Covered Population and Coverage Area Per Medical Facility in the Target Areas

	Covered Population per Medical Facility (Person / Medical Facility)	Covered Area per Medical Facility (km^2 / Medical Facility)
Phnom Penh	39,345	11.94
Kandal	10,732	29.06

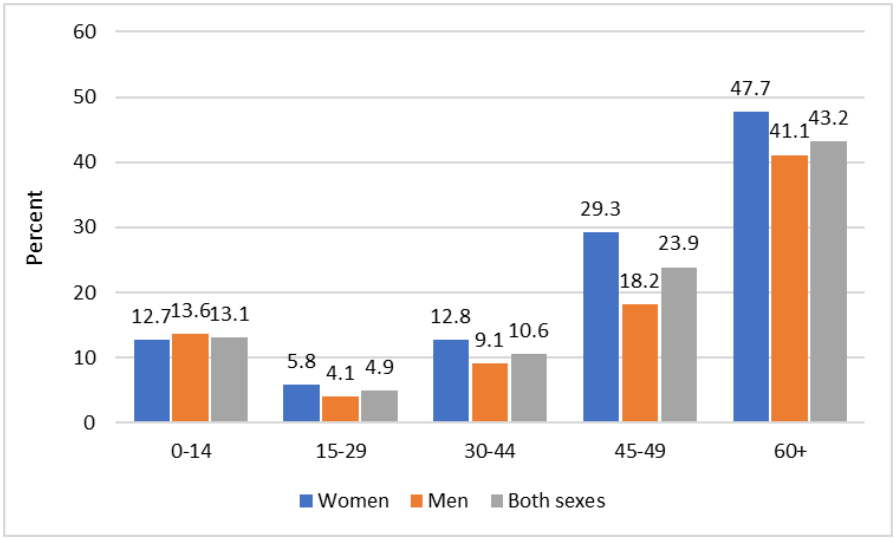
Source: National Institute of Statistics "Statistical Yearbook 2021"

According to the Cambodia Socio-Economic Survey 2021, 14.7% of residents were sick or injured in a month, and the percentage trend was upward until 2020, but there was a decline in 2021. Rural areas have slightly higher rates of injury and sick than urban. The percentage of respondents aged 60 and over was the highest, accounting for about 43% of the total.



Source: National Institute of Statics "Report of Cambodia Socio-Economic Survey 2021"

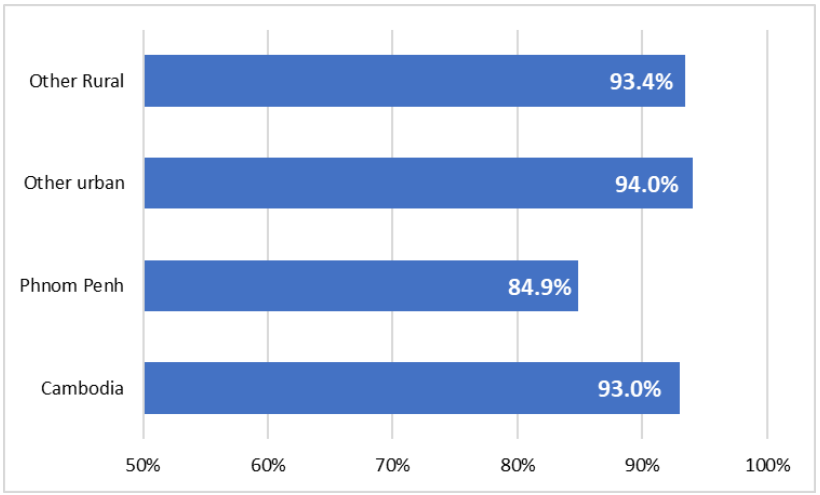
Figure 2.1-28 Illness/Injury in the Last 30 Days by Geographical Domain, 2009 to 2021 in Percent



Source: National Institute of Statics "Report of Cambodia Socio-Economic Survey 2021"

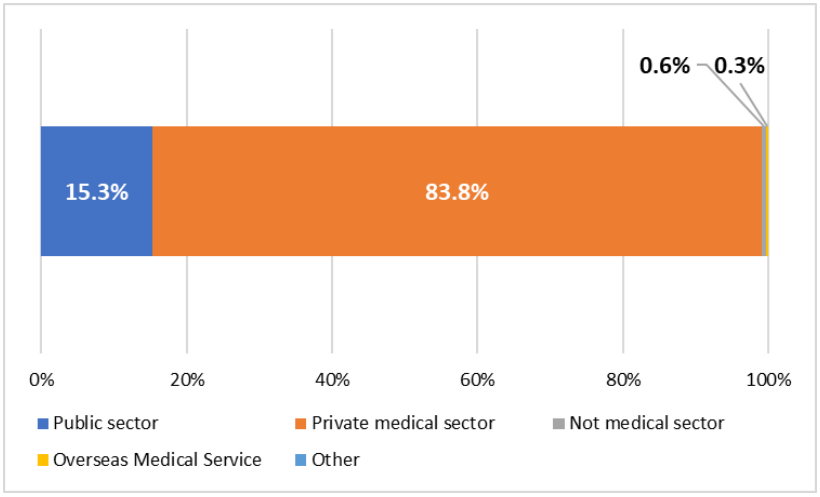
Figure 2.1-29 Illness/Injury in the Last 30 Days by Age Group and Sex, 2021 In Percent

About 93% of the residents who became sick or injured in the past month have been treated at a hospital. In addition, about 84% of the residents who received medical check used private medical facilities, and about 15% used public medical facilities. In Cambodia, it is customary to visit a medical facility when injured or sick, and it is assumed that residents in the target area also regularly visit a hospital.



Source: National Institute of Statics "Report of Cambodia Socio-Economic Survey 2021"

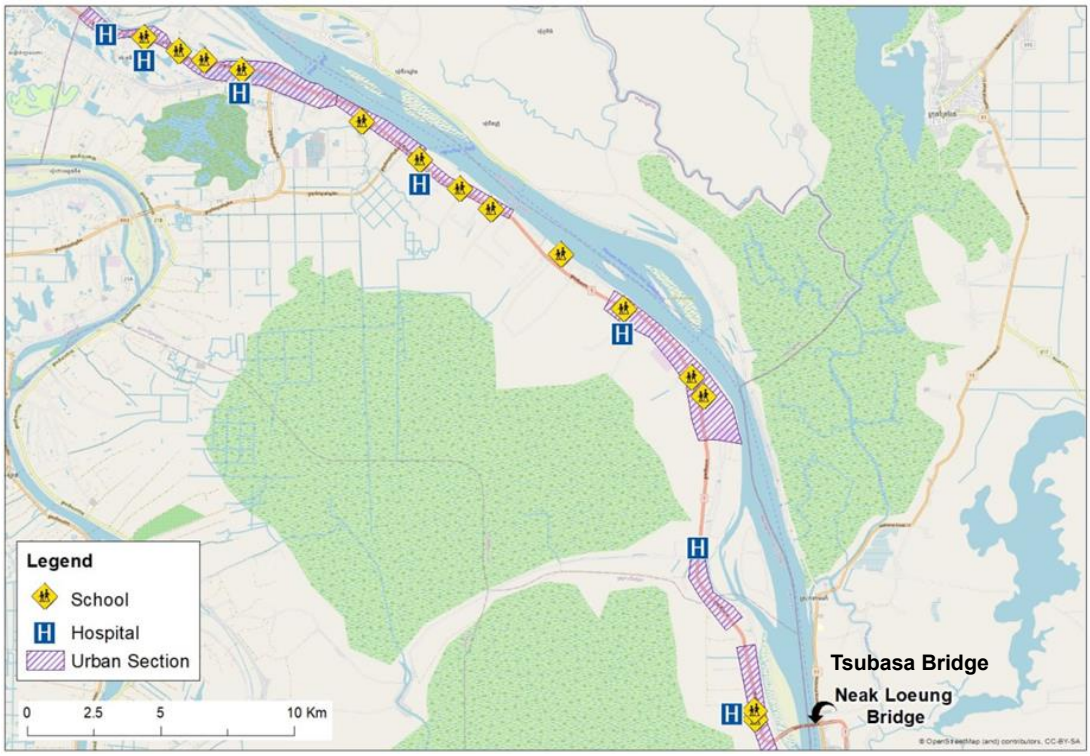
Figure 2.1-30 Health Care Visits (One or More Visits) in the Last 30 Days by geographical Domain, 2021. In Percent



Source: National Institute of Statics "Report of Cambodia Socio-Economic Survey 2021"

Figure 2.1-31 First Provider of Health Care among Household Members who were Seeking Care in the Last 30 Days, 2021. In Percent

The figure below shows the locations of schools and health centers along the line, as provided by the DPWT Kandal. (Reprint)



Source: Department of Public Works and Transport of Kandal Province

Figure 2.1-32 Location Map of School, Health Center and Urban Section in Kandal Province

Table 2.1-10 List of Public Health Center along NR1

No.	Health Center Name	From KP	Direction to Bavet
1	Kbal Koh Health Center	15+500	RHS
2	Phum Thom Health Center	17+850	RHS
3	Dei Eith Health Center	23+000	RHS
4	Banteay Daek Health Center	29+880	LHS

No.	Health Center Name	From KP	Direction to Bavet
5	Samrong Thom Health Center	40+300	RHS
6	Kokir Thom Health Center	50+700	RHS
7	Kampong Phnom Health Center	57+500	RHS

Source: Department of Public Works and Transport of Kandal Province

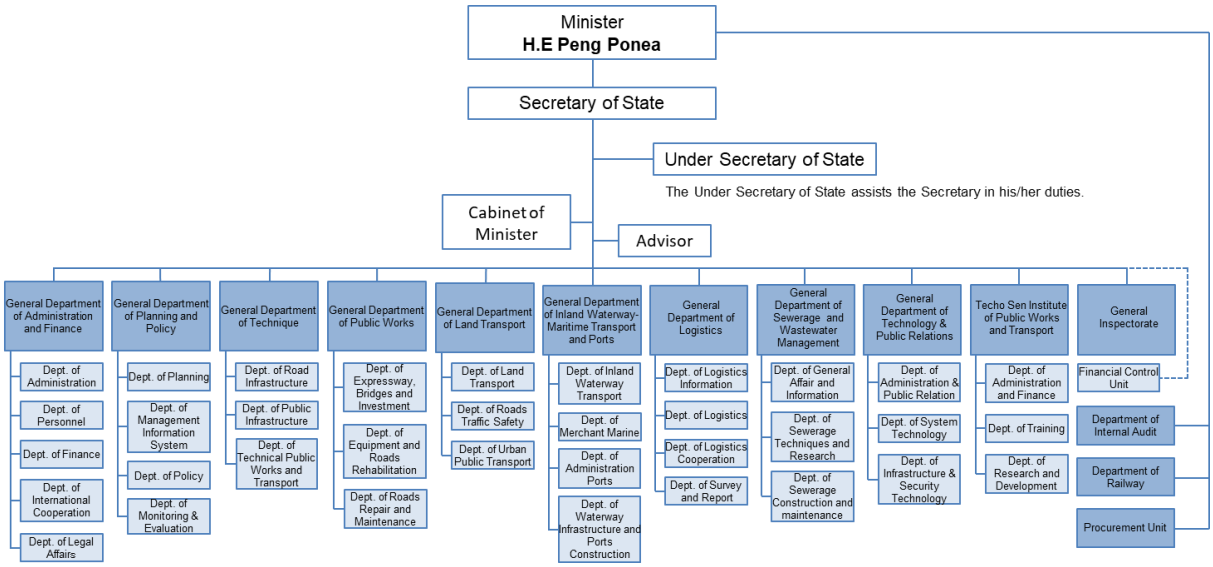
2.2 Current Status of Road and Bridge Sectors

2.2.1 Organizations / Authorities of Cambodia in charge of Road and Bridge Sectors

The followings are the organizations / authorities relevant to road and bridge sector in Cambodia.

(1) Ministry of Public Works and Transport (MPWT)

The organization chart of Ministry of Public Works and Transport (MPWT) are shown below.



Source: JICA Survey Team

Figure 2.2-1 Organization Chart of MPWT

The outline of the two organizations expected to be the main counterparts for the ODA loan project related to the Southern Economic Corridor (road and bridge sector) that is expected to be formed from this survey is as follows:

1) Department of Road Infrastructure (MPWT-RID)

Department of Road Infrastructure (RID) is under General Department of Technique in MPWT. RID takes charge of construction of national roads including ordinary bridges. RID has been in charge of JICA's previous road development projects in Cambodia (Rehabilitation of NR1, NR5, etc.).

2) Department of Expressway, Bridges and Investment (MPWT-EXMID)

Expressway, Mega Bridge and Investment Department (EXMID) is under General Department of Public Works in MPWT. EXMID takes charge of implementation of projects related to expressway and large sized bridges.

(2) Department of Public Works and Transport (DPWT)

Each of Cambodia's sub-national administrations (such as Phnom Penh Capital, Kandal Province etc.) has Department of Public Works and Transport (DPWT), which belongs under RID as an organization, and DPWT is in charge of maintenance for national roads and their ordinary bridges (Each DPWT archives as-built drawings of existing bridges).

(3) Ministry of Rural Development (MRD)

For rural roads, Ministry of Rural Development (MRD) is in charge of construction and maintenance.

2.2.2 High-level plans and maintenance policies for road maintenance

(1) Road Master Plan

MPWT formulated the Road Development Master Plan in 2004 and revised it in 2009 with JICA support. Road networks and infrastructure are defined as arteries that transform the country into an integrated economy and are critical to distributed economic growth. They play an essential role in contributing to poverty reduction, which is the government's highest target, by facilitating trade, movement of goods and services, by promoting tourism and rural development and by fostering integration of domestic markets as well as enabling integration with the region and the world. In order to achieve the above-mentioned purpose, the following six (6) strategies are set forth:

Strategy 1: Enhancement of multi growth pole development

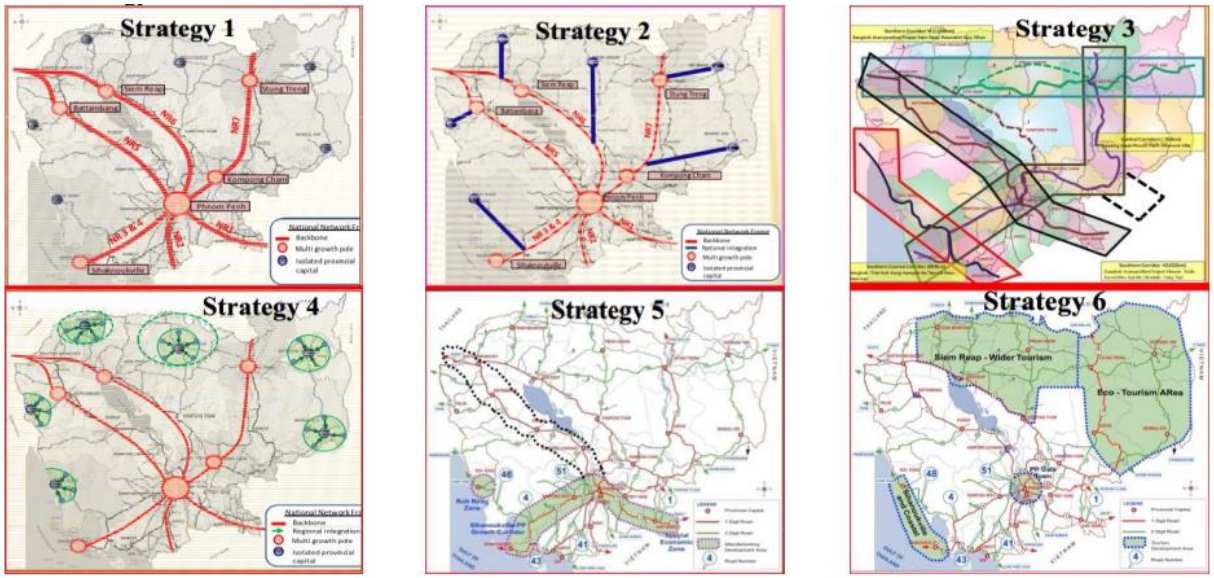
Strategy 2: National integration

Strategy 3: Development of international corridors for Cambodian Regional Integration

Strategy 4: Enhancement of rural socio- economic development, mainly agriculture development for poverty reduction

Strategy 5: Strengthening of economic growth corridor development

Strategy 6: Promotion of tourism development



Source: Overview on Transport Infrastructure Sectors in the Kingdom of Cambodia (2023, IRITWG)

Figure 2.2-2 Road Development Strategies

In this Road Development Master Plan, NR1 is positioned as a priority road, and the two-laning of Neak Loeung - Babette, the second Neak Loeung bridge and the Phnom Penh New Port - Neak Loeung are recommended as priority road improvement projects.

Cambodia's Road Master Plan study was funded by China under the Economic and Technical Cooperation Agreement signed on 08 April 2013. The task was carried out by Henan Provincial Communications Planning & Design Institute Co., Ltd and the final report was released in January 2017. According to the report, by taking into consideration various parameters such as population growth, economic growth, traffic demand (OD), vehicle ownership, etc., the planning of Cambodia road network is divided into three stages: Short term (2015-2020), Medium term (2021-2025) and Long term (2026-2030). The objectives of the planning of Cambodia road master plan are:

- 25,000km of national road for the overall scale of road network
- Highway technical level significantly enhances
- 30 international transport channel exports to connect neighbouring countries with multi-channel
- Vehicles can get to the national road from each district in ten minutes which can further enhance the road network coverage in Cambodia
- More than 2 national roads locate in each of 24 provinces and 1 municipality to form a national road network with more secure
- To form a connection and distribution highway system to connect 7 ports, 11 airports and national tourist cities such as Siem Reap, Phnom Penh and Sihanoukville

Table 2.2-1 Guidance for planning objectives of National Road Network in Cambodia

Functional Requirements		Planning Objective	Main roads
Speed up economic development	Develop the industry steadily	Develop road infrastructure for industrial development	NR1, NR18, NR13, NR3, NR4, NR41, NR31, NR33, NR43, NR31A, NR22, NR48
	Achieve sustainable development in agriculture	Connect main agricultural areas and promote the export of agricultural products	NR76, NR78, NR78C, NR78-5, NR7, NR71, NR71C, NR73, NR11, NR72, NR8, NR70, NR64, NR67, NR68, NR5, NR59, NR57, NR48, NR44
	Improve tourist service level	Connect tourist cities and areas with abundant resources, and form a resource development road network	NR51, NR3, NR4, NR48, NR48-5, NR33, NR33A, NR31, Ring Road of Phnom Penh
	Guarantee steady development of logistics industry	Improve logistics channel and reduce logistics costs	NR4, NR18, NR48, NR5, NR6, NR48, NR33, NR7, NR3, NR2, NR21, NR14
Coordinate regional development	Coordinate regional economic development	Enhance inter-provincial connection and form multi-directional smooth channels among various economic regions	NR1, NR13, NR8, NR7, NR21, NR2, NR3, NR4, NR48, NR55, NR5, PR146B, PR148
	Enlarge openness of inland and coastal regions	Enhance the links with surrounding main economic entities and national road networks, and build a large international transportation channel	NR1, NR2, NR5, NR6, NR7, NR72, NR88, NR74, NR764, NR78, NR78-5, NR62, NR67, NR68, NR55, NR57, NR48, NR14, NR18, NR21
	Speed up development of resources	Speed up development of resources and promote economic growth	NR7, NR11, NR73, NR76, NR78, NR9, NR64, NR62, PR2623B, PR2676B, NR44, NR53, PR1534, NR55, NR57, NR2, NR31, NR4, NR5
Improve social progress	Improve basic public service level	Enhance the links among medium and small cities, countries and towns	PR258A, PR157, PR2718, PR386, PR312, PR3789, PR266E, PR266F, PR129B, PR1TK5, PR2678
	Achieve balanced development	Improve north regional road network	NR7, NR9, NR60B, NR76, NR78, NR78C, NR78-5, NR92, NR94, NR95, NR62-3, PR2620, PR377B, PR2718, PR298, PR2647, PR2686B, P42678
	Support sustainable development	Emphasized environmental protection, avoid ecological	NR3, NR4, NR56, NR76, NR78, NR44, NR48, NR56, NR58, NR57, NR62, PR376B

Functional Requirements		Planning Objective	Main roads	
		sensitive areas, and utilize lands intensively		
Improve transportation corridor	Strengthening international transportation guarantee	Provide many routes in the international transportation corridor	NR1, NR3, NR4, NR5, NR6, NR7, NR9, NR33, NR48, NR78, NR64	
	Be adapted to diversified transportation demands	Provide multiple national roads in the main comprehensive transportation corridor	NR3, NR4, NR31, NR31A, NR41, NR43, PR1534, NR71, NR73, NR73C, NR9, NR95, NR62-3	
	Promote integration of comprehensive transportation	Enhance the links between comprehensive transportation junctions and other traffic junctions as well as logistics nodes	Air	NR4, NR5, NR6, NR7, NR9, NR76, NR78
			Railway	NR4, NR5, NR3, NR42, NR51, NR53, NR55, NR57, NR57B2
			Inland waterway	NR7, NR70, NR73, NR5, NR52, NR54, NR6, NR63, NR9
			Harbor	NR4, NR45, NR48, NR48-5, NR3, NR33
Maintain national stability	Comply with national administrative requirements	Enhance the links among administrative centers at the national, provincial and country levels	NR1, NR2, NR31, NR4, NR5, NR6, NR7, NR92, NR76, NR78, NR56, NR64, NR60B, NR33, NR44, NR57	
	Guarantee national security	Enhance the links with border regions and build important national frontier channels	NR78-5, NR92, NR94, NR58, NR59, NR55-1, NR55-4, NR57-7, PR2626, PR3768, PR3789, PR3766, PR2PVH5, PR2625, PR2678, P42686	
	Guarantee sustainable development of road traffic	Raise standards properly, and optimize existing road resources	NR1, NR2, NR31, NR4, NR5, NR6, NR7, NR55, NR43, NR22, NR11, NR45, NR48, NR13, PR3764, NR44	

Source: Overview on Transport Infrastructure Sectors in the Kingdom of Cambodia (2023, IRITWG)

Based on these survey results, the MPWT established the following road development policy:

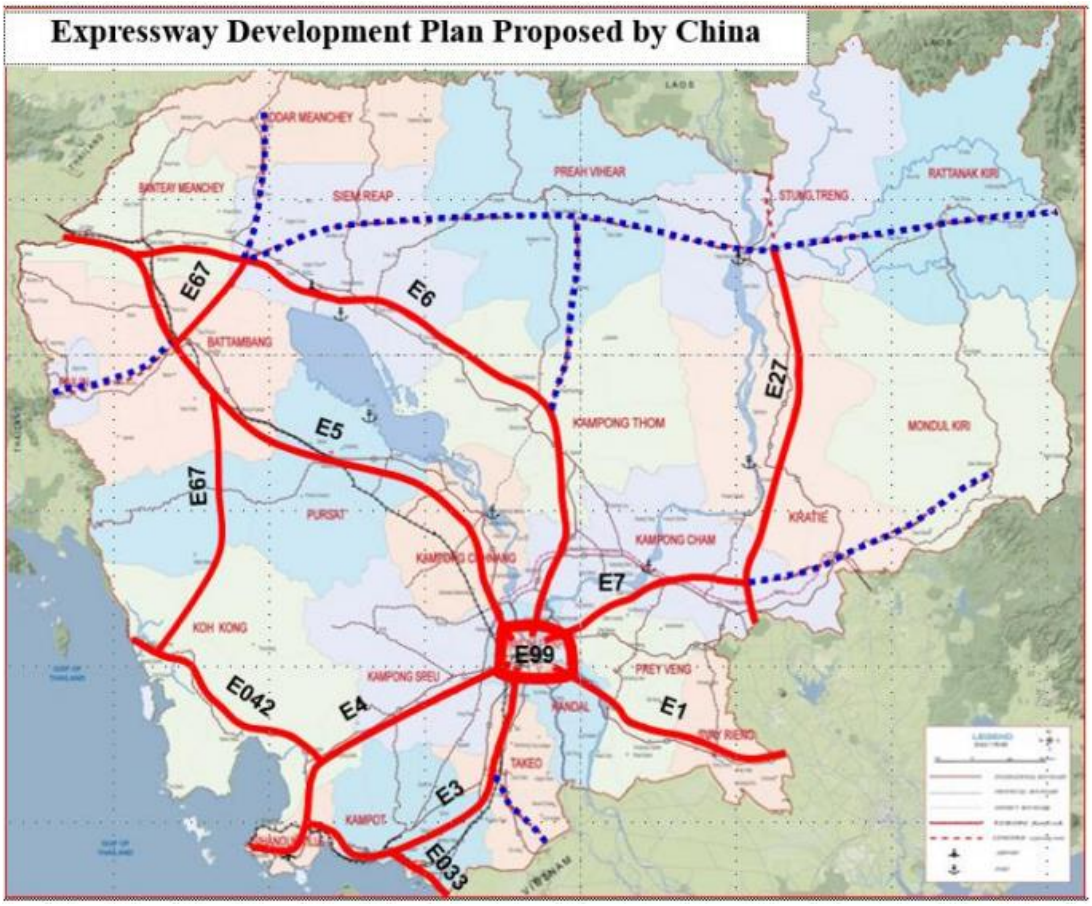
Table 2.2-2 Road Improvement Policy

Classification	Design Target
1-digit NR	To improve the road to be all weather condition by asphalt concrete pavement with sufficient capacity and standard for international corridor.
2-digit NR	To improve the road to be highway class function under all-weather condition by asphalt concrete pavement or DBST.
Provincial and Rural Road	To maintain the road function level to be trafficable in accordance with traffic demand by strengthening the road maintenance system.
Bridge	To replace all temporary bridges that remained in the completed road section to be a permanent bridge. To improve or replace all bridges with low standard (less than 7m to withstand 20ton loads) to be a permanent bridge.

Source: Overview on Transport Infrastructure Sectors in the Kingdom of Cambodia (2023, IRITWG)

(2) Expressway Master Plan

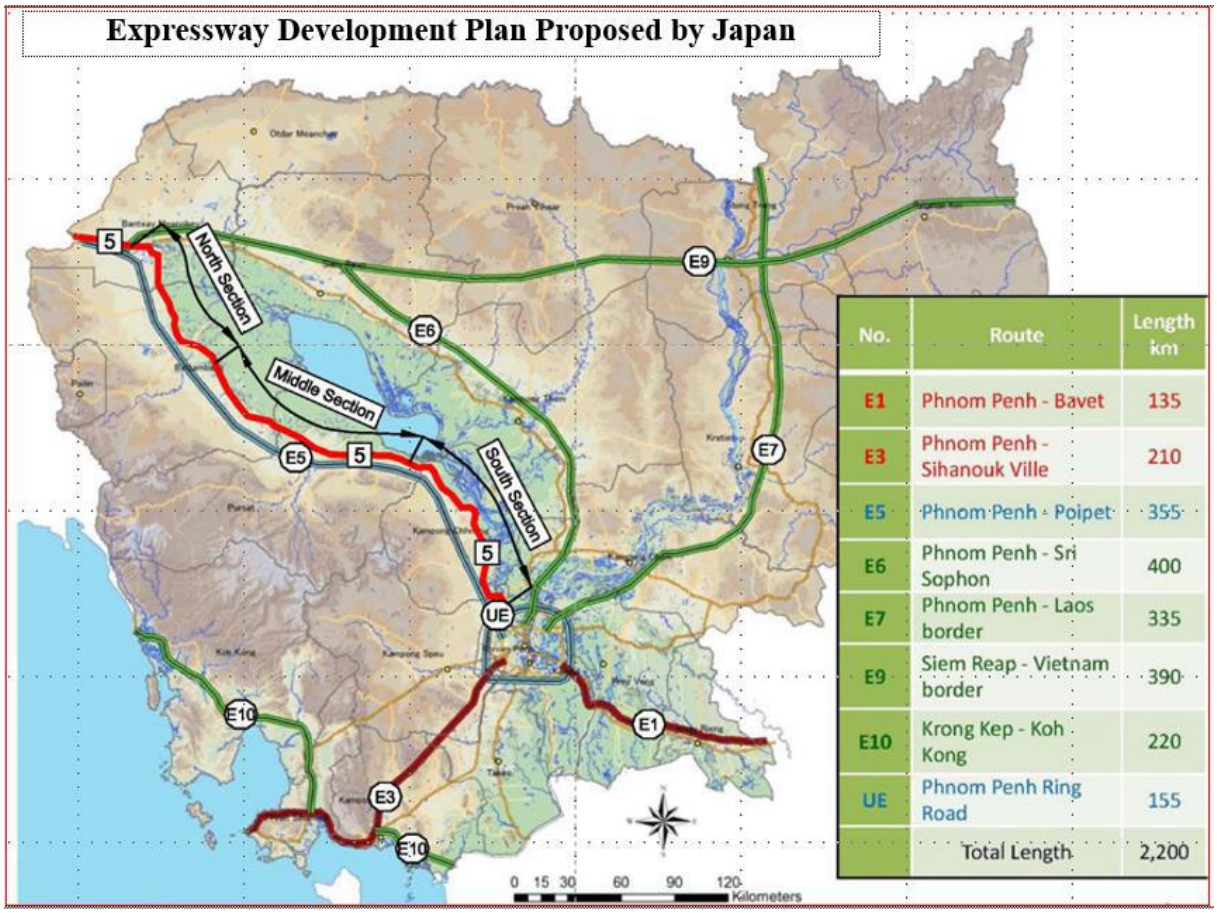
The expressway master plan of Cambodia had been started with the technical assistance of Henan Province, China in 2014. The study came up with 2,230 kilometers of Cambodia Expressway Network. Based on China's master plan report, Cambodia needs to develop some 2,230 kilometers of national expressway network by 2040 with the investment amount of approximately US$26 billion. But for the short-term plan, by 2020 the country needs to build about 850 kilometers in length requiring some US$9 billion.



Source: Overview on Transport Infrastructure Sectors in the Kingdom of Cambodia (2023, IRITWG)

Figure 2.2-3 Expressway Development Plan Proposed by China

Under these circumstances, JICA implemented "Data Correction Survey for Expressway Development in the Kingdom of Cambodia" in 2013. The survey recommended that a national expressway network, with a total length of 2,200km, be planned and constructed.



Source: Overview on Transport Infrastructure Sectors in the Kingdom of Cambodia (2023, IRITWG)

Figure 2.2-4 Expressway Development Plan Proposed by Japan

(3) The relevant laws for road and bridge maintenance

The relevant laws for road and bridge maintenance in Cambodia can be summarized into the following five categories.

Table 2.2-3 The Relevant Laws for Road and Bridge Maintenance

Law	Characteristics
Road Law	The Road Law was adopted by the National Assembly on 3rd of April 2014. This law is composed of 13 Chapters and 81 articles. This law is the division of road classification 6 categories (Expressways, National Roads, Provincial Roads, Rural Roads, Urban Roads and Special Roads). All of these roads will be managed by 3 ministries/agencies: ・ **Ministry of Public Works and Transport (MPWT)** in charge of Expressway, National Roads and Provincial Roads; ・ **Ministry of Rural Development (MRD)** in charge of Rural Roads and other roads as assigned by the Royal Government; and ・ **Sub-national Administration** is the competent authority, whose obligation include planning, design, construction, rehabilitation and road maintenance within the capital, cities and provincial towns.
Road traffic law	The Road traffic law was adopted by the National Assembly on the 5th of December 2014, and were amended on January 4, 2017. The Road traffic law composed of 12 Chapters and 92 articles. This law provides for general provisions, traffic signs and priority signs, drivers, pedestrian, competency of the traffic police, road accidents, driving license issues, vehicle identification and a number plate, law validity and implementation.

Law	Characteristics
National Port Policy	The National Port Policy, with the support from JICA, was developed on the 10th of May 2013. It is composed of 7 chapters. This law provides for the role of ports, the efficiency of maritime transport, strategies, plan and actions, monitoring and evaluation.
Law on Waterway Transport	MPWT drafted Law on Port, Law on Maritime Transport and Law on Inland Waterway Transport supported by JICA. These drafts were held in 2019 to hear the opinions of related organizations such as the private sector. In March 2024, the Law on Waterway Transport, which consolidated the three draft laws, was promulgated.
Public-Private Partnership	The government through MEF is promoting PPP mode of public investment. In 2016, the "Policy paper on PPP for Public Investment Project Management 2016-2020" was formulated. The draft law was approved by the government in June 2016 and approved by Cabinet by early October 2021. It comprises of 14 Chapters, 49 articles. Within the MPWT, a PPP Office is established under the Department of Logistics Cooperation, General Department of Logistics.

Source: Overview on Transport Infrastructure Sectors in the Kingdom of Cambodia (2023, IRITWG)

2.2.3 Present Status of Roads in Cambodia

(1) International Road Network in Cambodia (Economic Corridor)

Cambodia also has international road networks such as Asian Highway including AH-1, AH-11, AH-21, comprising a part of Southern Economic Corridor in Greater Mekong Subregion (GMS) as shown in the following figure.

Source: REVIEW OF CONFIGURATION OF THE GREATER MEKONG SUBREGION ECONOMIC CORRIDORS (2018, ADB)

Figure 2.2-5 GMS Economic Corridors

Table 2.2-4 Southern Economic Corridor in Cambodia

Name of international road		Transit Cities/provinces	Length in Cambodia (km)
GMS Economic Corridor	Asian Highway		
Southern	AH1	Poipet-Phnom Penh (NR5)	407.45
		Phnom Penh - Bavet (NR1)	166.85
		Total Length (km)	574.30
Southern	AH11	Phnom Penh - Sihanoukville (NR4)	214.20
		Phnom Penh - Skun (NR6)	75.00
		Skun - Trapengkreal (NR7)	460.83
		Total Length (km)	750.03
Southern	AH21	Siem Reap - Talaborivath (NR6+NR64+NR62+NR9)	305.20
		Talaborivath - Pongmoan (NR7)	19.00
		Pongmoan – Ou Ya Dav border (NR78)	187.70
		Total Length (km)	511.90

Source: MPWT

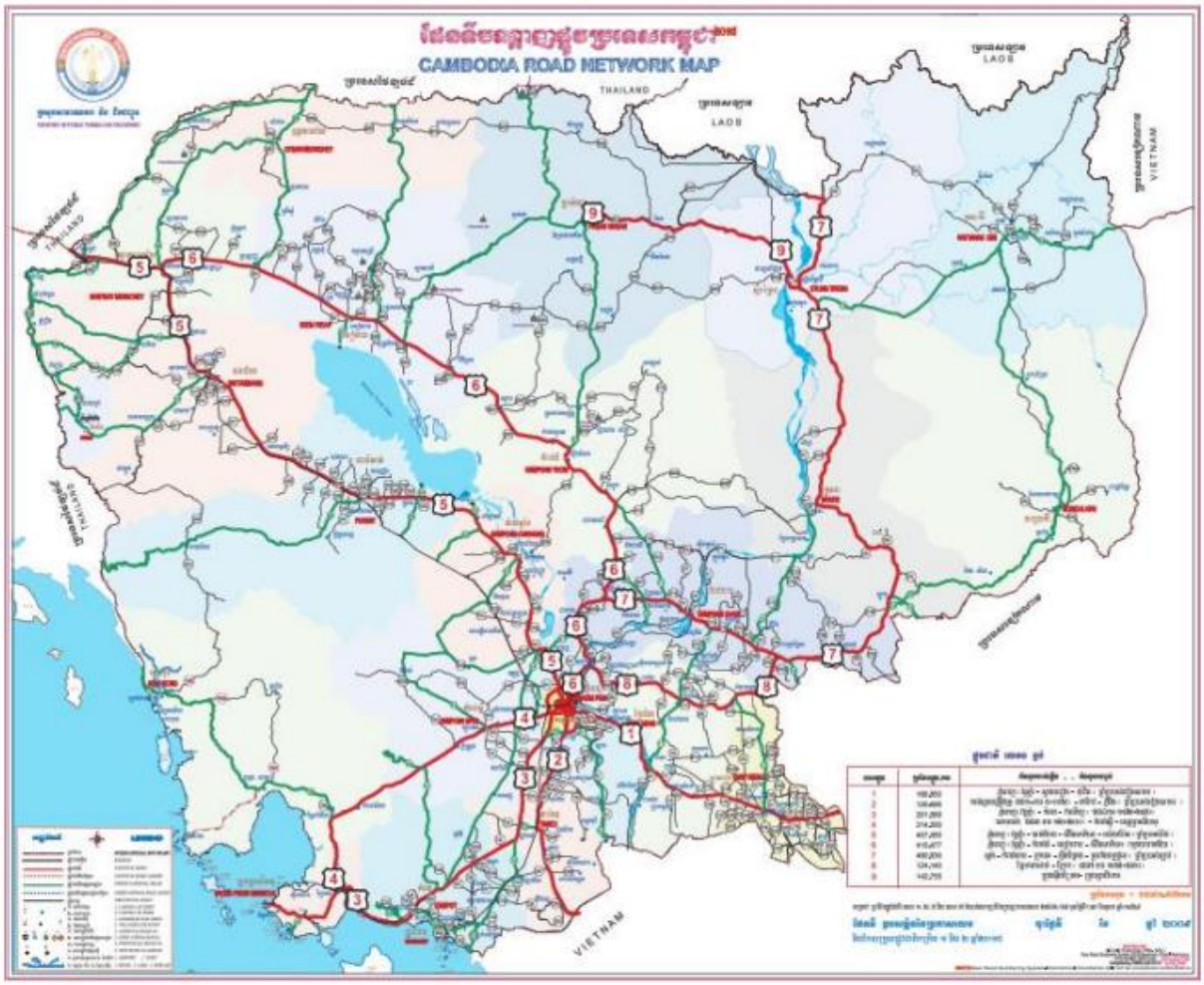
(2) Domestic Road Network in Cambodia

The road network in Cambodia in 2022 has national roads (1 and 2 digit) stretching 7,415.09km long with 81 lines, and provincial roads (3 ~ 4 digit) of 12,380.04km in length with 750 lines. The rural road network is composed of 47,919.01km with 16,711 lines as of 2020.

Table 2.2-5 Road Network

Road Classification	Length (km)	Road Percentage	Number of road network	Number of bridges	Bridge Percentage	Bridge length (m)	Bridge Length Percentage	Management Authority
NR (1-digit)	2,254.99	3.41%	9	471	10.84%	26,261	23.89%	MPWT
NR (2-digit)	5,161.10	7.62%	72	752	17.30%	26,376	23.99%	MPWT
Provincial Road (3-4 digit)	12,380.04	18.28%	750	1,183	27.21%	29,018	26.39%	MPWT
Rural Road	47,919.01	70.76%	16,711	1,941	44.65%	28,284	25.73%	MRD
Total Length	67,714.14	100.00%	17,542	4,347	100.00%	109,939	100.00%	
Expressway	187.05	-	1	-	-	-	-	MPWT

Source: MPWT,2022 and MRD,2020, for bridges,2017



Source: Overview on Transport Infrastructure Sectors in the Kingdom of Cambodia (2023, IRITWG)

Figure 2.2-6 National and Provincial Road Network in Cambodia

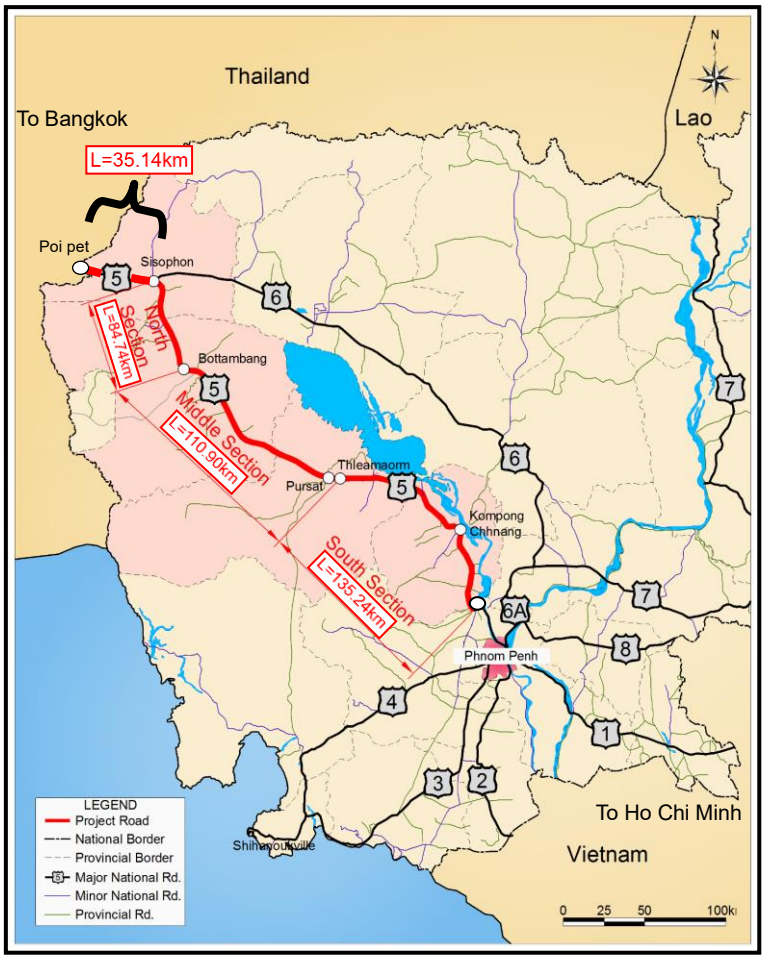
2.3 Development Assistance from Japan and Other Development Partners

2.3.1 Trends in Development Assistance from Japan and Review of Prior Studies and Existing Projects

(1) National Road 5 Improvement Project

NR5 is the trunk national road connecting the capital city of Phnom Penh to a major city of Battambang and to Poipet, the Thai border which leads to Bangkok. It is also designated as Asian Highway No.1 or the Southern Economic Corridor of Grater Mekong Subregion (GMS).

However, all the road surface type was double-layered bituminous surface treatment (DBST) and the surface condition had been deteriorated due to rapidly increasing heavy vehicles, as well as inundation / flood. Under such situation, NR5 improvement projects have been implemented since 2013 with ODA loan by Japan. The North section was completed in September 2021, the South section was completed in May 2023.



Source: JICA

Figure 2.3-1 Location of NR5 Improvement Project

Outline of the Project

- Improvement of NR5 into 4-lane
- Total length of Improvement 366km over 3 Sections; North, Middle and South
- Construction of Five (5) Bypasses with 4-lane
- North Section: Battanbang - Sri Sophorm → 2021.9 completed
- Middle Section: Thlea Ma'am - Battambang and Sri Sisophorn - Poipet →On going
- South Section: Prek Kdam - Thlea Ma'am → 2023.5 Completed

(2) Project for Improvement of Road Traffic Safety on Trunk Roads

A project was being implemented from 2022 on NR5 to increase transport capacity and improve transport efficiency in the target area, while ensuring the safety of nearby residents and others by verifying traffic safety measures, strengthening the organizational structure and human resource development related to traffic safety measures, and promoting awareness-raising activities.

Outline of the Project

- Improve traffic accident data analysis and accident investigation capabilities
- Implementation of road safety audits, road facility measures, and monitoring
- Pilot traffic enforcement, improve enforcement operations, and create manuals

- Identification and analysis of traffic behaviour, implementation of behaviour change pilots, preparation of manuals

(3) The RR2 Mekong River Bridge (North Section)

Currently, no donor has expressed support for the RR2 Mekong River bridge (North section). Therefore, there is a possibility that Japan may support the project. As shown in the figure on the right, the construction of two bridges across the Mekong River will connect the RR2 in a circle, increasing transport capacity and improving transport efficiency, strengthening regional connectivity, and contributing to the development of AKC.

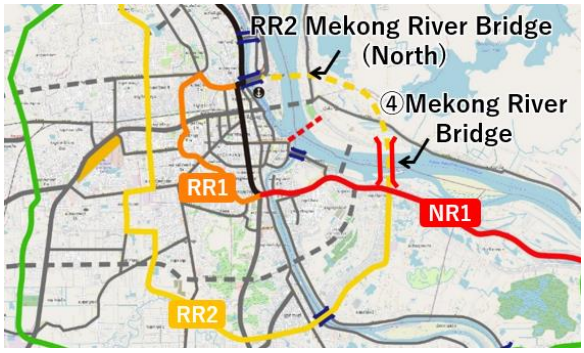
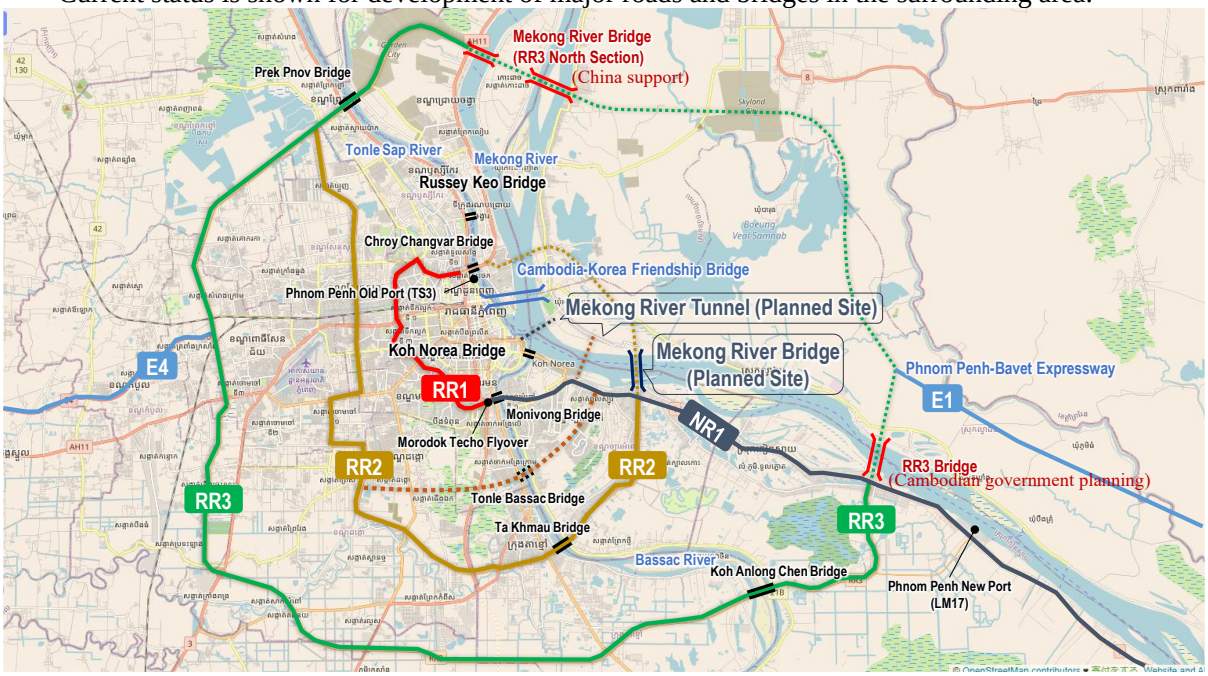


Figure 2.3-2 Location of the RR2 Mekong River Bridge

2.3.2 Trends in Development Assistance from Other Development Partners

Current status is shown for development of major roads and bridges in the surrounding area.



Source: JICA Study Team

Figure 2.3-3 Development of Major Roads and Bridges in Surrounding Area

(1) Roads

1) Phnom Penh Ring Road (RR)

To ease traffic congestion in Phnom Penh, ring roads and fly over had been proposed and construct.

Phnom Penh Ring Road had been studied under the grant aids from French in October 2002. This grant aid had set up the master plan development of Phnom Penh municipality (2002-2020). Based on the Phnom Penh Ring Road Development Master Plan year (2000-2020), MPWT had been modified this Master Plan for suitable to the real situation, the new final one had been set up step by step to be 5 lines in year 2010:

- RR1 had been finished by the government budget in dedicate 1960's.
- RR2 is divided in two sections:

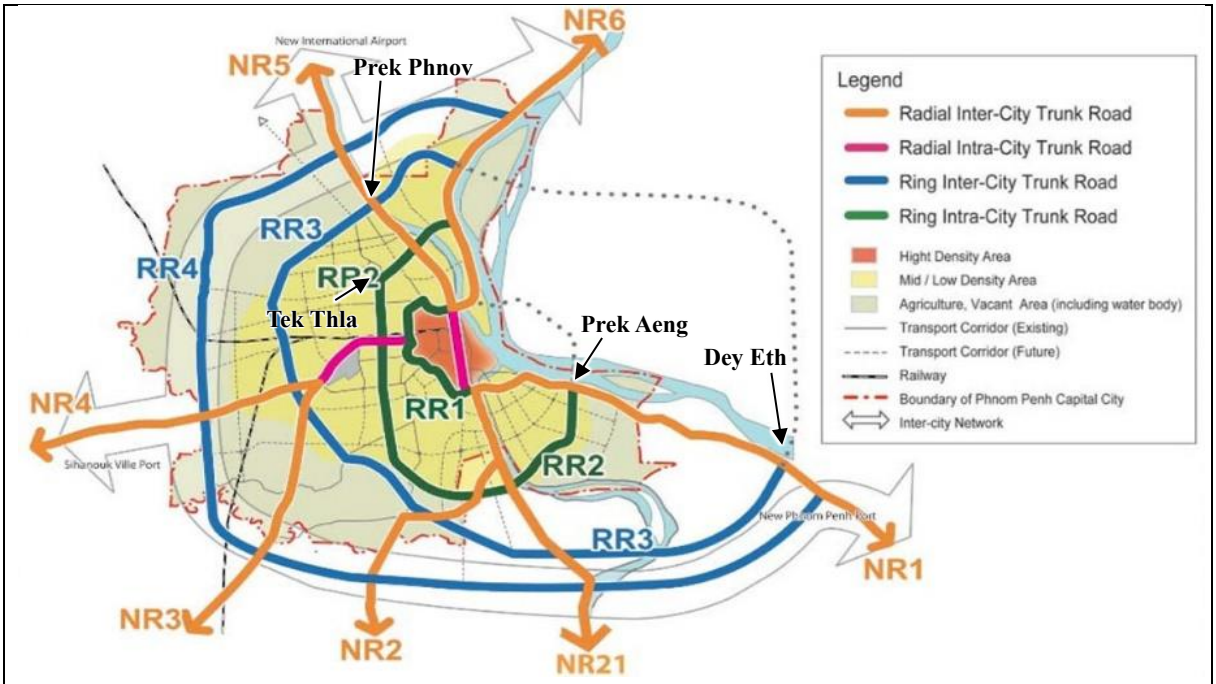
- Section 1 from Prek Phnov (NR5) to Tek Thla.
- Section 2 from Tek Thla (Russian Blvd) to Prek Aeng (NR1).
  The RR2 that is currently being developed is being financed by a loan from China.
- The northeast side of the Mekong River is currently under planning and funding sources have not yet been determined.

o RR3 is divided in two sections:

- Section 1 from Prek Phnov (NR5) to Odem (NR4).
- Section 2 from Odem (NR4) to Dey Eth (NR1). This project was constructed by MPWT and SCG (Shanghai Construction Group) and opened to traffic in June 2023. The total length is 52.985km include main road 4-lanes (road length is 47.61km and road width 25m) and branch road 2-lanes (road length is 5.375km and road width is 13m).
- The northeast side of the Mekong River has been completed to FS by SCG, including the northern crossing bridge, and is planned to be maintained by BOT. The south side crossing bridge will be implemented by the Cambodian government.

o RR4 is under the planning, not yet seek out the investor or funding to build.

o RR5 is express way outer most ring road. It is under the planning, not yet seek out the investor or funding to build. (Planning to introduce PPP)



Source: (https://construction-property.com/phnom-penh-ring-road-4-under-feasibility-study/)

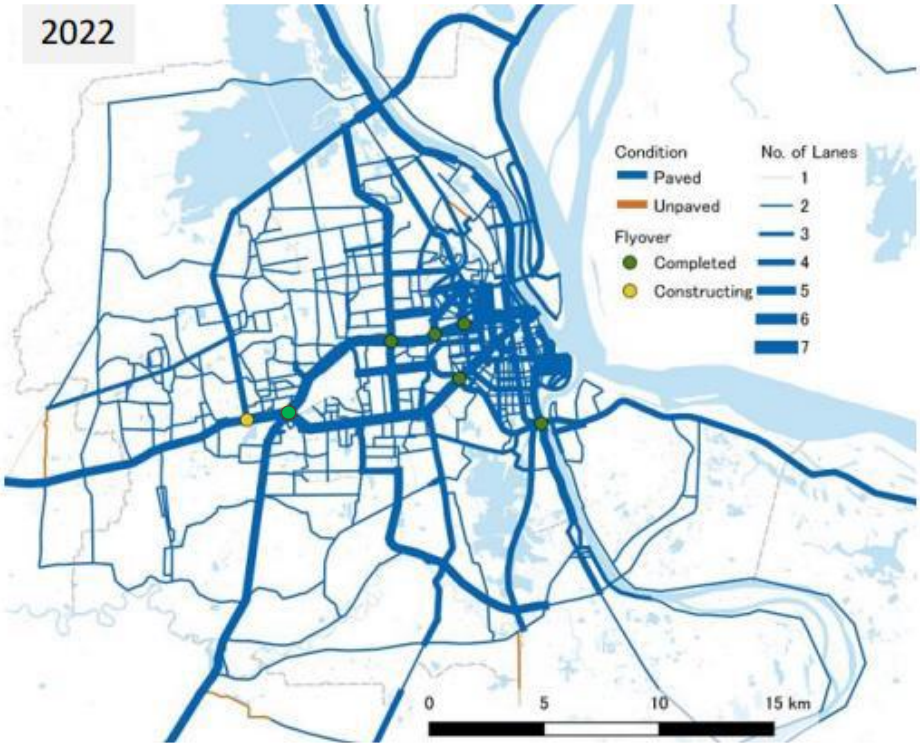
Ring Road development plan

	
Current condition of RR2	Current condition of RR3

Figure 2.3-4 Ring Road development Plan and Status

2) Viaduct

Viaducts are located at the Monivong intersection of NR1, four along Russia Street (the Chaom Chao intersection is under pass), and one along Vensuren Street. An SCG is also now under construction on the west side of the Chaom Chao intersection (NR4-RR3 intersection).



Source: JICA Study Team based on Overview on Transport Infrastructure Sectors in the Kingdom of Cambodia (2023, IRITWG)

Figure 2.3-5 Location map of viaduct around Phnom Penh

3) Phnom Penh – Bavet Expressway

The Project is planned in the southeast of Cambodia. The starting point is the east bank of the planned the RR3 Mekong River Bridge in Phnom Penh., passing through Kandal Province, Prey Veng Province, and Svay Rieng Province. The ending point is located at the Cambodia-Vietnam border in the north of Bavet city. The total mileage of the route is about 135.1km.

The Project is an important part of the national road network in Cambodia and an important corridor between Phnom Penh City - Bavet City (external port). It plays an important role in promoting the rapid development of the economy along the route. Phnom Penh City, Prey Veng Province, and Svay Rieng are the directly affected areas of the Project, meanwhile, Vietnam is the indirectly affected areas of the Project. Phnom Penh – Bavet Expressway is expected to be connected to Ho Chi Minh - Mok Bai Expressway in the future.

- Estimated Cost: 1.35 billion USD
- Investment Scheme: Build-Operate-Transfer (BOT) 50 Years
- Construction Period: 4 Years

The project is currently being carried out with BOT from Chinese company, and the schedule is as follows:

The preliminary work of the project was completed by the end of 2023, which had started on January 1, 2024 and shall be completed on December 30, 2027.

i) The revision of the F/S report had been completed before October 30, 2022;

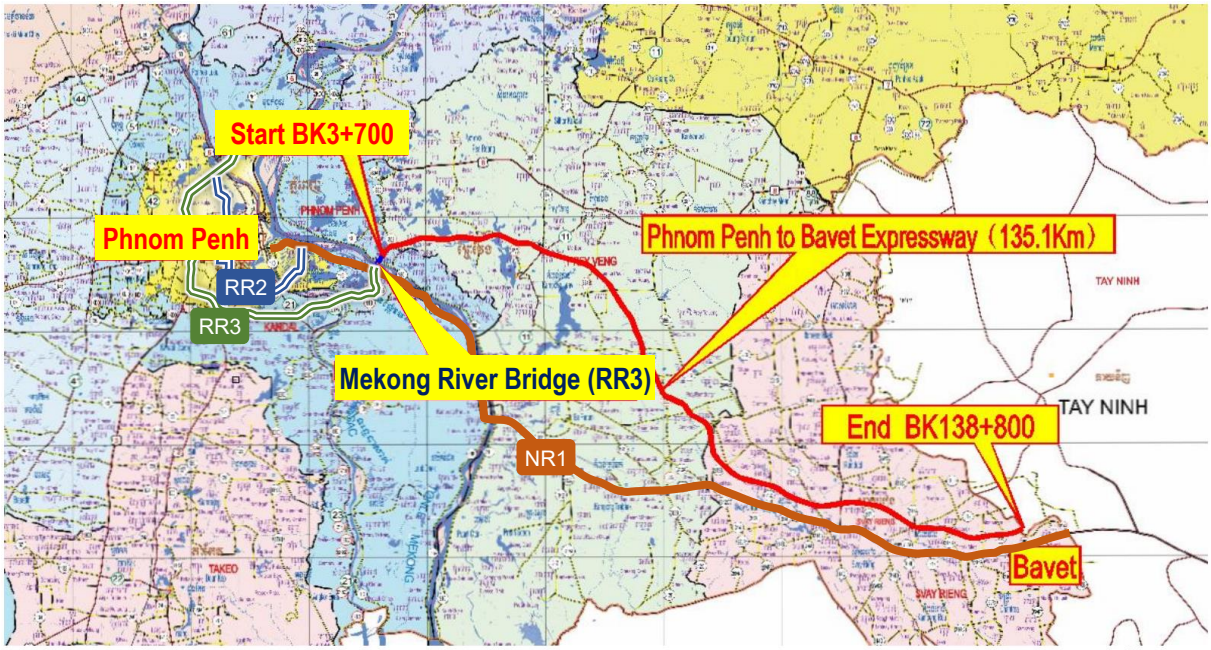
ii) Had been complete the field survey and design before April 2023;

iii) Had been complete all construction drawing design before October 2023;

iv) Land acquisition and demolition had been started in August 2023 and completed by the end of December 2023.

v) On January 1, 2024, the civil engineering of the project had been fully started. The subgrade works will be completed in April 2026, and the bridge works will be completed in May 2026. The pavement will be paved in September 2026. The traffic engineering and facilities along the line will be completed by the end of September 2027. The whole line will be completed and open to traffic by the end of December 2027.

The locations of this project are shown in below.



Source: Overview on Transport Infrastructure Sectors in the Kingdom of Cambodia (2023, IRITWG)

Figure 2.3-6 Location Map of Phnom Penh - Bavet Expressway Project

4) National Road Improvement Projects

Nearly three decades after the ending of the civil war, Cambodia has completed the stage of infrastructure rehabilitation and development. Major route networks were rehabilitated/constructed with financial and technical support from various foreign development partners.

The following is an overview of the project. The AC pavement of NR1 from Tsubasa Bridge to the Vietnam border (Bavet) was implemented by ADB under the Road Network Improvement Project. (Phase 2 is still underway).

Table 2.3-1 National Road Improvement Projects in Cambodia

Road No.	Org.	Cost (Mill.)	Length (km)	Section	Year		Fund	Pavement status
					Start	End		
1	Japan	$47.48	43.0	PK: 13+000 – Neak Loeung (2nd phase)	2006	2009	Grant	AC
	Japan	$11.17	9.0	PK: 4+000 – PK: 13+000 (3rd phase)	2009	2011	Grant	AC
	Japan	$12.07	4.0	Monivong Bridge – PK: 4+000 (4th Phase)	2015	2017	Grant	AC
	ADB	$50.00	107.0	Neak Loeung - Bavet	1999	2004	Loan	DBST
	ADB	$70.00	96.9	Neak Loeung - Bavet	2017	2020	Loan	AC
	WB	$3.00	107.0	Neak Loeung - Bavet	2009	2013	Loan	Road Maintenance (Upgrading)
2	ADB	-	63.0	Kbal Thnal - Takeo	2001		Loan	DBST
	Korea	$56.1	72.17	Kbal Thnal – Takeo (Including NR22, 9.6km)	2019	-	Loan	AC
	Korea	-	-	Takeo - Ang Tasaom (NR3)	-	-	-	DBST
	Japan	$12.45	51.7	Takeo - Phnum Den	2003	2007	Non-Project Fund	AC
3	Korea	$21.30	32.79	Kampot - Trapeang Lopaou (phase 1)	2004	2007	Loan	DBST
	Korea	$41.50	134.8	Phnom Penh - Kampot (phase 2)	2008	2011	Loan	DBST
	WB	$47.60	32.5	Trapeang Lopaou - Veal Rinh	1999	2006	Loan	DBST
	WB	$60.00	54.3	Kampot/Sihanoukville	2016		Loan	AC
	ADB & AusAid	$28.50		Southern Coastal Corridor Project (NR3: Kampong Trach to Prek Chak, NR3: Kampot to Veal Rinh, Cross-Border Facilities at Lork (Vietnam Border)	2011	2014	ADB=$7 AusAid=$8	DBST (upgrading & Periodic Maintenance)
	Korea	$40.00	190.00	Upgrade to AC (Phase III)	2015	-	Loan	AC, Completed
4	USA	$50.50	217.0	Chaom Chao - Sihanoukville		1996		AC
	AZ	-	217.0	Chaom Chao - Sihanoukville	2001	2035	OT	RGC bought back in 2017
	WB	$110.00	206.3	Chaom Chao-Sihanoukville	2018		Loan	AC
5	Cambodia		91.0	Phnom Penh - Kampong Chhnang		2003	Treasury	DBST
	ADB	>$1	85.0	PK:6+00 - Kampong Chhnang	2010	2011	Loan	Maintenance
	ADB	$68.00	261.0	Kampong Chhnang - Sisophorn	2000	2004	Loan	DBST
	China	$56.80	30.0	Phnom Penh – Prek Kdam	2012	2016	Loan	AC (4 lanes)
	Japan	$800	366	Battambang – Srisophorn	2017	2021	Loan	AC
				Prek Kdam - Thlea Ma'am	2018		Loan	AC, Under Construction
				Thlea Ma'am - Battambang	2019		Loan	AC, Under Construction
				Srisophorn - Poipet	2022		Loan	AC, Under

Road No.	Org.	Cost (Mill.)	Length (km)	Section	Year		Fund	Pavement status
					Start	End		
								Construction
5+6	ADB & OPEC	$77.50	48+102	Poi Pet - Sisophon – Siem Reap	2006	2008	Loan	AC
6	Japan	$28.00	44.0	Phnom Penh - Chealea	1993	1995	Grant	AC
	Japan		30.0	Chealea - Skun	1996	1999	Grant	AC (deteriorated condition)
	ADB		112.0	Cheung Prey	2000	2004	Loan	DBST
	WB	$16.10	73.0	Kampong Thom - Ro Lous	1999	2006	Loan	DBST
	Japan	$12.00	15.0	Siem Reap - Bakong temple	2000	2001	Grant	AC
	ADB		100.0	Sisophon - Siem Reap	2006	2008	Loan	AC
	China	$248.8	248.525	4 lanes: Thnal Kaeng (44+294) –Skun 2 lanes: Skun – Angkrong (290+747.80)	2013	2016	Loan	AC
	China	$70.25	40.0	PK: 4+000 to Thnal Keng	2012	2015	Loan	AC (4 lanes)
	ADB	$70.00	103.8	Siem Reap - Srisophorn	2017	2020	Loan	AC
7	Japan		45.0	Skun - Kampong Cham	1996	1999	Grant	AC
	Japan	$19.00	10.2	Kampong Cham - Chub	2001	2003	Grant	AC
	ADB		205.0	Chub - Kratie	2000	2004	Loan	DBST
	WB	$60.00	164.0	Tboung Khmum/Kratie	2016		Loan	AC
	China	$62.80	192.8	Kratie – Stung Treng – Lao Border (Trapeang Kriel)	2004	2007	Loan	TBST
		$10.68	38.8	Maintenance NR7	-	-	-	Completed
			45.0	Skun - Kampong Cham				AC (4 lanes)
8	China	$143.80	109.08	Prek Tameak - Anlong Chrey	2007	2011	Loan	AC
8-1, 8-2	China	$14.80	24.21	Rehabilitation (Krabau – Meaoun Chey) and (Aunlong Chrey –Krek)	2009	2012	Loan	AC
9	China	$63.8	143.33	Tbaeng Meanchey – Talaborivath	2012	2015	Loan	DBST
10	China	$188.38	197.363	Samlot - Veal Veng - Koh Kong	2019		Loan	DBST (in Progress)
11	ADB	-	90.4		2001	2004	Loan	DBST
	China	$72.00	90.4	NR1: Neak Loeung – NR7: Thnal Tortoeung	2015	2017	Loan	AC, Completed
13	ADB	$23.39	62.4	Svay Rieng - Anlong Chrey	2014	2016	Loan	DBST (Completed)
21	ADB	-	77.5		2002	2004	Loan	DBST
	Korea	$40.74	55	AC, 4 & 2 lanes structures	2015	2017	Loan	Completed
27	China	$45.00	53.5	Deum Thlork – Koh Thom bridge – Peam Raing Leu	2015	-	Loan	2015 Project
23	China	$33.00	53.00	Pea Reang Leu – Chombork (border)	2013	-	Loan	DBST
31	WB	$12.90	51.7		2003	2005	Loan	DBST
31, 33, 117	Korea	$24.95	106.10	2 lanes, slope protection and drainage system and Structures	2011	2014	Loan	DBST
33	WB		39.8	Takeo - Kampong Trach - Kampot	2002	2005	Loan	
	ADB	$13.00	17.0	Kampong Trach - Lork (Vietnam border)	2007	2010	Loan	DBST
41	WB			National Road 4 - Prek Thnout River	-	-	Loan	DBST
	China	$46.25	95.28	Thal Tortoeng – Chum kiri - Kampot	2011	2014	Loan	DBST
43	China	$77	77.00	NR4: Treng Troyeng – NR3: Thvear Thmey	2015	2017	Loan	DBST (planned 2016-2017)
44	China	$80.30	139.14	Chbamorn – Oral – Amleang –Udong	2012	2015	Loan	DBST (65.06% As of 31 May 2014)
48	Thai	$21.89	149.0	Koh Kong - Sre Ambel	2004	2007	Loan	DBST
	Korea	$75.70	148.0		2021	-	Loan	AC(Commence

Road No.	Org.	Cost (Mill.)	Length (km)	Section	Year		Fund	Pavement status
					Start	End		
								ment Nov 2021)
	WB, ADB	$60.00	-	Upgrade	2018	2020	Loan	N/A
51	WB	$5.80	38.9	Udong - Thnal Torteng	2003	2006	Loan	DBST
	China	$27	38.9	Udong - Thnal Torteng	2014	-	Loan	AC (under negotiation)
55	China	$132.80	182.16	Pursat – Thmar Da, Thai – Cambodia border	2015	2018	Loan	DBST (Completed)
56	ADB + Korea	$29.90	84.0	29km from Sisophon to Samrong	2009	2015	Loan	Road improvement
57	China	$41.88	103.14	Batambang – Pailin - Thai Border	2008	2012	Loan	DBST
57B	China	$89.98	176.81	Reconstruction:1) Tmor Kol - Bovel - Sampov Luun2) Bovel-Samseb-Phnom Prek3) Samseb - Kamrieng	2010	2013	Loan	DBST
58	China	$122.98	174.16	Banteaymeanchey – Banteay Meanrit – Thmar Daun – Phaong (including connecting road 8.98km)	2015	2018	Loan	DBST (Completed)
59	China	$72.89	140.25	NR 59 (Koun Damrey - Malay -Sampov Luun – Phnom Prek –Kamrieng - Pailin)	2010	2013	Loan	DBST
5x	Private	$5.50	13.0	National Road 5 - Thai border (through Chay investment) 2004 - -DBST (not yet started)				
60B	China	$135	140 +1.650	Kg. Thmor – Kratie + Bridge	2015	2017	Loan	DBST (+ bridge cost), 2015 project
61	WB		16.0	Prek Kdam - Thnal Keng (NR6)	2002	2005	Loan	Maintenance
	China	$9.76	15.63	Prek Kdam - Thnal Keng (NR6)	2010	2012	Loan	AC
62	China	$57.80	150.46	Koh Ke – Thnal Bek, Tbeng Meanchey - Preah Vihear temple	2008	2011	Loan	DBST
		$52.00	128.0	Kampong Thom - Tbaeng Meanchey	2009	2013	Loan	DBST
66	WB	$1.40	18.5	Phnom Dek - Rovieng	2004	2006	Loan	DBST
		$3.20	18	Rovieng - River Stung Sen			Loan	DBST (not yet started)
67	Thai	$3.06	18.0	Choam Sa Ngam - Anlong Veng	2006	2007	Grant	DBST
		$33.42	131.0	Anlong Veng - Siem Reap	2007	2009	Loan	DBST
68	Thai	$35.00	113.0	O Smach - Kralanh	2007	2009	Loan	DBST
	Cambodia	$33.00	113.745 + 3.175	O Smach – Kralanh + Bypass Samraong town	2009	2011	Nat. Budget	DBST Re-pavement
70B	China	$150.00	150.00	Tonlebet – Srey Santhor – Prek Tameak – Lvear Em – Peam Ro	2015	2017	-	DBST, 2015 project
	WB	$1.50	15.5	Traueng (NR7) - Kampong Thmar (NR6)	2004	2006	Loan	DBST
71C	China	$78.00	110.00	Tbong Khmum – Kroch chmar –Chamkarleu + Kroch chmar bridge	2015	2017	-	DBST (planned 2016-2017)
72	ADB		14.0	Memot – Tropeang Plong	2007	2009	Loan	
71 + 7 + 72	China	$113	145	Tropeang Plong – Krek – Troeung – Kg. Thmar	2015	2017	-	AC (planned 2016-2017)
76	China	$51.90	127.0	Snoul - Sen Monorom	2008	2011	Loan	DBST
	China	$91.68	171.78	Sen Monorom – Koh Nhek	2012	2016	Loan	DBST (52.25%

Road No.	Org.	Cost (Mill.)	Length (km)	Section	Year		Fund	Pavement status
					Start	End		
				–Lumphat – Ta Ang				as of 31 May 2014)
78	VN	$22.00	69.56	Bang Lung - O Yadav	2007	2009	Loan	AC
	China	$73.30	121.1	O Pong Moan - Ban Lung	2009	2012	Loan	DBST
78x	Private	$6.00	36.0	Ban Lung - Bou Sra (waterfall)	2008	-	-	DBST (not yet started)
92	China	$76.00	137.00	Sam'Ang (NR9) – Kg. Sralav II –Kg. Sralav I – Mom Bei	2015	2017	-	DBST, Rolling plan 2013 - 2017
134 B + 135	China	$25.00	43.00	Chumkiri – Chhuk – Dorng Tung – Kg. Trach	2015	2017		DBST, planned
181	WB	$2.00	28	Samraong - Chong Kal	2004	2006	Loan	DBST
207	WB	$1.00	1	Sautr Nikum - Boeung Tonle Sap	2004	2006	Loan	DBST
210	Private	$21.50	-	Siem Reap - Koh Ke	2003	-	BOT	DBST (RGC bought back)
258 D	China	$48.30	20.0	Kob (NR5, PK: 383) – O Beychoann	2011	2013	Grant	DBST
314 D	ADB	$14.32	25.6	NR1 –VN border: Prey Mlu	2014	2016	Loan	DBST (in progress)
378	China	$86.00	141.00	NR7: Dong Krolor – NR78: Banlung	2015	2017	Loan	DBST (Rolling plan 2013 – 2017)
1551	China	$73.00	135.00	NR44: Smach Meanchey – NR55: Promoy	2015	2017	Loan	DBST (Rolling plan 2013- 2017)
1554	China	$42	66.00	Veal Veng (NR55) – Samlot (PR1577)	2015	-	Loan	DBST, 2015 project
1577	China	$37.28	51.798	Sek Sork – Samlot – Border Pass 400	2015	2018	Loan	DBST (Completed)
3762	China	$14.89	26.38	Sen Monorom - Dakdam	2010	2012	Loan	DBST
3787	China	$99.00	180.00	Banlung – Kantuyneak	2015	2017	Loan	DBST (Rolling plan 2013 – 2017)

Source: Overview on Transport Infrastructure Sectors in the Kingdom of Cambodia (2023, IRITWG)

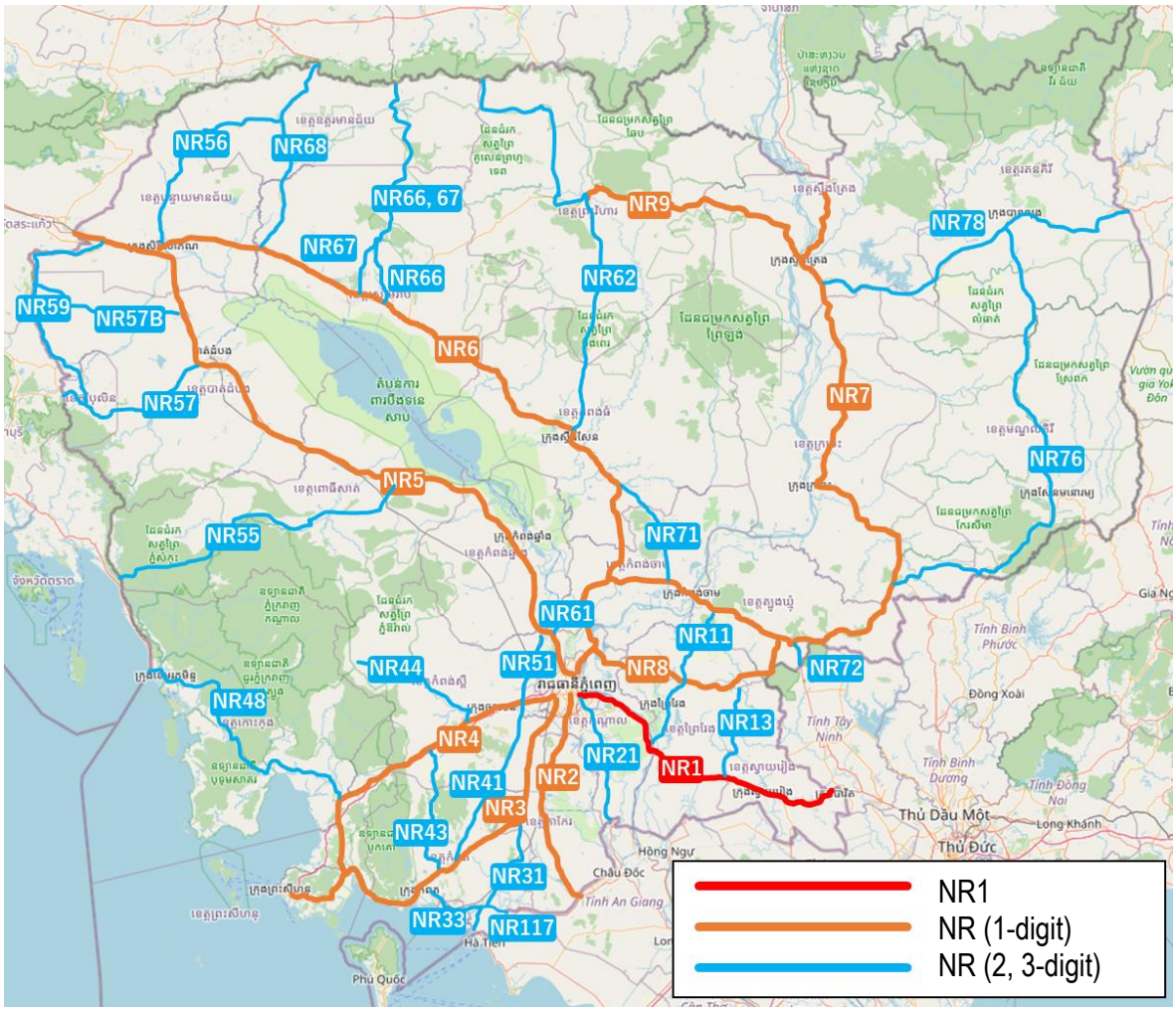
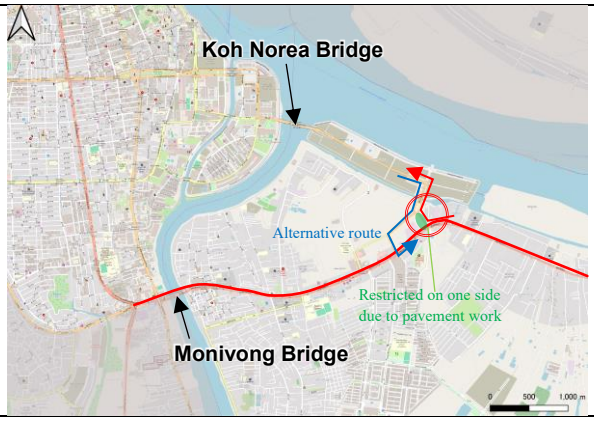


Figure 2.3-7 Major National Road Rehabilitation Projects in Cambodia Road Network Map

5) Koh Norea Entry Road

The Koh Norea Bridge is contributing to the alleviation of traffic congestion on NR1 near the Monivong Bridge. Currently, the road branching from NR1 to Koh Norea Bridge is undergoing improvements. Originally scheduled for completion by the end of 2023, the construction is still ongoing. While no updated schedule has been announced, construction is progressing, and the road improvements are expected to be completed in the near future.

Under Construction on Koh Norea Entry



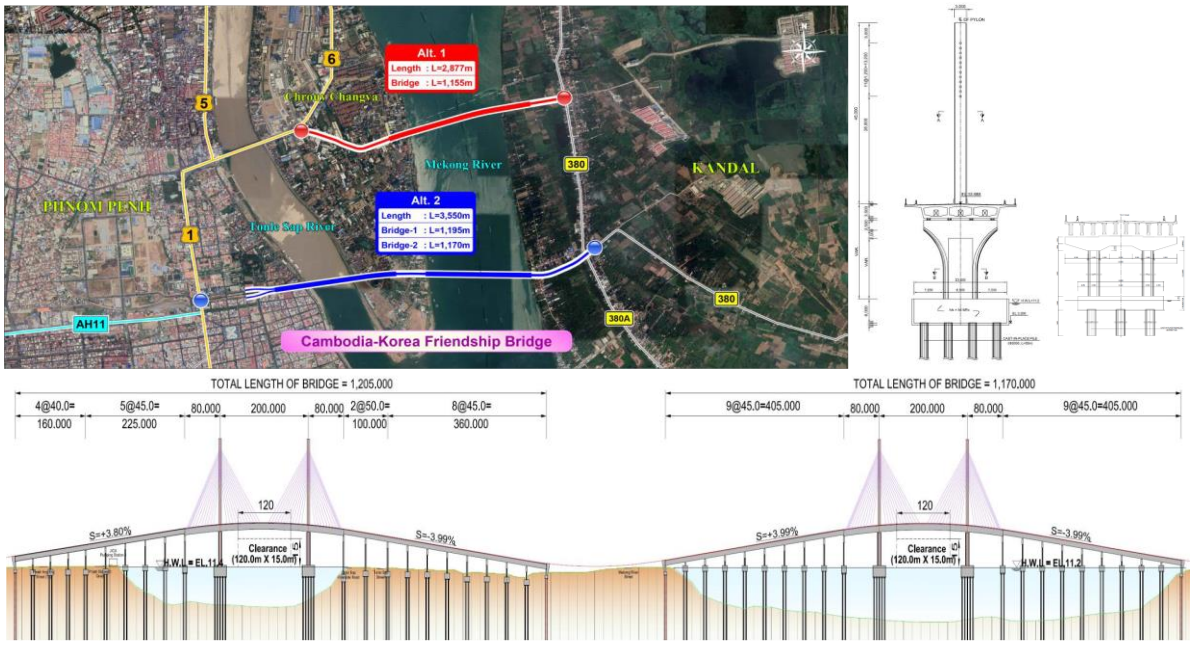
Location of Koh Norea Entry

Figure 2.3-8 Koh Norea Entry Road

(2) Bridges

1) Cambodia-Korea Friendship Bridge

Cambodia-Korea Friendship Bridge is planned to cross over the Mekong River on the downstream of Phnom Penh Old Port (TS3). Its feasibility study has been conducted by Korea Eximbank and EDCF. The project is supposed to be implemented with loan aid by Korea. Its main bridges are planned as cable stayed bridges carrying 4 lanes and 2 pedestrian walkways. The Mekong River Bridge in this study is located on RR2, and this Cambodia-Korea Friendship Bridge is expected to act as a main access temporarily to connect between Akreiy Ksatr City side and Phnom Penh City side until RR2 will be connected to Phonm Penh. For the alternatives of routes, the following 2 options are presented in the F/S; Alt-1: crossing the Mekong River on the upstream side of the Phnom Penh Old Port, Alt-2: crossing the Mekong River on the downstream side of the Phnom Penh Old Port, and the Alt-2 is recommended as the optimum in the feasibility study. The project period is assumed as 6 years in total (including preparation, consultant selection, detailed design and 4-year construction period).



Source: "Feasibility Study for Cambodia-Korea Friendship Bridge Construction Project", 2022, Korea Eximbank & EDCF

Figure 2.3-9 Cambodia Korea Friendship Bridge (Plan)

The project is currently entering the stage of detailed design, and according to information from the Ministry of Public Works and Transport (MPWT), a proposal has been made by the Korean side regarding road development on the Akreiy Ksatr City side. Although the proposal is still in the conceptual stage and the drawings have not been disclosed, it has been suggested that the proposal includes three directions: north, east, and south from the landing point on the Akreiy Ksatr City side. Moving forward, careful coordination with MPWT and the Korean side will be essential as preparatory studies progress.

2) Tonle Bassac Bridge (Chak Angrae Kraom – Praek Pra)

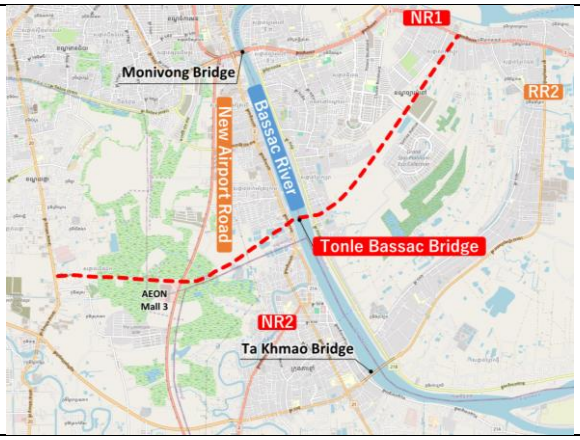
The bridge is under construction by a Chinese construction company.

The Construction of Tonle Bassac Bridge (Chak Angrae Kraom - Praek Pra) Project is located on the southern part of Phnom Penh. Starting point is the west Bassac riverside in Khan Mean Chey, Sangkat Chak Angrae Kraom, in the west section of Chunk Kong blvd., and ending point is the east Bassac riverside in Khan Chbar Ampov, Sangkat Praek Pra, in the east section of Chung Kong blvd. (connecting to NR1). The total length of this project is 1,650m, with 845.7m of Tonle Bassac Bridge (Chak Angrae

Kraom- Praek Pra) and 804.3m of connecting road. This project locates from the Monivong Bridge at upstream about 3,982m, from the Ring Road No.2-Takhmao Bridge at downstream about 3,617m.

In recent years, the economic and social development of the southern region of Phnom Penh capital city grow rapidly with an accelerating increment in traffic volume between both riverside of the Bassac River. The traffic volume of the current Monivong Bridge and Takhmao Bridge connecting to both riversides has exceeded that of the design and often caused bad traffic congestion. The construction of Tonle Bassac Bridge (Chak Angrae Kraom - Praek Pra) project is a part of Chung Kong blvd. project planned by Cambodia government, which belong to the part across Bassac River. The forward direction of Chung Kong blvd. (under construction) is to eastern direction, from west part crossing Hun Sen blvd., NR2, NR110 and NR1. Hun Sen Blvd. is a north-south main road, connecting Phnom Penh, Takhmao, and the New Phnom Penh Airport, under construction. This project is connected with Hun Sen blvd. and other important roads through Chung Kong blvd. which will improve the surrounding road network and ease the current traffic congestion across the Bassac River. The project broke ground in February 2024 and is expected to be completed in 2027.

Tonle Bassac Bridge project site



Location of Tonle Bassac Bridge

Figure 2.3-10 Tonle Bassac Bridge Project

2.4 Challenges in Road and Bridge Sectors

Based on the situation outlined so far, the challenges facing Cambodia's road and bridge sector can be summarized as follows:

(1) Road and Bridge Infrastructure

Since the end of the civil war in 1991, Cambodia's road and bridge infrastructure has been repaired and upgraded with support from the international community, including Japan, WB and ADB, and as shown in Table 2.3-1: National Road Improvement Projects in Cambodia, basic reconstruction projects have generally been completed for the main road and bridge routes. However, approximately 20% of national roads, 70% of provincial roads (total: approximately 1,400 km) and 90% of rural roads (approximately 46,000 km) are unpaved, and it is important to complete the basic reconstruction of existing roads as soon as possible for the balanced development of the country.

In addition, further economic development must be achieved through the four main objectives set out in the CITL-MP: i) expand and improve the scope and capacity of the transport infrastructure system, ii) improve the efficiency and effectiveness of transport services and infrastructure, iii) push and improve transport infrastructure to support national development policies, and iv) strengthen service efficiency and logistics costs. Specific measures in the road and bridge sector include the development of highways, the upgrading of international economic corridors to higher standards, the expansion of traffic capacity on cross-sections of the Mekong River, and the elimination of bottlenecks in and around Phnom Penh.

(2) Road Safety

Given the rapid spread of cars and motorcycles in Cambodia, attention to improving road safety in this sector is an extremely important issue. Most road accidents in Cambodia are due to road user error and behavioral issues, such as speeding, drunk driving, driving against the traffic flow and failure to stop at stop lines etc. As indicated in section 2.3.1 Trends in Development Assistance from Japan and Review of Prior Studies and Existing Projects, JICA is implementing a technical cooperation project on improving road safety from 2022 to address these issues.
On the other hand, measures such as physical separation of pedestrians and vehicles, installation of safe crossing facilities, provision of motorcycle lanes, intersection improvements, installation of traffic signals and improved night-time lighting are also effective, but there are some existing roads where these road safety facility improvements are insufficient. Road safety measures should be fully considered from the planning and design stage when building new or improved road infrastructure.

(3) Climate Change

One of the tasks in priority area 4 "Resilient, Sustainable and Inclusive Development" of the Pentagonal Strategy-Phase I, "Ensuring Environmental Sustainability and Readiness for Responding to Climate Changes, as well as Promotion of Green Economy," addresses concerns about flooding and it is stated to promote the development and implementation of management plans to minimize risks from floods and droughts and to ensure long-term water security.
Cambodia is strongly affected by climate change and suffers frequently from floods and typhoons. Especially during the rainy season, many roads are flooded and traffic is often paralyzed (see Figures 2.1-3 and 2.1-4). When building new or improving road infrastructure, it is necessary to take into account preemptive responses to climate change from the planning and design stages.

(4) Road and Bridge Asset Management

Although routine maintenance allocations increased to an appropriate level for national and provincial roads in Cambodia, periodic maintenance, which are carried out every 5 to 10 years, are still underfunded[1]. In addition, since pavement is progressing rapidly on rural roads with support from Japan, ADB and WB, expansion of the maintenance budget in line with the increase in paved road length is considered to be a future challenge.
On the other hand, in the MPWT, a performance-based contract method has been introduced with the support of WB and ADB, and effective road asset management is expected. In addition, curbing overloading and conducting periodic bridge inspections are also effective in extending the service life of assets.
Technical cooperation projects for road and bridge maintenance and management have been also implemented with Japanese support. Through these efforts, it is important to continue to develop local engineers with the necessary skills and expertise for road and bridge maintenance and management.

[1] CAMBODIA TRANSPORT SECTOR ASSESSMENT, STRATEGY, AND ROAD MAP, SEPTEMBER 2019, ADB

CHAPTER 3 CONDITIONS ON AND ALONG NATIONAL ROAD 1

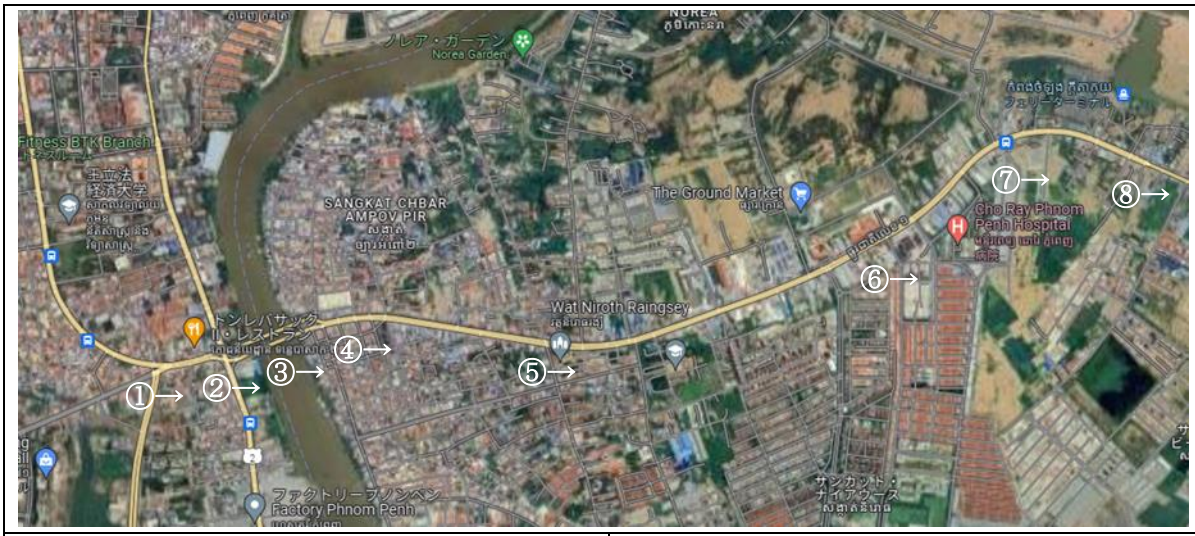
3.1 Road Conditions

The total length of NR1 within the target area is 53.57 km. As shown in Figure 1.2-2, the sections are divided into the following sections according to the requested projects for which MPWT intends to utilize ODA loan: 1) 0-4 km section, L = 4.63 km, 2) 4-20 km section, L = 15.17 km, 3) 20-54 km section, L = 33.77 km. The road development status of NR1 has been summarized by section.

3.1.1 National Road 1; 0-4km Section

(1) Roadside Conditions

Roadside conditions along NR1 (0-4 km) section are shown below.

<table>
<tr><td colspan="2"> 
</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>① Morodok Techo Flyover
Under the supervision of DPWT (PP), the roundabout on the second level and the flyover on the third level were opened. The intersection on the ground level is currently being constructed. This intersection will be fully opened in April 2025.</td><td>② Monivong Intersection
Intersection with NR2 flyover, NR1 and Kbal Thnorl Bridge (loop ramp). The traffic from west of NR1 cannot turn left to NR2.</td></tr>
</table>

	
③ Monivong Bridge The Monivong Bridge is separated by an upper and lower line; it is operated with three lanes and sidewalk.	④ Around Chbar Ampov Market (KP6) Market near Monivong Bridge, with many shops along NR1. The roadside is wide and there are many parked vehicles.
	
⑤ Intersection with Traffic Signal (No.1+750) Intersection with traffic signal. Vehicles obey traffic signals to allow pedestrians to cross the street. The sidewalks are well maintained.	⑥ Around Shopping Mall (No.3+800) Around the shopping malls that are being developed in accordance with the Koh Norea development.
	
⑦ Around Traffic Signal Intersection (No.4+0) It intersects with the access road to the Koh Norea Bridge. The access road is currently under construction and is in temporary operation. The traffic signals are maintained in temporary.	⑧ End of 4-Lane Improvement (Around KP10) Near the end of the target section. After this area, the road switches from four lanes to two lanes.

Figure 3.1-1 Roadside Conditions along NR1 (0-4 km)

(2) Existing Road Width

This section of the road has previously been improved with the assistance of JICA. The road width of each section after the construction is shown in below.

The Right of Way (ROW) of NR1 is designated as 30 meters wide on both sides from the road center in Prakas 06 (1999) and the Sub-Decree of November 23, 2009. The Prakas indicates that it shall be flexible according to actual roadside conditions, and the ROW for the section is designated in the range of 20m to 30m on each side.

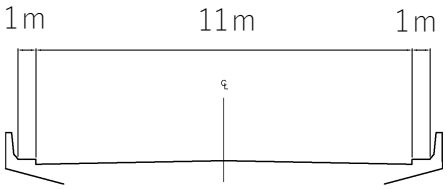
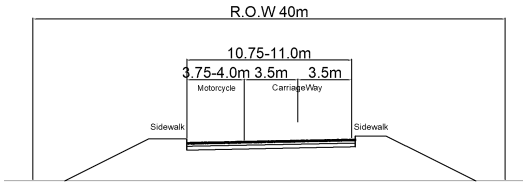
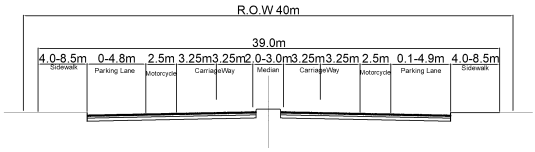
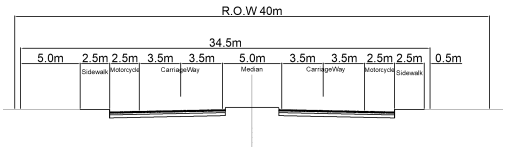
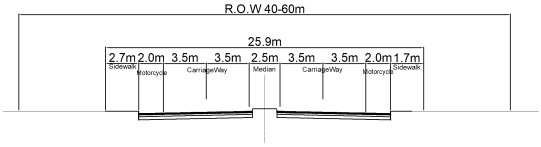
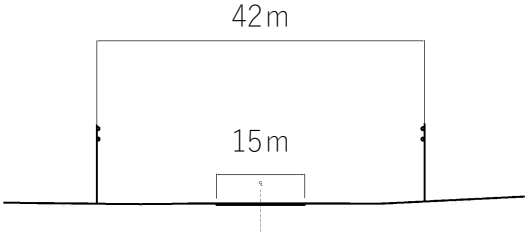
① Monivong Bridge	② Around the Monivong Bridge connection
Separate cross-Section 	Separate cross-Section  W=10.75-11.00m, ROW 40m
③ No.0+800～No.1+80	④ No.1+80+No.2+600
 W=39.00m, ROW 40m	 W=34.5m, ROW 40m
⑤ No.2+600～No.4+600	⑥NO.4+650 (KP10)
 W=25.9m, ROW 40-60m	

Figure 3.1-2 Existing Road Width of NR1 (0-4 km)

(3) Existing Road Structure

The road structure identified in this section was the Monivong Bridge. The Monivong Bridge has three lanes in each direction, divided into upper and lower lanes.

Monivong Old Bridge : L=269m, Concrete
Monivong New Bridge : L=269m, Concrete

Figure 3.1-3 Existing Road Structure of NR1 (0-4 km)

(4) Pavement condition

The pavement condition of this section was asphalt pavement throughout. The table below shows the latest version of the International Roughness Index (IRI), a measure of pavement condition for this segment. The pavement condition of this section is classified as fair to good in the Cambodian indicator, with IRI values ranging from 1.6 to 4.1.

Table 3.1-1 International Roughness Index 2023 (0-4km)

Location	6+000	6+100	6+200	6+300	6+400	6+500	6+600	6+700	6+800	6+900	7+000	7+100	7+200	7+300	7+400	7+500	7+600	7+700	7+800	7+900	8+000	8+100	8+200	8+300	8+400	8+500	8+600	8+700	8+800	8+900	9+000	9+100	9+200	9+300	9+400	9+500	9+600	9+700	9+800	9+900	10+000
IRI		2.6	2.4	2.5	3.2	3.1	3.2	3.0	3.1	2.7	2.5	3.3	3.3	3.1	3.1	2.9	2.2	2.2	3.1	4.1	2.3	1.7	2.5	2.1	2.0	2.0	2.2	2.8	2.2	1.8	1.9	2.5	2.5	2.2	2.2	2.0	1.6	1.6	2.0	2.4	2.6

Fair
Poor

Source; Report on International Roughness Index (IRI) 2023

Evaluation Indicators in Cambodia

IRI	Evaluation Indicators
IRI＜3	Good
3＜IRI＜5	Fair
5 ＜IRI＜7	Poor
7＜IRI＜10	Very Poor
10＜IRI	Bad

Pavement condition of Monivong Bridge. Pavement is in good condition.

Pavement condition near the Monivong Bridge. Pavement is in good condition.

Pavement condition around No.1+600. Pavement is in fair condition. (IRI=3.1)

Pavement condition near the end point (No.4+630). Pavement is in good condition.

Figure 3.1-4 Pavement Condition (0-4 km)

3.1.2 National Road 1; 4-20km Section

(1) Roadside Conditions

Roadside conditions along NR1 (4-20 km) section are shown below.

① Around School (No.6+400)
There are several schools, hospitals, and markets along NR1. Many pedestrians cross the street during school hours.

②RR2 Intersection (No.7+620)
Around the T-signal intersection with RR2. RR2 is a two-lane asphalt road without sidewalks.

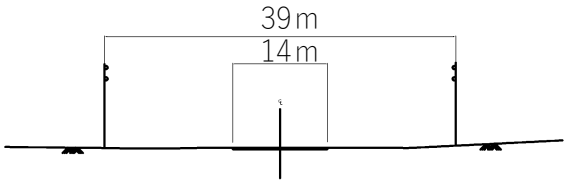
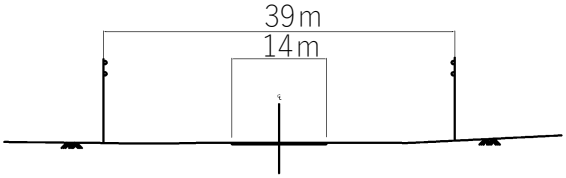
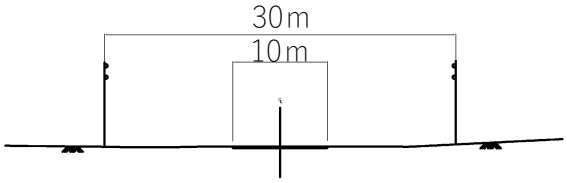
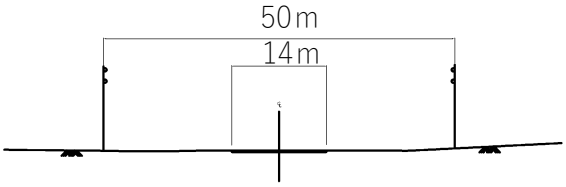
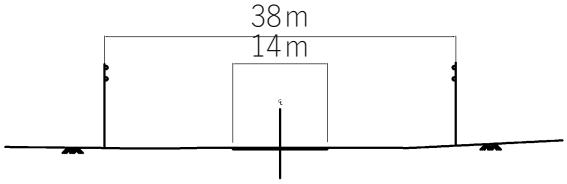
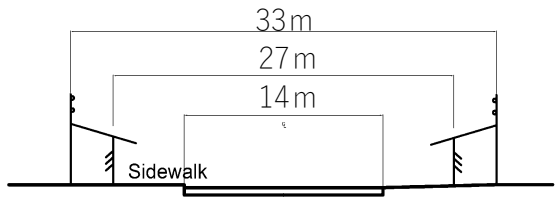
③ Around Kokir Market (No.14+400)
Markets are located on both sides along NR1. There are wide parking strips and sidewalks on both sides of the road, but the width is narrowed by stores overhanging the road.

④ RR3 Intersection (No.19+800)
Around the T-signal intersection with RR3. RR3 is a 4-lane concrete road without sidewalks. A flyover will be installed over NR1 in the future.

Figure 3.1-5 Roadside Conditions along NR1 (4-20 km)

(2) Existing Road Width

This section consists of two-lane carriage way and motor cycle lanes on both sides. There are wide shoulders for cars to park, and with sidewalks on the both side around Kokir Market (section ⑦ in the figure below). ROW of NR1 is designated as 30 meters wide on both sides from the road center in Prakas 06 (1999) and the Sub-Decree of November 23, 2009.

① No.5+700	② No.7+300
 W=14m、ROW 60m	 W=14m、ROW 60m
③ No.7+620(RR2)	④ No.8+000
 W=10m、ROW 30m	 W=14m, ROW 60m
⑤No.9+000	⑥No.10+900
 W=14m、ROW 60m	 W=14m、ROW 60m

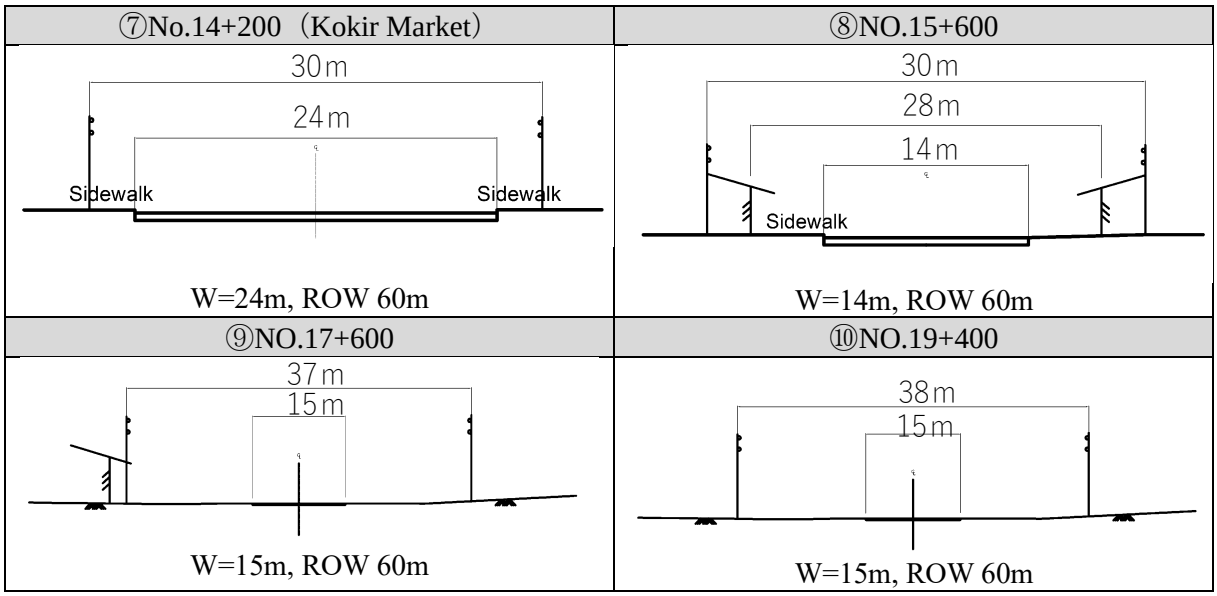


Figure 3.1-6 Existing Road Width of NR1 (4-20 km)

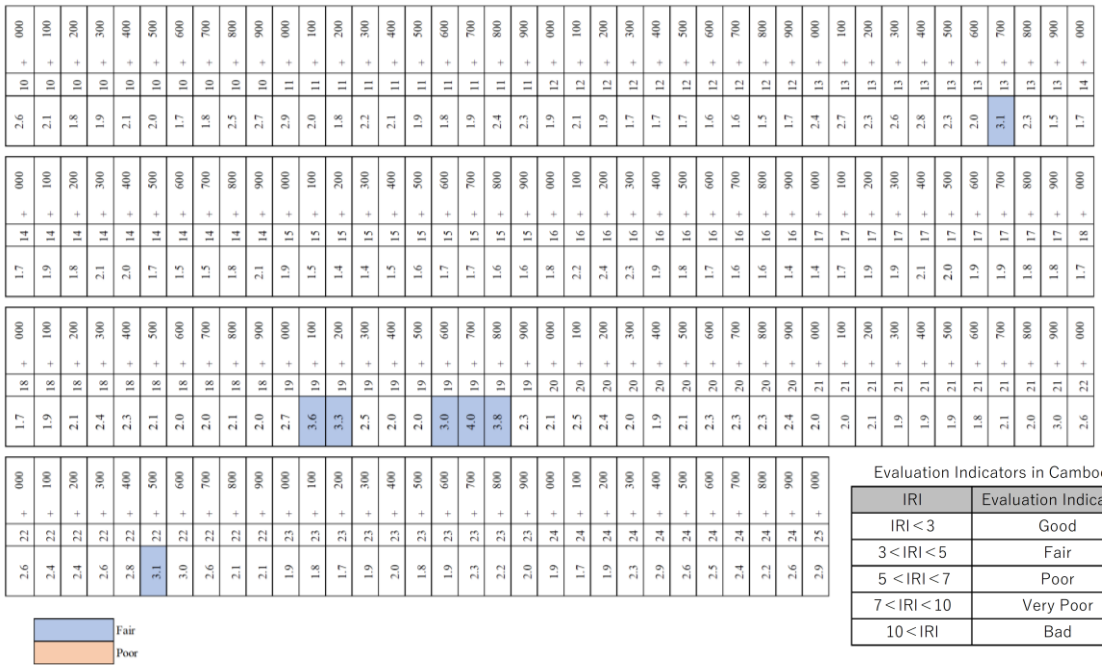
(3) Existing Road Structure

No road structures such as bridges or box culvert were found in this section.

(4) Pavement condition

The pavement condition of this section was asphalt paved in all sections. The table below shows the latest version of the International Roughness Index (IRI), an indicator of pavement condition, for this section. The pavement condition of this section is classified as fair to good in the Cambodian indicator, with IRI values ranging from 1.4 to 4.0.

Table 3.1-2 International Roughness Index 2023 (4-20km)



Evaluation Indicators in Cambodia

IRI	Evaluation Indicators
IRI＜3	Good
3＜IRI＜5	Fair
5＜IRI＜7	Poor
7＜IRI＜10	Very Poor
10＜IRI	Bad

Source; Report on International Roughness Index (IRI) 2023

	
Pavement condition near No.5+700. Pavement is in good condition. (IRI = 2.7)	Pavement condition near No.7+300. Pavement is in good condition. (IRI = 1.7)
	
Pavement condition near the RR2 (No.7+620).	Pavement condition near No.8+000. Pavement is in good condition. (IRI = 2.3)
	
Pavement condition near No.9+000. Pavement is in good condition. (IRI = 1.8)	Pavement condition near No.10+900. Pavement is in good condition. (IRI = 2.2)

Pavement condition near the Kokir Market. Pavement is in good condition.

Pavement condition near No.15+600. Pavement is in good condition. (IRI = 2.3)

Pavement condition near No.17+600. Pavement is in good condition. (IRI = 2.1)

Pavement condition near No.19+400. Pavement is in good condition. (IRI = 2.5)

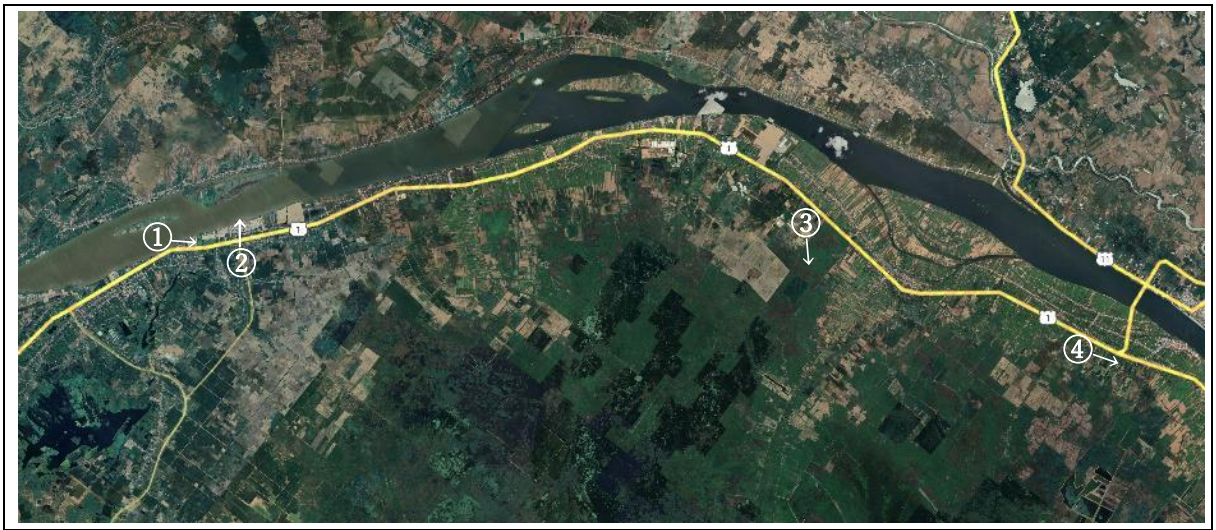
Pavement condition near the end point (No.19+800). Pavement is in good condition.

Figure 3.1-7 Pavement Condition (4-20km)

3.1.3 National Road 1; 20-54km Section

(1) Roadside Conditions

Roadside conditions along NR1 (20-54 km) section are shown below.



① River Bank Erosion Area (No.23+150)
Closest location to the Mekong River. The Mekong River revetment had been eroded in the past and simple measures have been implemented.

② PPAP Intersection (No.25+320)
Intersection for PPAP entrance and NR1. An access road to RR3 has been built in recent years.

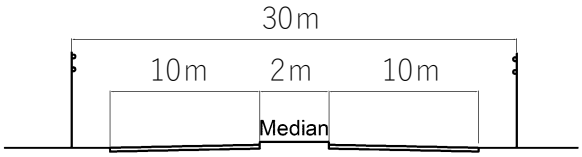
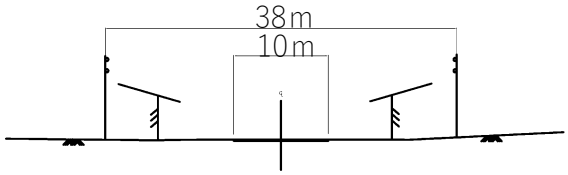
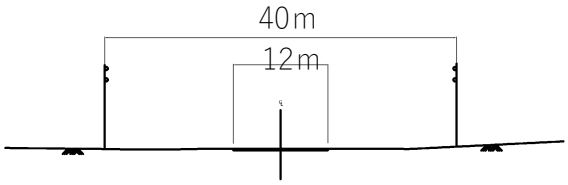
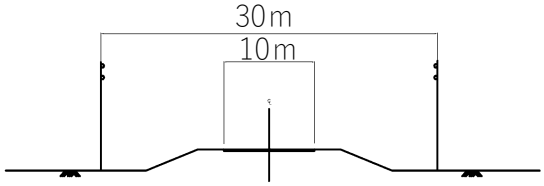
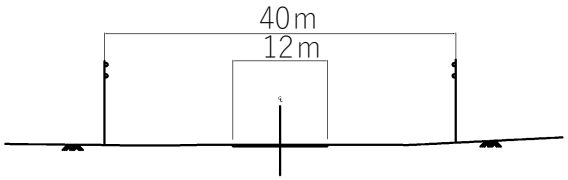
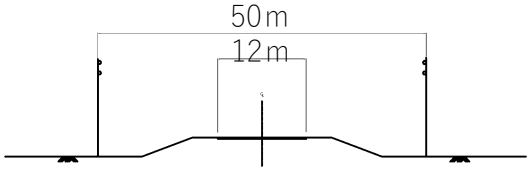
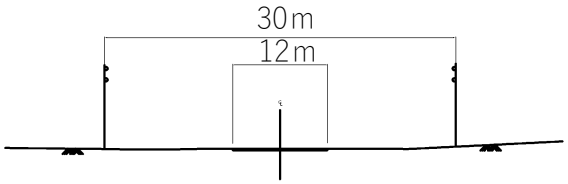
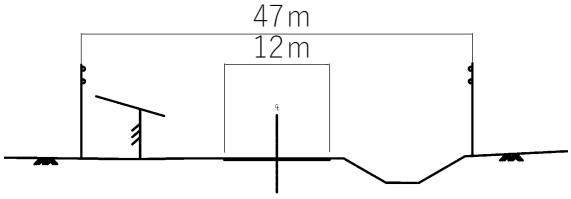
③ Around Wetland Area (No.43+400)
Wetland areas along NR1. A bridge was constructed in this section with JICA assistance. Because of the wide distribution of such wetlands along NR1, a soft geologic composition is to be expected.

④ Around High School near end point (No.53)
Hun Sen kampong phnom high school is located along the road. Many motorcycles and pedestrians use NR1 during school hours. Because of the wide shoulder, motorcycles sometimes run the wrong way on the shoulder.

Figure 3.1-8 Roadside Conditions along NR1 (20-54 km)

(2) Existing Road Width

This section consists of two-lane carriage way and motor cycle lanes on both sides. ROW of NR1 is designated as 30 meters wide on both sides from the road center in Prakas 06 (1999) and the Sub-Decree of November 23, 2009.

①RR3	②No.20+000
 W=22m, ROW 30m	 W=10m, ROW 60m
③No.23+200	④RR3 （PPAP crossing）
 W=12m, ROW 60m	 W=10m, ROW 60m
⑤No.26+950	⑥No.31+900
 W=12m, ROW 60m	 W=12m, ROW 60m
⑦No.38+350	⑧No.41+500
 W=12m, ROW 60m	 W=12m, ROW 60m

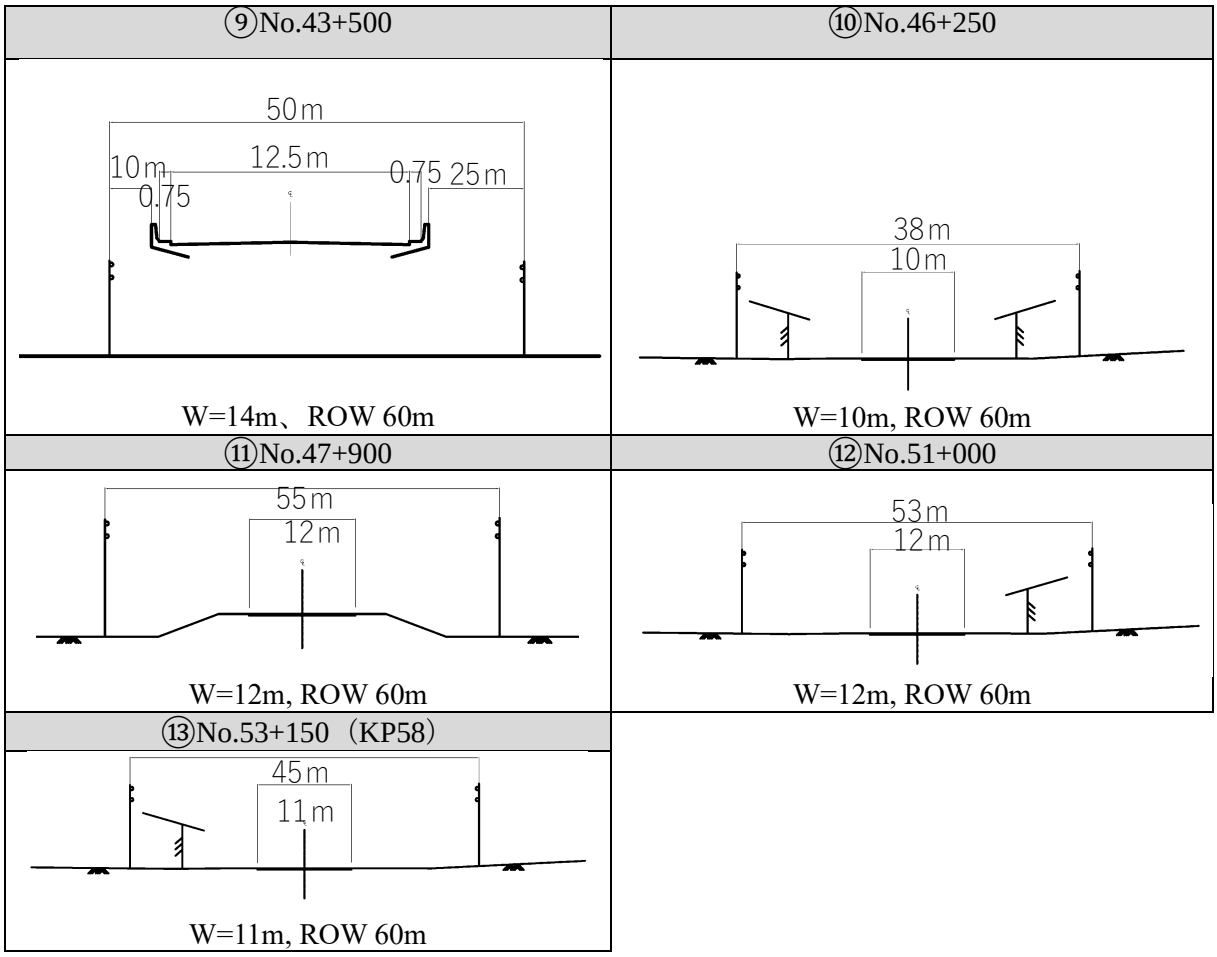
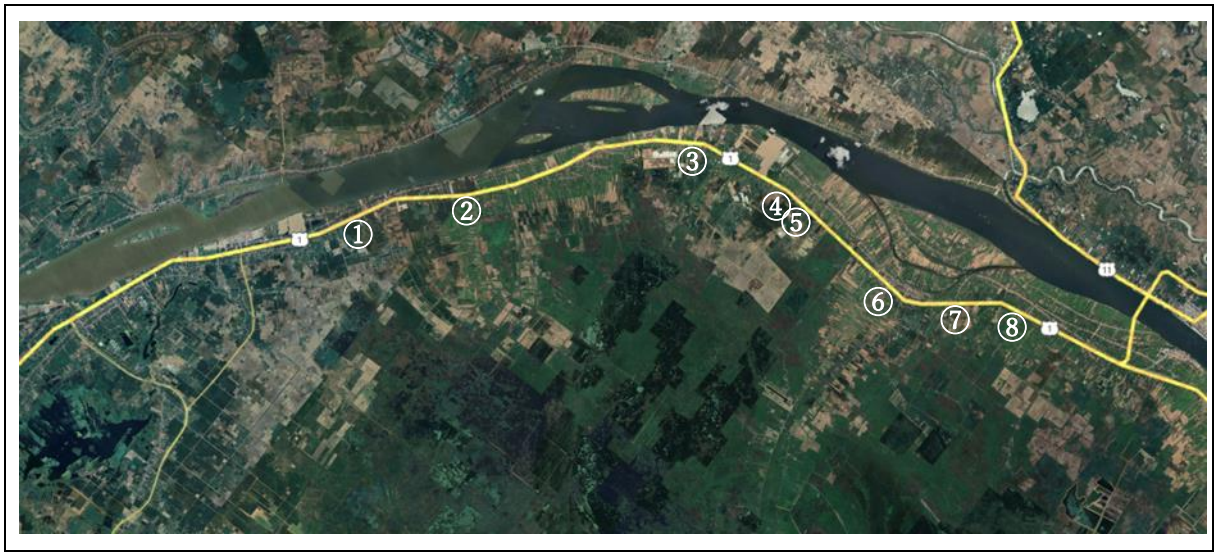


Figure 3.1-9 Existing Road Width of NR1 (20-54 km)

(3) Existing Road Structure

The road structure confirmed in this section are the bridges and Box culverts shown below.



	
①No.29+100 Prek pol Bridge (L=10m)	②No.31+780 Prek takeo Bridge (L=10m)
	
③No.39+580 Plek treng Bridge (L=10m)	④No.42+850 Somroung thom Bridge (L=75m)
	
⑤No.43+450 Pormeav Bridge (L=100m)	⑥No.46+420 (L=10m)

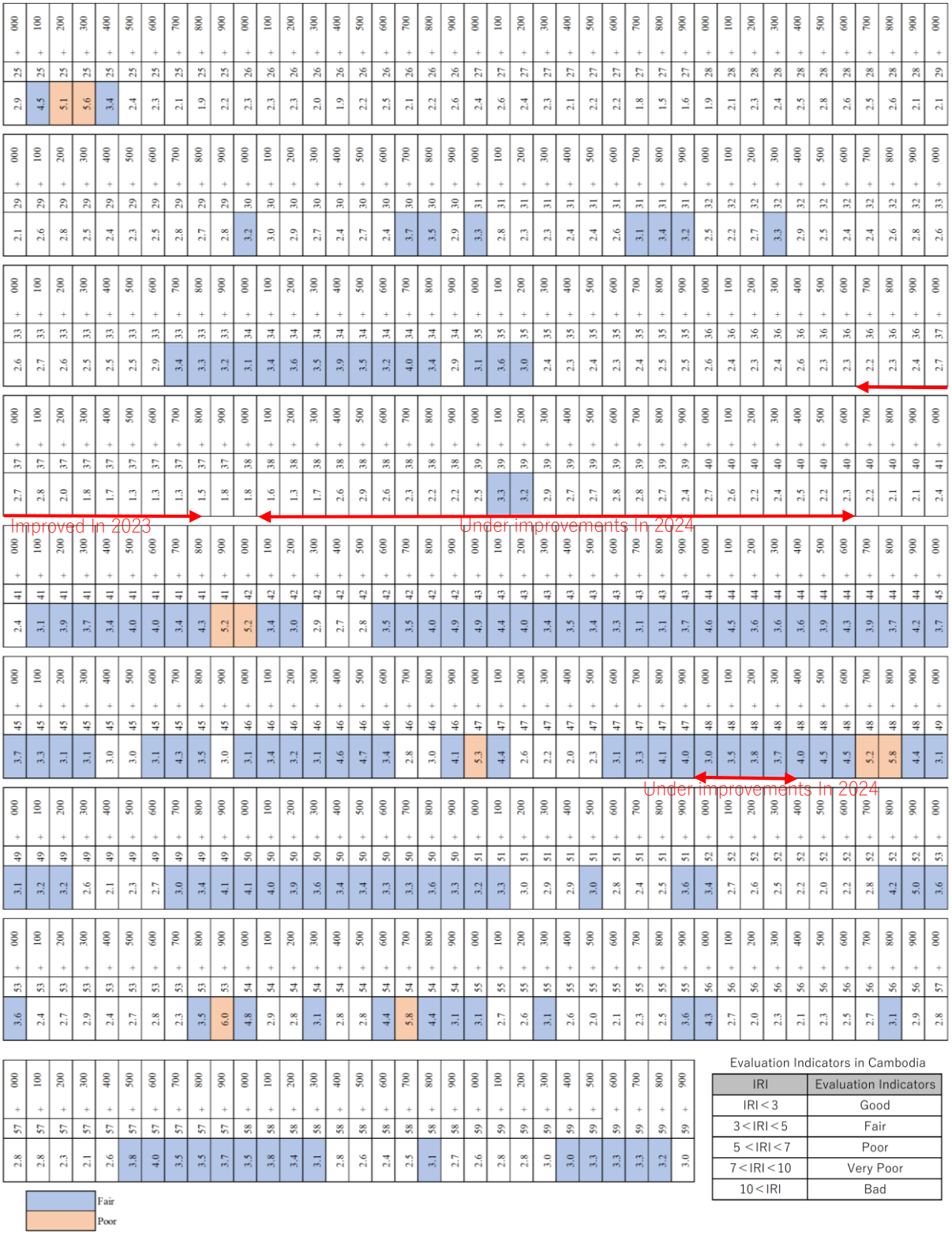
	
⑦No.48+600 Kampong Phnom Bridge (L=69m)	⑧No.50+650 (L=10m)

Figure 3.1-10 Existing Road Structure of NR1 (20-54 km)

(4) Pavement condition

The pavement condition of this section was asphalt paved in all sections. The table below shows the latest version of the International Roughness Index (IRI), an indicator of pavement condition, for this section. The pavement condition of this section is classified as poor to good in the Cambodian indicator, with IRI values ranging from 1.3 to 6.0.

Table 3.1-3 International Roughness Index 2023 (20-54km)



Evaluation Indicators in Cambodia

IRI	Evaluation Indicators
IRI＜3	Good
3＜IRI＜5	Fair
5＜IRI＜7	Poor
7＜IRI＜10	Very Poor
10＜IRI	Bad

Source; Report on International Roughness Index (IRI) 2023

	
Pavement condition in RR3. Pavement is in good condition.	Pavement condition near RR3 Intersection. (KP20+000) Pavement is in poor condition.
	
Pavement condition near the eroded bank. (KP23+200) Pavement is in good condition. (IRI = 2.5)	Pavement condition in RR3 (PPAP crossing). Pavement is in good condition.
	
Pavement condition near PPAP Intersection (No.25+300). Pavement is in good condition. (IRI = 2.7)	Pavement condition near No.26+950. Pavement is in good condition. (IRI = 2.7)

	
Pavement condition near No.31+900. Pavement is in good condition. (IRI = 2.8)	Pavement condition near No.38+350. Pavement is in fair condition. (IRI = 3.4)
	
Pavement condition near No.41+500. Pavement is in good condition. (IRI = 2.8)	Pavement condition near Pormeav Bridge. (KP48+800) Pavement is in poor condition.
	
Pavement condition near No.43+600. Pavement is in poor condition. (IRI = 5.8)	Pavement condition near No.46+250. Pavement is in fair condition. (IRI = 3.0)

Pavement condition near No.47+900. Pavement is in good condition. (IRI = 2.4)

Pavement condition near No.51+000. Pavement is in good condition. (IRI = 2.0)

Pavement condition near No.53+150. Pavement is in good condition. (IRI = 2.8)

Figure 3.1-11 Pavement Condition (20-54 km)

(5) Summary of the latest repair work

Table 3.1 4 shows a summary of repair work completed between 2020 and 2024 for NR1. According to the report, the No. 31+500 to No. 32+518 (KP36+700 to KP37+718) section will be overlaid in 2023, while the No. 32+900 to No. 35+520 (KP38+100 to KP40+720) section and No. 42+800 to No. 43+150 (KP 48+000 to KP48+350) sections are undergoing overlay in 2024.

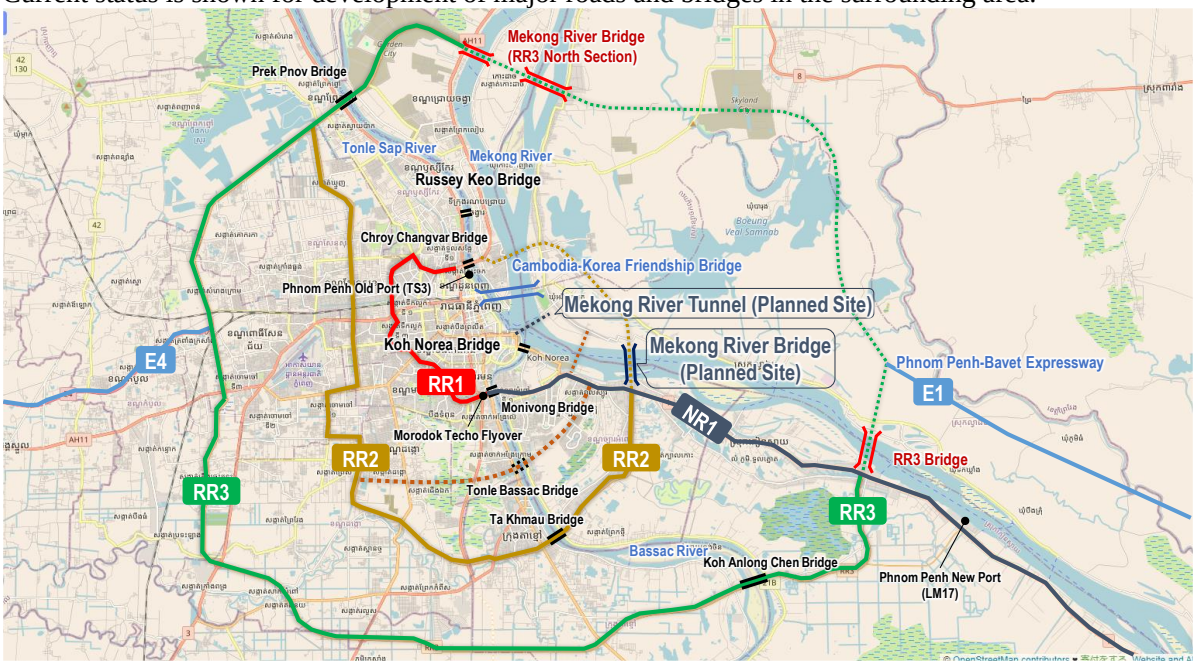
Table 3.1-4 Summary of repair work on NR1 （2020-2024）

No.	Location	Work Description	Year	Progress	Amount(Riels)
1	PK36+700～PK37+718 Kien Svay District, Kandal Province	Overlay AC of 0.05m、Length 1,018m　Width 12.5m	2023	100%	1,965,000,000
2	PK38+100～PK40+720, PK48+000～PK48+350 Kien Svay District, Kandal Province	Overlay AC of 0.05m、Length 2,970m Width 12.5m	2024	96%	4,088,000,000

Source: JICA Study Team based on DPWT report

3.2 Bridge Conditions

Current status is shown for development of major roads and bridges in the surrounding area.



Source: JICA Study Team

Figure 3.2-1 Development of Major Roads and Bridges in Surrounding Area

3.2.1 Morodok Techo Flyover

This project is a Cambodian self-financed (implemented by Oversea Cambodia Investment Company (OCIC)) multi-level intersection project to improve traffic flow at the intersection of NR1 / Monivong Blvd and Hun Sen Blvd. The project consists of three levels: a ground level, three-lanes roundabout, and four-lanes flyover. As of the completion of this survey, the second level of roundabout and the third level of flyover have been completed and opened to traffic. According to Phnom Penh DPWT, the remaining the ground level section is expected to be completed in April 2025.

Source: Phnom Penh DPWT

Figure 3.2-2 Morodok Techo Flyover (Plan and Rendering)

Figure 3.2-3 Morodok Techo Flyover (partially opened, under construction)

3.2.2 Koh Norea Bridge

Koh Norea Bridge is a cable stayed bridge carrying 4 lane carriageway and 2 bike lanes, connecting the southeast side of Phnom Penh city area and suburban area of NR1. The bridge was implemented by Cambodia's own fund and has been opened to traffic since 2023. It contributes to mitigate congestion of NR1 near Monivong Bridge, since it allows traffic from suburban area of NR1 to access Phnom Penh city area on the north side without going through Monivong Bridge.

Source: JICA Study Team

Figure 3.2-4 Koh Norea Bridge

3.2.3 Russey Keo Bridge

This is a cable stayed bridge with 4 lane carriageway and 2 bike lanes located at the upstream of Chroy Chongvar Bridge on Tonle Sap River. The bridge was constructed together with Russey Keo Overpass on the west bank side under Public-Private Partnership (PPP) by Phnom Penh Capital and private sector, and officially opened to traffic in June 2023 after a few months of trial use. The bridge and the overpass connect National Roads 5 and 6 together, and are expected to ease the traffic flow on Russey Keo and Chroy Chongvar communes.

Russey Keo Bridge, Side View

Russey Keo Bridge on the Deck

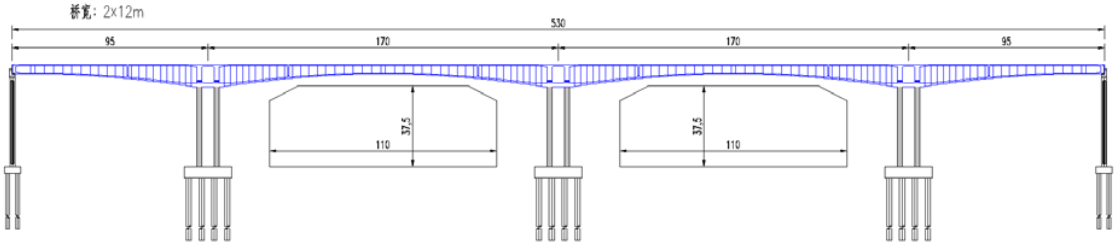
Russey Keo Bridge from East Side

Russey Keo Overpass

Figure 3.2-5 Russey Keo Bridge and Overpass

3.2.4 Ring Road 3 Bridge

Ring Road 3 (RR3) Bridge is planned at the intersection of RR3 and the Mekong River, and the project is supposed to be implemented by Cambodia's own fund. The bridge composes a part of RR3 and is expected to act as an access from NR1 to Phnom Penh – Bavet Expressway as well. The cross section of the bridge is composed of dual 2 lanes.



Source: "Phnom Penh to Bavet Expressway Technical Proposal (Draft)", Oct 2022, China Road and Bridge Corporation

Figure 3.2-6 The Mekong River Main Bridge on RR3 (Plan)

3.2.5 NR1 Bridges and Box Culverts

There are 3 existing bridges and 5 box culverts along NR1 between Monivong Bridge and Tsubasa Bridge. The type of the bridges is PC-I girders. The box culverts are equipped with floodgates. On the planning of widening of NR1, consideration is required on such as road alignment in order to construct new bridges and box culverts along these existing ones while utilizing them.

Refer to 3.1.3(3) for details regarding the location and shape of these structures.

3.3 Land Use and Urban Development

3.3.1 Private Development Project along the National Road 1

There are many housings project being developed and developed along NR1 and its vicinity including Koh Norea Development Project, Borey Peng Huoth, Borey Mongkul Phnom Penh and more as shown in Figure 3.3-1.

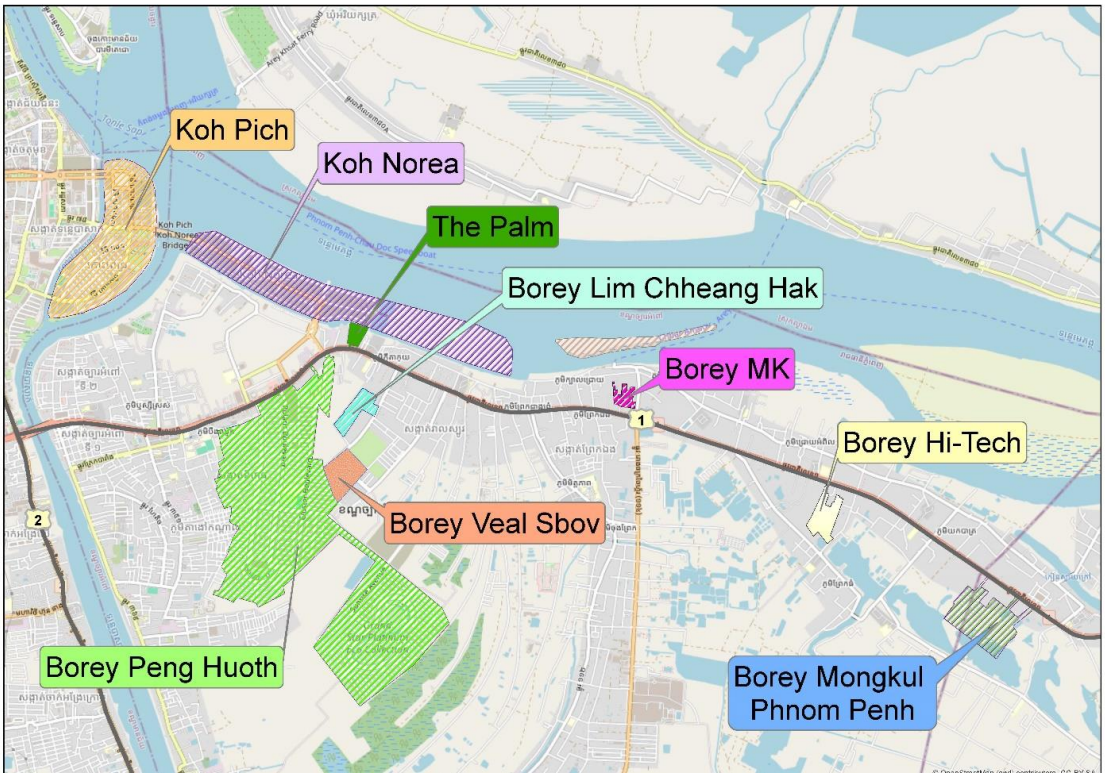


Figure 3.3-1 Private Housing Development Project along National Road 1

Table 3.3-1 Opening Year of the Private Housing Development Project along National Road 1

Borey Name	Opening/Completion Year	Remark
Borey Peng Huoth	2014	Completion of 1st project
Koh Pich	2006	Completion
Koh Norea	2023	Opening of Bridge in November 2023
The Palm	2021	Completion
Borey Lim Cheang Hak	2017	Completion
Borey MK	2019	Completion
Borey Veal Sbov	2017	Completion
Borey Hi-Tech	2017	Completion
Borey Mongkul Phnom Penh	2020	Completion

(1) Koh Norea Development Project

According to Overseas Cambodian Investment Company Group (OCIC Group); one of Cambodia's diversified conglomerates and a developer of Koh Norea Development Project, Norea City, located on Koh Norea, will become a one of the satellite cities in Phnom Penh Capital City, with a budget of more than $2.5 billion. It is being developed over 125 hectares of land and is expected to accommodate approximately 50,000 residents.

Figure 3.3-2 Koh Norea Development Project

(2) Borey Peng Huoth

According to Peng Huoth Group; a property development company in Cambodia and developer of Borey Peng Huoth, this development project extents over 200 hectares and become one of the biggest community housing complexes in Phnom Penh Capital City along NR1.

Figure 3.3-3 Borey Peng Huoth

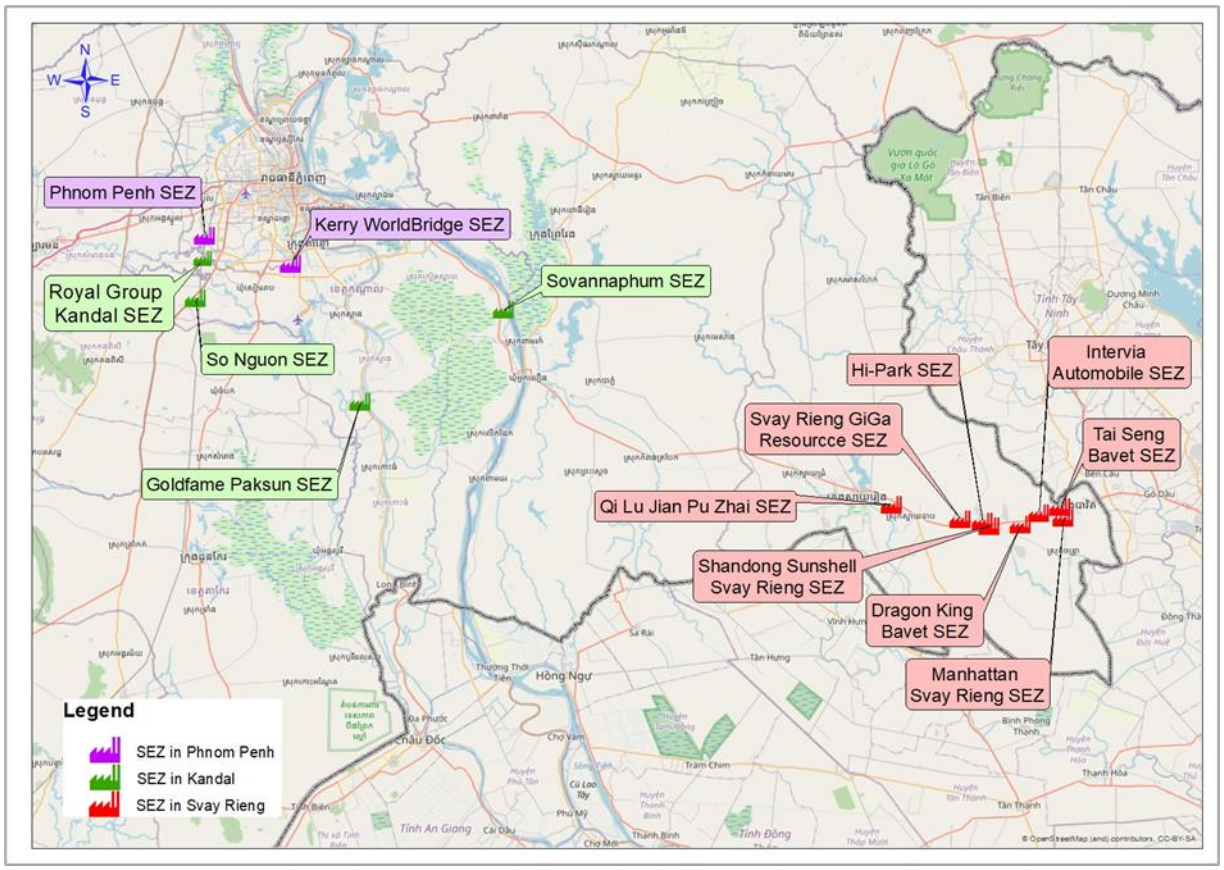
3.3.2 Current Industrial Zone along NR1 (Phnom Penh, Kandal, Svay Rieng)

Special Economic Zones are strategically ready zones for business to operate with easy access to transport infrastructure. Over the past few years, the export output of the SEZ has been significantly increased. SEZs situate in the most suitable location possible to help business thrive.

As of 2021 there were stated to be 54 Special Economic Zones ("SEZs") in Cambodia, spanning the entirety of the country, with zones in Sihanoukville in the south, the capital Phnom Penh and in border towns such as Bavet. SEZs were created in two pieces of legislation promulgated on the same day; Sub-Decree 147 on the Organization and Function of the Council for the Development of Cambodia ("CDC") and Sub Decree 148 on the Establishment and Management of Special Economic Zones, which both came into force on 29 December 2005. The function of these special economic zones is to stimulate growth in the Cambodian economy by incentivizing investment, primarily in the manufacturing sector, by providing tax incentives, improved infrastructure and a simplified method of operation in Cambodia.

According to the Overview of Transport Infrastructure Sector in the Kingdom of Cambodia (7th Edition) 2023, there are currently two (2) special economic zones operating in Phnom Penh, three (3) special economic zones operating in Kandal and eight (8) operating in Svay Rieng as shown in Figure 3.3-4 and Table 3.3-2 List of SEZ Zones in Phnom Penh, Kandal and Svay Rieng

In addition to above-listed special economic zone, in a significant development, Royal Group, is embarking on the construction of a sprawling 120-hectare special economic zone (SEZ) in Kandal province; known as Royal Group Kandal Special Economic Zone (RGKSEZ). This new SEZ, poised to connect with the Phnom Penh Special Economic Zone via a bridge spanning the Prek Tnaot River, marks a strategic move for economic expansion. Once operational, it is anticipated to generate approximately 20,000 employment opportunities for Cambodian citizens, further bolstering the local economy and fostering sustainable growth.



Source: JICA Survey Team

Figure 3.3-4 Location Map of Special Economic Zone in Phnom Penh, Kandal and Svay Rieng

Table 3.3-2 List of SEZ Zones in Phnom Penh, Kandal and Svay Rieng

No	Name	Location	Land Size, (Ha)	Inv. Capital, (USD)	Sub-Decree	FRC	SEZ Administration	No of Project	Inv. Capital of Project in SEZ
Phnom Penh City									
1	Phnom Penh SEZ	Sangkat Kantork, Sangkat Plerng Cheroesh and Sangkat Bueng Thom, Khan Posenchey, Phnom Penh.	350	68,308,418	Ref. No. 33 19-04-2006		Ref. No. 46 27-10-2006	129	940,476,434
2	Kerry Worldbridge SEZ	Damnak Sangkeo Villagd and Prek Rot Taing Village, Sangkat Prek Kampeous, Khan Dangkor, Phnom Penh.	62	21,000,000	Ref. No. 87 08-07-2015	2073/15 16-07-2015	Ref. No. 89 16-08-2016	1	21,000,000
Sub-Total				89,308,418				130	961,476,434
Kandal Province									
1	Goldfame Paksun SEZ	Sethbou Commune, Saang District, Kandal Province.	75	34,462,510	Ref. No. 30 04-04-2007		Non	2	4,294,436
2	Sovannaphum SEZ	Somrong Kaer Village, Samrorng Thom Commune, Keansvay District, Kandal	204	55,792,000	Ref. No. 60 11-02-2014	471/14 21/02/2014	Ref. No. 116 26-12-2017	2	21,500,000

No	Name	Location	Land Size, (Ha)	Inv. Capital, (USD)	Sub-Decree	FRC	SEZ Administration	No of Project	Inv. Capital of Project in SEZ
		Province.							
3	SO NGUON SEZ	Taleark Village, Trol Peang Veng Commune, Kandalsturng District, Kandal Province.	50	50,000,000	Ref. No. 47 03-04-2020	1389/20 07-04-2020	Non	Under-Construction	-
Sub-Total				140,254,510				4	25,794,436
Svay Rieng Province									
1	Manhattan Svay Rieng SEZ	Bavet Commune and Bati Commune, Chantrea District, Svay Rieng Province.	157	30,000,000	Ref. No. 135 29-11-2006		Ref. No. 57 15-12-2005	40	250,788,494
2	Tai Seng Bavet SEZ	Chhrokmates Commune, Svay Teab Distict and Bavet Commune, Chantrea District, Svay Rieng Province.	127	41,369,946	Ref. No. 29 04-04-2007		Ref. No. 42 14-08-2007	52	270,433,754
3	Dragon King Bavet SEZ	Ang Sela Village, Songkat Preyongkunh, Bavet City, Svay Rieng Province.	106	40,488,000	Ref. No. 190 25-10-2012	2373/12 19-10-2012	Ref. No. 40 30-10-2013	5	21,960,416
4	Hi-Park SEZ	Thnorl Cheat Village, Sangkat Chhrokmates, Bavet City, Svay Rieng Province.	263	62,784,870	Ref. No. 285 30-05-2013		Ref. No. 37 26-04-2016	10	31,903,709
5	Shandong Sunshell Svay Rieng SEZ	Chrey Thom Village, Sangkat Preyongkunh, Bavet City, Svay Rieng Province.	96	36,709,800	Ref. No. 462 01-07-2013		Ref. No. 41 30-10-2013	17	99,923,712
6	Qi Lu Jian Pu Zhai SEZ	Svay Teu, Khor Sang and Ta Nor Village, Sangkat Svay Teu, Bavet City, Svay Rieng Province.	215	51,000,000	Ref. No. 47 28-03-2017 Ref. No. 47 24-03-2021	1197/17 04-04-2017	Ref. No. 11 06-02-2018	12	402,178,900
7	Svay Rieng GiGa Resource SEZ	Dermpo and Kondeang Rey Village, Kondeang Rey Commune, Svayteab City, Svay Rieng Province.	222	56,816,800	Ref. No. 219 24-07-2014 Ref. No. 90 01-07-2019	3682/16 08-12-2016	Ref. No. 53 17-07-2017	32	171,427,423
8	Intervia Automobile SEZ	Prey Phdao Village, Sangkat Chhrokmates, Bavet City, Svay Rieng Province.	111	75,000,000	Ref. No. 103 27-06-2017	2247/17 29-06-2017	Ref. No. 03 09-01-2018	3	51,824,000
Sub-Total				394,169,416				171	1,300,440,408

Source: Overview on Transport Infrastructure Sectors in the Kingdom of Cambodia (2023, IRITWG)

3.3.3 Information on Economic Activities along NR1

From Monivong Bridge to Tsubasa Bridge, there are many developed urban section with many housings' development as well industrial complex and factories.

Table 3.3-3 List of Urban Section along NR1

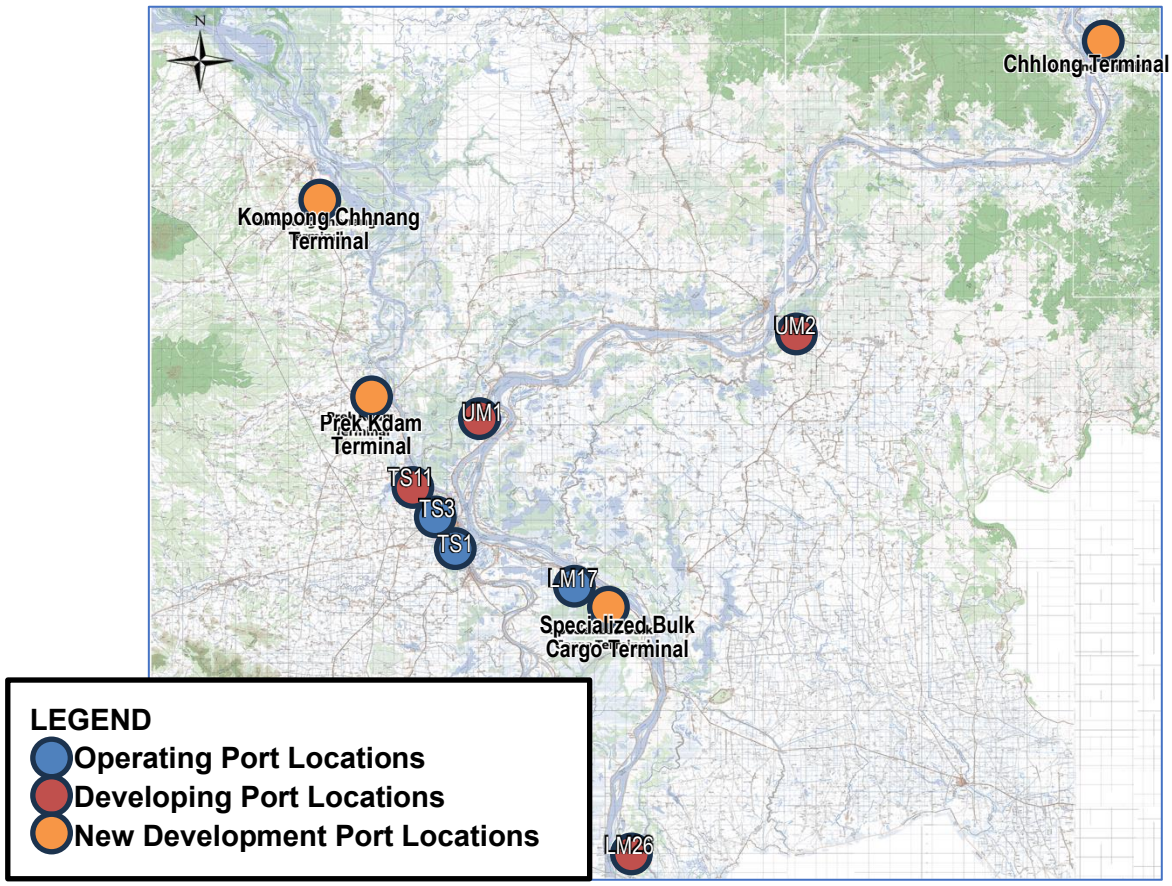
No.	Urban Section Name	From KP	To KP	Length (km)
1	Kien Svay	16+500	20+060	3.56
2	Koki	20+060	24+860	4.90
3	Dei Edth	24+860	27+260	2.40
4	Banteay Daek	27+260	35+460	8.20
5	Somrong Thom	40+460	47+160	6.70
6	Koki Thom	49+660	53+710	4.05
7	Kampong Phnom	55+260	57+460	2.20
8	Neak Loeung	57+460	60+719	3.26

Source: Department of Public Works and Transport of Kandal Province

3.3.4 Logistic Activity and Facilities along NR1

(1) Phnom Penh Autonomous Port (PPAP)

Phnom Penh Autonomous Port (PPAP) currently has 7 terminals including 3 operating and 4 developing port locations. In addition to these 7 port terminals, PPAP is also planning to develop 4 more terminals.



Source: PPAP

Figure 3.3-5 Port Locations

1) Multipurpose Terminal TS3 and TS1

Multipurpose Terminal TS3—the head office—is currently being revolutionized to be an International Passenger and tourist terminal TS3 and TS1, located along the Tonle Sap about 4km North of the Mekong junction.

To meet the inland waterway tourism demand, PPAP is planning to improve Passenger and Tourist Terminal by building a passengers' waiting facility, which includes coffee shop, souvenir shop and restaurant with an aim to have passengers enjoy both domestic and international cruises as well as a short city tour along the rivers.

2) The Container Terminal LM17

The Container Terminal LM17 is the main terminal located 30km south of Phnom Penh along the Mekong River, which commenced operation in January 2013 after its construction in 2011.

Situated in Kandal Leu Village, Banteay Dek Commune, Kien Svay District, Kandal Province, this terminal is considered as an important terminal for the service of both containerized and conventional cargoes with the quay of 300m by 22m consists of 3 Travelling Cargo Cranes (TCCS) and two floating cranes, which provide five berths for the barges at the same time. The container yard is operated by Rubber Tired Gantry Cranes, reach stackers, and sky stackers.

Legend

Developed Project

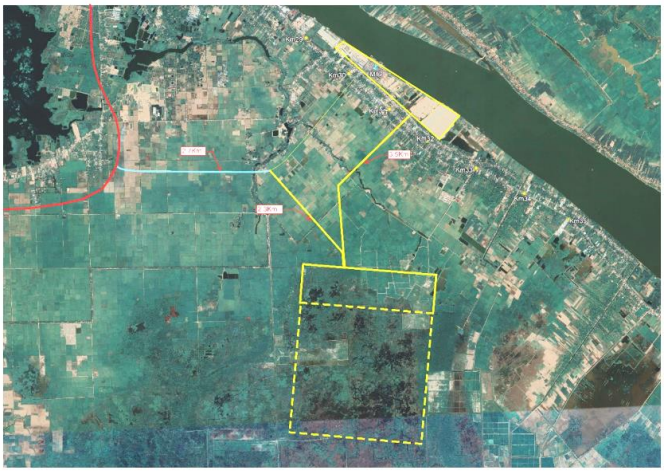
1. Development Project of Phase I (2013)
2. Development Project of Phase II Expansion (2018)
3. Development Project of Phase III Expansion - Step 1 (2021)
4. Dormitory Construction (2021)
5. Quay 12m x 149m Construction (2021)
6. Exit Gate Construction (2021)
7. Development Project of Cold Warehouse (2023)
8. Development Project of Phase III Expansion - Step 2 (2023)
9. New Quay 16m x 149m Construction (2023)
10. New Scanner Construction (2022)
11. New Gate Construction (2022)
12. LCL Warehouse Construction (2023)

Development Plan Project

13. Development Project of Phase IV Expansion (2026)
14. Development Project of Specialized Bulk Cargo Terminal (2025)
    - Development Project of Inland Container Deport (ICD-LM17) (2025)
    - Development Project of Rice Processing Facility (2027)

Source: PPAP

Figure 3.3-6 Development Plan of LM17

 Source: PPAP	PPAP plans to efficiently develop a special economic zone, located 3.5 kilometers in front of the Container Terminal LM17 near ring road #3, in order to bring more benefits to the investors, make gateway for the movement of cargoes more cost-effective, contribute to the economic growth, and ensure the sustainability of container growth via PPAP. Currently, PPAP has conducted a case study an investment partner to assess the project's viability.

3) Multipurpose Terminal TS11

Multipurpose Terminal TS11 is located along Tonle Sap River, which is connected with intermodal transport including inland waterway transportation, road transportation and railway; and

4) Sub-feeder Multipurpose Terminal UM1

Sub-feeder Multipurpose Terminal UM1 is located at Kandal province and the upper-Mekong, approximately 24 km northeast of Phnom Penh;

5) Sub-feeder Multipurpose Terminal UM2

Sub-feeder Multipurpose Terminal UM2 is located on the mainstream of the Mekong 106km up from Phnom Penh;

6) Sub-feeder Multipurpose Terminal LM26

Sub-feeder multi-purpose terminal LM26 is located in Koh Roka commune, Peam Chor District, Prey Veng Province. Currently, sub-feeder multi-purpose terminal LM26 has concluded its container yard construction, and is planned to enable the operation of general cargoes handling for the mean time until containers handling is viable.

This development will be equipped with the following core infrastructures:

- Quay construction
- International tourists' terminal
- Cargo yard construction
- Substation, Pumping station, Gas station
- Reefer plugs for refrigerated containers
- Entrance/Exit gate and Road

Source: PPAP

Figure 3.3-7 Development Plan of LM26

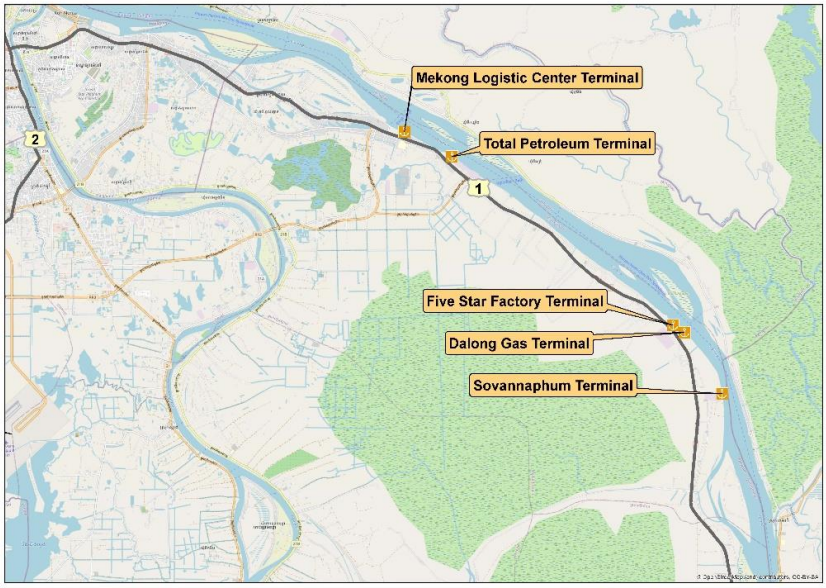
7) Other River Port

In addition to the Phnom Penh Autonomous Port facility, many private run terminals can be found up to Tsubasa Bridge.

Table 3.3-4 List of Other River Port

No.	Description	Status	Handling
1	Mekong Logistic Center Terminal	Operational	General cargo and Agricultural product
2	Dalong Gas Terminal	Operational	Natural Gas Terminal
3	Total Petroleum Terminal	Operational	Oil Terminal
4	Five Star Factory Terminal	Operational	Agricultural Fertilizer
5	Sovannaphum Terminal	Operational	General cargo

Source: Overview on Transport Infrastructure Sectors in the Kingdom of Cambodia (2023, IRITWG)



Source: PPAP

Figure 3.3-8 Location of Other River Port

(2) Cold Chain Storage

An official opening of Khmer Cold Chain (KCC)'s 6,046 cubic meter cold storage cross-docking facility in Phnom Penh Autonomous Port was launched on January 24, 2024.

This facility was made in part through a $2 million partnership between USAID and KCC, with U.S. $999,604 from USAID and $1,017,605 in co-investment from KCC. The cross-docking facility, which began operations on August 1, 2023, offer crucial sanitary and phytosanitary services (SPS). Further, it addresses market system barriers to import-export opportunities for large companies, small and medium-sized enterprises, and agricultural cooperatives, with a focus on improving access for smallholder farmers and woman- and youth-owned businesses.

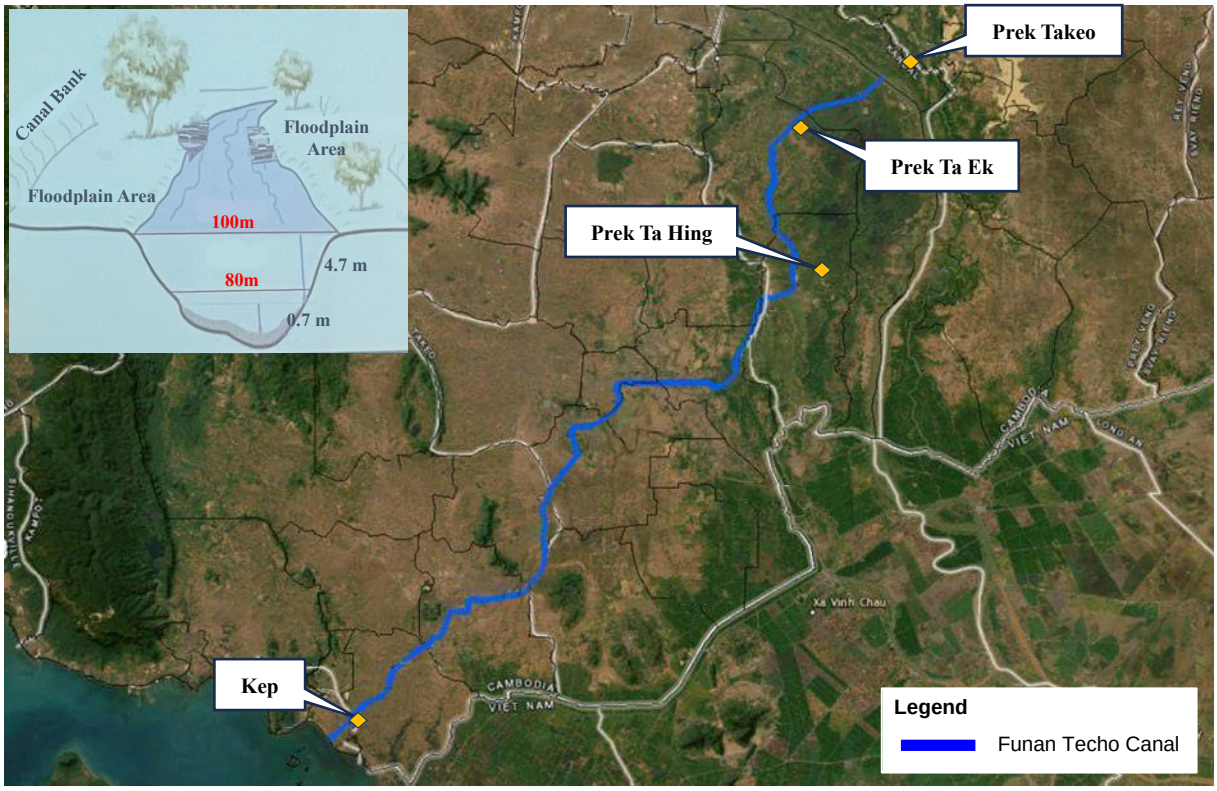
This facility was built to boost regional and international trade, prevent food spoilage, and provide economic benefits for businesses and consumers alike. It aims to provide valuable services to dozens of import and export customers, directly and indirectly benefiting thousands of Cambodian farmers and consumers. USAID supports KCC through its Feed the Future Market Systems and Partnerships (MSP) Activity, one of several USAID projects developing cold storage and logistics capacity for agricultural applications in Cambodia.

Source: KCC

Figure 3.3-9 Khmer Cold Chain Storage Facility

(3) Funan Techo Canal

The Tonle Bassac Navigation Road and Logistics System Project, commonly known as the "Funan Techo Canal" project, whose feasibility study was conducted by China Road and Bridge Construction and CCCC Water Transportation Consultants Co., Ltd conducted a groundbreaking ceremony on August 5, 2024. The Funan-Techo canal is 180 km long from Prek Takeo of the Mekong River, through the Prek Ta Ek of the Bassac River, then into Prek Ta Hing of the Bassac River, Koh Thom district, and extends to the Kep province passes through four provinces, including Kandal, Takeo, Kampot and Kep, with a total population of 1.6 million people living on both side of the waterway. The waterway is 100 meters wide upstream and 80 meters downstream and a depth of 5.4 meters (navigation depth 4.7 meters and safety gap 0.7 meters), 2 lanes can get in and out and avoid each other safely.



Source: MPWT

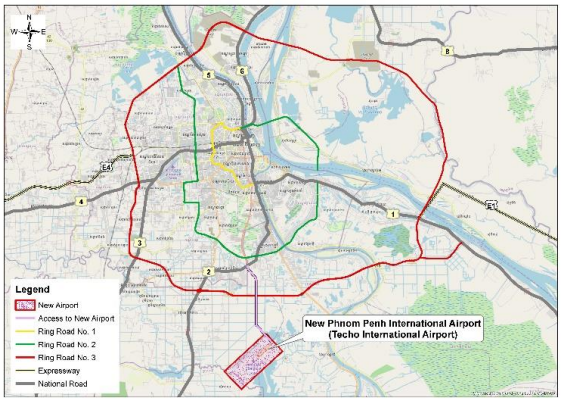
Figure 3.3-10 Funan Techo Canal Project Location Map and Cross Section

The project will build three waterway dams, build 11 bridges, build a 208-kilometer sidewalk, and provide navigation assistance and other cross-river infrastructure. The construction of the new waterway project is estimated to cost USD 1.7 billion and take about four years to complete.

With an estimation of EIRR between 20% to 31%, this Funan Techo canal project is expect to provide many benefits, including reducing the time, distance and cost of current transport, the establishment of commercial areas and logistics centers, and the development of new satellite ports, more expansion of agriculture, irrigation, aquaculture and livestock development areas, supporting the development of Cambodia's fourth economic pole, creating more jobs at Sihanoukville Autonomous Port, Phnom Penh Autonomous Port and other Ports, promoting urban development and urbanization, and the promotion of real estate growth.

(4) New Phnom Penh International Airport

The New Phnom Penh International Airport, also known as Techo International Airport, is a proposed development to serve the city of Phnom Penh which is being developed around 30-40km outside of the city and located in Kandal province. It will cover an area of 2600 hectares, making it the world's ninth largest airport and it is expected to be operational by 2025. This New Phnom Penh International Airport is developed by the Cambodia Airport Investment Co., Ltd (CAIC) which is a joint venture between Overseas Cambodia Investment Corporation (OCIC) and the State Secretariat of Civil Aviation (SSCA), with OCIC to own 90% of CAIC. The construction of this new airport is divided into three with a total projected cost approximately 1.5 billion USD.



Source: JICA Survey Team

Source: OCIC Group

Figure 3.3-11 Location Map of New Phnom Penh International Airport

The construction of new the airport (Phase 1) has started in 2019 and scheduled to begin operations in 2025. It will be a category 4F-class airport and it will be able to accommodate Airbus A380-800s and Boeing 747-800s. The 108-metre aero plane control tower will be operational by 2022, as also will be the 4,000-metre runway, VIP terminal building, solid waste building, sewerage system, cargo warehouse, aero plane petroleum station, firefighter station among other facilities. Techo International Airport in the first phase will be capable of handling a maximum of 13 million passengers and 175,000 tons of cargo per year. The second phase is expected to be completed by 2030 and will be able to receive 30 million passengers a year, and the third phase will be completed by 2050 when 50 million passengers per year are expected to be received.

As of February 8, 2024, the construction work achieved by the company (Phase 1) accounted for 64.1% of the total work, with a total cost of $932 million, statement made by SSCA. In addition to the new airport, the construction of the road connecting Samdech Blvd. on National Road 2 to the airport, which is 60 meters wide and 13.5 kilometers long, has reached 85%.

3.3.5 Impact of ASEAN Free Trade Zone and Economic Partnership Agreement

The Southern Economic Corridor connects Bangkok, Phnom Penh, and Ho Chi Minh City, those cities with a large concentration of domestic and international manufacturing and other industries, and is attracting attention for its supply chain construction. Similarly, industrial development and corridor development based on each country's development strategy and development needs have progressed in recent years, and each development partner is paying close attention to the momentum to verify prioritization based on higher-level plans and provide infrastructure support based on the results.

However, Cambodia, located at the center of the Southern Corridor, has so far received only limited benefit from Thailand-plus-one, Vietnam-plus-one, or China-plus-one through enhanced connectivity. Of the goods imported and exported at Aranyaprathet Customs (Thailand side) on the Thailand-Cambodia border, most of the goods exported from Thailand to Cambodia are industrial products such as automobile products and construction materials. Exports are mainly agricultural products, and there is an imbalance in the amount of trade.

Against this background, as a member of ASEAN, Cambodia agreed to eliminate tariffs on products in the ASEAN Free Trade Area (AFTA) in 2018, and in the Regional Comprehensive Economic Partnership (RCEP), trade in goods and rules of origin have been implemented to be strengthening economic cooperation in areas such as trade in services, investment, intellectual property, and e-commerce.

At the same time, Cambodia will focus on improving agricultural productivity, which creates high added value through the processing of agricultural products, and will develop improvement policies to expand

the use of the Southern Economic Corridor.

Strengthening connectivity through corridor development is a priority in Cambodia's development policy in terms of strengthening international competitiveness, with a focus on infrastructure development, in order to shift from processed goods and light industry to heavy industry.

Such cooperation should be linked to improvements in the infrastructure sector, and Cambodia is implementing a rectangular strategy.

Road development under NSDP 2019–2023 outlined the government's priorities to enhance transport connectivity by increasing its own investment budget and attracting investment from the private sector.

3.3.6 Necessity of Widening National Route 1 in Light of Roadside Development

As previously noted, various facilities serving as major transportation hubs and private development plans are progressing along the route. Considering the connection with Ring Road 3, which intersects National Route 1, and the upcoming opening of the new airport in 2025, development demand along the route is expected to increase significantly. Furthermore, with extensive media coverage of the Funan Techo Canal improvement, attention is growing toward the southern Phnom Penh region, enhancing the role of National Route 1 as increasingly vital to national development.

The Ministry of Public Works and Transport's (MPWT) three-year Public Investment Program (PIP) for 2024–2026 includes plans for Ring Road 4, with surrounding roads undergoing rehabilitation supported by South Korea and China, further spurring future development along the route. In light of these conditions, it is anticipated that the current number of lanes on National Route 1 will be insufficient to accommodate future roadside demand. Thus, widening National Route 1 is essential to promote the healthy development of the Southern Economic Corridor.

3.4 Traffic Condition

3.4.1 Traffic Survey

(1) Survey Items

A total of six traffic surveys were carried out as follow in order to understand the latest traffic conditions and issues, and update traffic demand.

Table 3.4-1 Traffic Survey

No	Survey Items	Quantity	Purpose
1	Traffic Count Survey	10 Points (Intersection) 6h (6:00-9:00, 16:00-19:00)	Count surveys were conducted to understand the traffic volume and to verify the reproducibility of the traffic model.
		2 Points (Roadside) 24h（6:00-6:00）	
2	Signal Phase Survey	7 Points 6h (6:00-9:00, 16:00-19:00)	To assess traffic congestion at major intersections and identify bottlenecks
3	Ferry OD Survey	4 Points Approximately More than 100 Sample	To determine the condition of the Mekong River crossings and to update the OD table.
4	Travel Speed Survey	NR1	To identify bottleneck and traffic congestion area
5	Queue Length Survey by Drone	NR1(0-4km)	
6	Logistics OD Survey	Approximately 600 Sample	To determine the logistics to the Phnom Penh Autonomous Port and to update the OD table.

(2) Location of Traffic Survey

The survey locations for the traffic survey are shown in Figure 3.4-1. Table 3.4-2 through Table 3.4-7 lists the location of each survey.

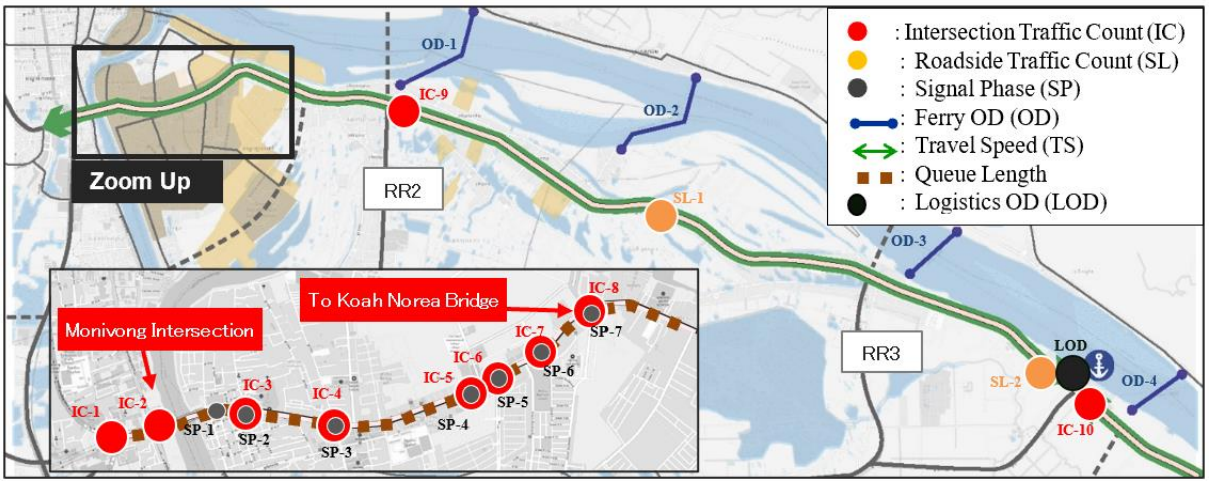


Figure 3.4-1 The Survey Location for the Traffic Survey

Source：JICA Survey Team

Table 3.4-2 The Survey Location for the Intersections

Station Code	Survey Date	Intersection Location	Name of Intersection
IC-1	Wednesday, 24th April 2024 Thursday, 25th April 2024	NR1/Hun Sen Blvd/ Yothapol Khemarak Phoumin Blvd (271)	Monivong-Hun sen Blvd Flyover Bridge Intersection
IC-2		NR1/ Norodom Blvd/ NR2	Monivong-Kbal Thanal Flyover Bridge Intersection
IC-3	Wednesday, 3rd April 2024 Thursday, 4th April 2024	NR1/ Street 357/Street 628	Chabar Amprov Intersection
IC-4		NR1/ Street 351	Nirouth Pagoda Intersection
IC-5		NR1/ Roadstery Park Mall	Park Community Mall Intersection
IC-6		NR1/ Borey Peng Huoth Street	Borey Peng Huoth Intersection
IC-7		NR1/ Cho Ray Phnom Penh Hospital	Norea Island Intersection
IC-8		NR1/ Koh Norea Entry	Koh Norea Entry Intersection
IC-9		NR1/NR21B (RR2)	Prek Eng Intersection
IC-10		NR1/ Phnom Penh Autonomous Port	Phnom Penh Autonomous Port (In)

Table 3.4-3 The Survey Location for the Roadside

Station Code	Survey Date	Location
SL-1	Wednesday, 3rd April 2024 Thursday, 4th April 2024	Korki Market
SL-2	Friday, 10th May 2024	Phnom Penh Autonomous Port (Out)

Table 3.4-4 The Survey Location for the Signal Phase

Station Code	Survey Date	Intersection Location	Name of Intersection
SP-1	Thursday, 4th April 2024	NR1/ Street 363	Chabar Amprov Market Intersction
SP-2		NR1/ Street 357/Street 628	Chabar Amprov Intersection
SP-3		NR1/ Street 351	Nirouth Pagoda Intersection
SP-4		NR1/ Roadstery Park Mall	Park Community Mall Intersection
SP-5		NR1/ Borey Peng Huoth Street	Borey Peng Huoth Intersection
SP-6		NR1/ Cho Ray Phnom Penh Hospital	Norea Island Intersection
SP-7	Thursday, 25th April 2024	NR1/ Koh Norea Entry	Koh Norea Entry Intersection

Table 3.4-5 The Survey Location for the Ferry OD

Station Code	Survey Date	Name of Port	Survey Sample
OD-1	Wednesday, 3rd April 2024 Thursday, 4th April 2024	Taprom Moat Krasah Ferry Terminal	119 Sample
OD-2		Kaoh Reah Kaoh Prak Ferry Terminal	600 Sample
OD-3		Plov Trey Ferry Terminal	1,449 Sample
OD-4		Boeng Krom Bang Teaydek Ferry Terminal	372 Sample

Table 3.4-6 The Survey Area for the Travel Speed

Code	Survey Date	Section	Distance
TS-1	Thursday, 4th April 2024	Monivong-Hun sen Blvd Flyover Bridge Intersection→Prek Eng Intersection (RR2)	7.6km
TS-2		Prek Eng Intersection (RR2)→Tsubasa Bridge	51.6km

Table 3.4-7 The Survey Location for the Logistics OD

Station Code		Name of Port	Survey Sample
LOD	Thursday, 2nd May 2024	Phnom Penh Autonomous Port	616 Sample

(3) Survey Results

1) Intersection Traffic Count Survey

The result of intersection traffic count survey is shown in Table 3.4-8. At the time of the traffic count survey, one side of the road from Koh Norea bridge to NR1 at IC-8 (Koh Norea Entry Intersection) was under construction and therefore closed to traffic. Most of the cars from the Koh Norea bridge to NR1 go through IC-7 (Norea Island Intersection).

- Traffic volumes on NR1 ranged from 26,400 to 104,800 PCU/day.
- Peak rates ranged from 5.7% to 9.6%.
- At IC-2 (Monivong-Kbal Thanal Flyover Bridge Intersection), traffic volumes were about 20% lower than in 2022. This may be due to the opening of the Koh Norea bridge from November 2023.
- The analysis conducted at major intersections, considering peak traffic volume, has shown that the

demand rate at these intersections significantly surpasses 0.9[1].

Table 3.4-8 Traffic Volume by Direction (PCU/day)

Location	Road Name	2019	2022	2024						
		Traffic Volume (PCU/day)	Traffic Volume (PCU/day)	Traffic Volume (PCU/day)	Peak time Traffic Volume (PCU/day)	Peak Ratio	MC	LV	HV	Flow ratio of Intersection
IC-1	Monivong Blvd(north)	-	-	52,500	4,236	8.1%	23,245	25,287	3,970	-
	Monivong Blvd(east)	-	-	76,800	5,850	7.6%	41,280	28,053	7,463	
	Hun Sen Blvd(south)	-	-	42,400	3,198	7.6%	15,128	23,999	3,240	
	St.271(west)	-	-	53,000	3,880	7.3%	28,030	19,541	5,453	
IC-2	Norodom Blvd(north)	87,719	96,415	82,700	6,503	7.9%	45,395	33,681	3,631	-
	NR1(east)	128,370	141,092	104,800	8,292	7.9%	59,633	39,947	5,177	
	NR2(south)	67,346	67,606	58,300	4,491	7.7%	30,527	25,173	2,615	
	Monivong Blvd(west)	123,401	123,965	100,000	8,370	8.4%	57,627	36,613	5,757	
IC-3	St.357(north)	-	-	13,200	1,057	8.0%	8,749	4,011	399	1.08
	NR1(east)	-	95,798	65,100	4,909	7.5%	29,521	30,273	5,287	
	St.628(south)	-	-	9,100	716	7.9%	5,300	3,552	199	
	NR1(west)	-	-	59,000	4,384	7.4%	26,038	27,653	5,260	
IC-4	St.351(north)	-	-	5,900	478	8.2%	3,345	2,265	254	1.68
	NR1(east)	-	-	61,600	4,441	7.2%	28,038	26,158	7,384	
	St.351(south)	-	-	10,400	777	7.5%	5,061	4,050	1,282	
	NR1(west)	-	-	64,500	4,573	7.1%	29,785	27,267	7,440	
IC-5	Park Mall(north)	-	-	11,700	978	8.3%	4,289	7,053	383	1.89
	NR1(east)	-	-	67,200	5,152	7.7%	28,834	32,698	5,679	
	NR1(west)	-	-	70,300	5,292	7.5%	30,418	33,870	6,027	
IC-6	NR1(east)	-	-	61,400	4,546	7.4%	27,369	27,666	6,322	1.97
	Borey Peng Hout(south)	-	-	24,100	1,965	8.2%	9,754	13,698	610	
	NR1(west)	-	-	73,800	5,703	7.7%	33,581	34,046	6,168	
IC-7	Noreal Island (north)	-	-	18,700	1,579	8.4%	5,700	12,179	865	-
	NR1(east)	-	-	57,500	746	8.2%	22,493	28,356	6,609	
	Borey Peng Huoth(south)	-	-	13,900	1,168	8.4%	5,082	8,525	297	
	NR1(west)	-	-	69,600	880	8.1%	30,093	32,676	6,845	
IC-8	Koh Norea(north)	-	-	16,200	1,561	9.6%	5,689	8,906	1,653	1.79
	NR1(east)	-	-	62,900	4,491	7.1%	23,477	31,552	7,887	
	Borey Peng Huoth(south)	-	-	11,300	871	7.7%	2,660	7,424	1,174	
	NR1(west)	-	-	48,700	3,444	7.1%	19,113	23,367	6,216	
IC-9	NR1(east)	39,346	-	48,000	3,584	7.5%	18,150	22,952	6,924	-
	NR21B(south)	19,490	-	18,500	1,183	6.4%	3,534	9,028	5,913	
	NR1(west)	34,858	-	50,700	3,785	7.5%	17,656	26,858	6,229	
IC-10	PP Port(north)	3,238	-	6,400	387	6.0%	536	213	5,658	-
	NR1(east)	22,274	-	33,800	1,931	5.7%	5,554	16,509	11,698	
	RR-3(south)	0	-	23,000	1,274	5.5%	1,823	5,975	15,246	
	NR1(west)	24,942	-	26,400	1,504	5.7%	4,887	11,917	9,620	

MC (Motorcycle): Motorcycle, Tuktuk, Motorumork

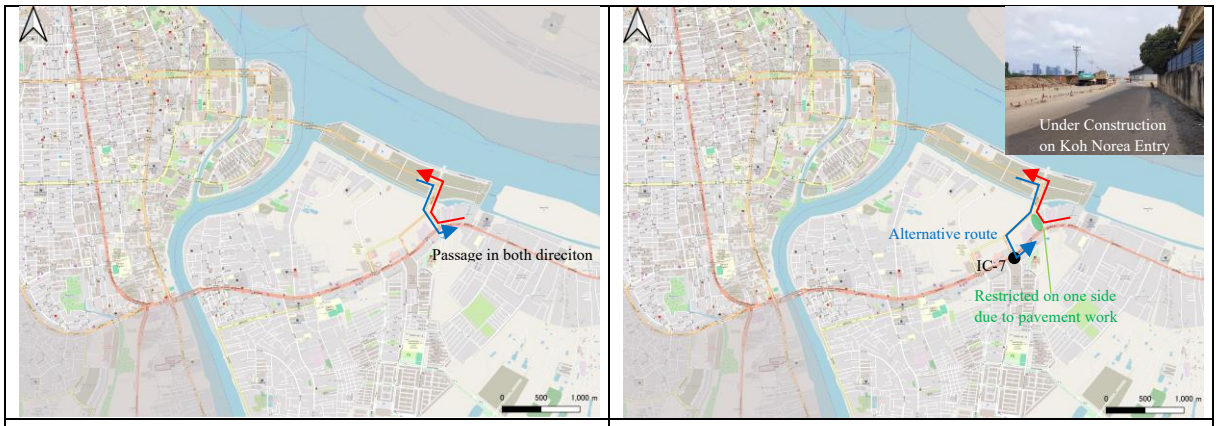
LV (Light Vehicle): Taxi &Passenger Car, Pick Up, Light Truck(< 4 tons) Minibus,

HV (Heavy Vehicle): Medium Bus Large Bus, Medium Truck (>4 ton), Heavy Truck, Trailer

Note1: 6-hour traffic counts were expanded to 24-hour traffic counts based on the results of 24-hour traffic counts.

Note2: Peak hour traffic volume refers to the traffic volume observed during the busiest one-hour period within the survey timeframe.

[1] The demand rate of an intersection represents the proportion of the total effective green time necessary to handle the traffic demand flowing into the intersection from all directions. Since a signal cycle includes both effective green time and lost time, when the demand rate of an intersection exceeds approximately 0.9, the designed phase indications often fail to provide sufficient traffic capacity to handle the traffic demand.



Before traffic survey	At the time of traffic survey

Figure 3.4-2 Traffic Condition on Koh Norea Entry Intersection (IC-8) at the time of Traffic Survey

2) Roadside Traffic Count Survey

The results of the roadside traffic counts are shown in Figure 3.4-3 and Figure 3.4-4.

SL-1 (Korki Market) is the NR1 traffic volume and SL-2 is the PPAP exit traffic volume, not the NR1 traffic volume.

- Traffic volume in SL-1 (Kokir market) was 31,207 PCU/day in 2019, 43,131 PCU/day in 2022, and 29,900 PCU/day in 2024. Compared 2022 and 2024, traffic volume was about 69% of the volume in 2022. In addition, the percentage of Heavy Vehicles by vehicle type has decreased significantly, from 29% to 12%. Because RR3 operated from June, 2023 and more vehicles utilize RR3 instead of NR1.
- MC (Motorcycle) and LV (Light vehicle) at SL-1 also showed a decrease in traffic volume compared to 2022.This is considered to be distributed in RR3.
- Due to the different entrance and exit of the PPAP, vehicles entering the PPAP were surveyed at IC-10, and vehicles exiting the PPAP were surveyed at SL-2. At SL-2, heavy vehicles account for approximately 92% of the traffic.
- Traffic volumes for IC-10 NR1 (west) are NR1 traffic volumes at the PPAP entrance intersection 29,900 PCU/day for SL-1 and 26,400 PCU for IC-10 NR1 (west) (see Table 3.4-8). SL-1 and IC-10 NR1 (west), traffic volumes for IC-10 NR1 (west) are about 10% lower, with a trend of decreasing traffic volumes as one move eastward.

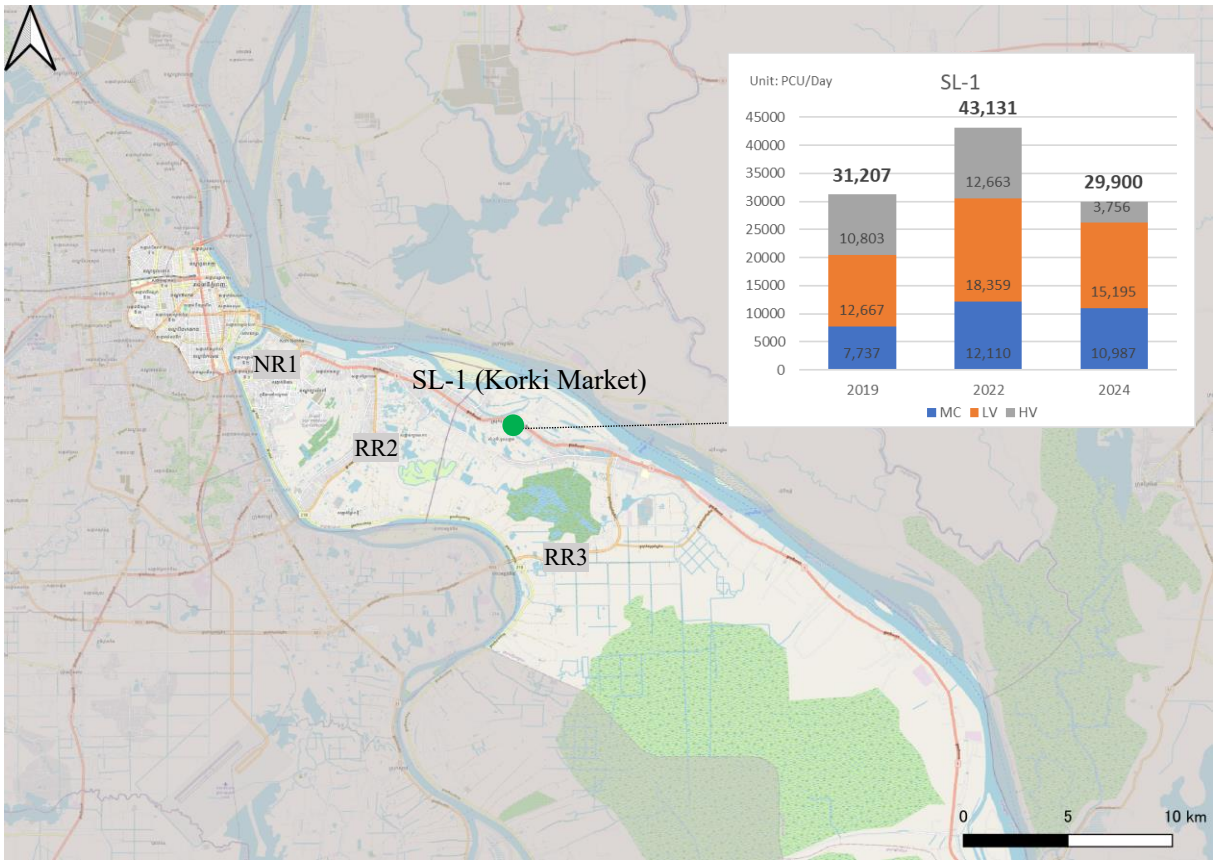


Figure 3.4-3 Comparison Traffic Volume (Y2019, Y2022, Y2024) (PCU/day)

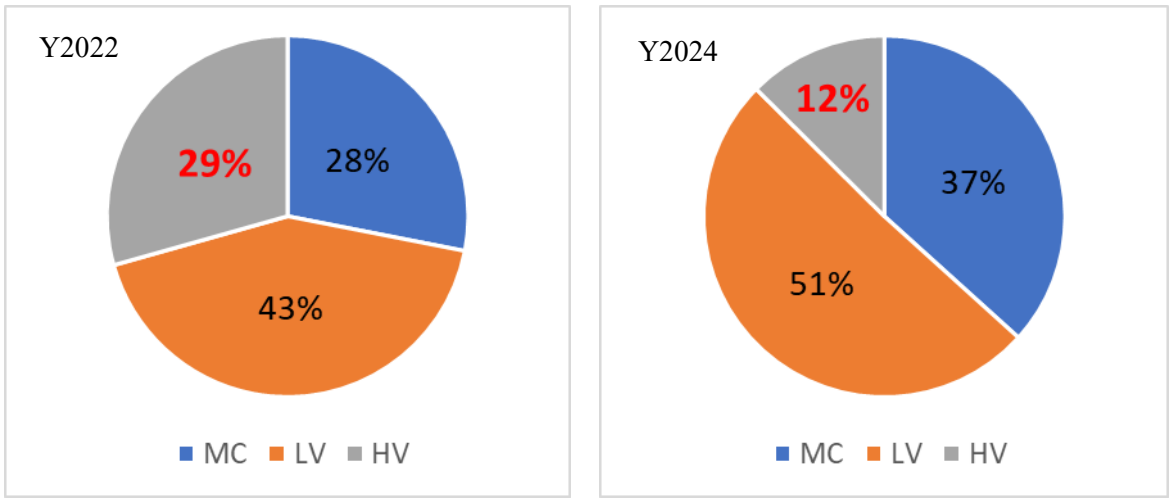


Figure 3.4-4 SL-1 (Kokir Market) Composition by Vehicle Type (Y2022, Y2024)

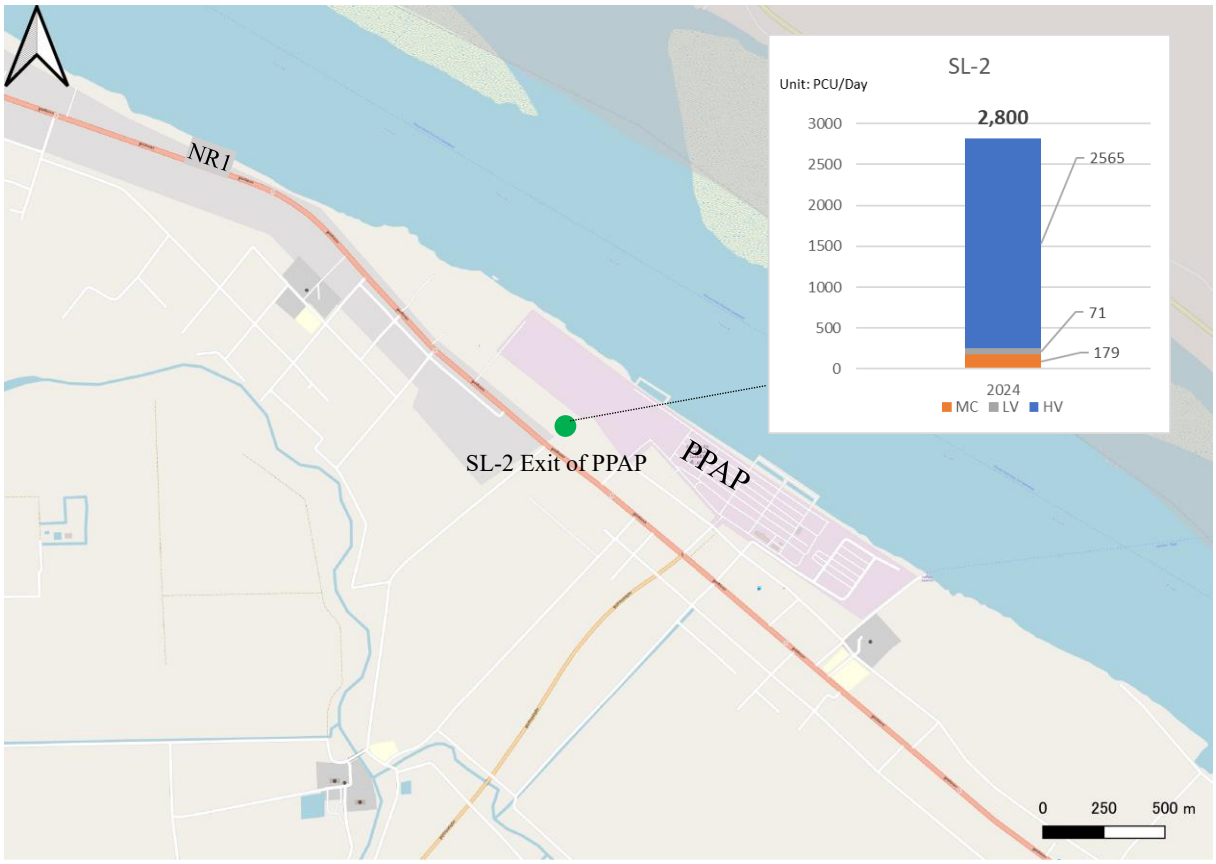


Figure 3.4-5 SL-2 (Exit of PPAP) Composition by Vehicle Type

3) Signal Phase Survey

Table 3.4-9 shows the results of the signal phase at each location at 7:00 AM and 5:00 PM. Signals SP-1 to SP-6 are being developed under the "The project for Development of Traffic Management System in Phnom Penh" and are controlled independently at each intersection. In the future, a system in which signals installed consecutively are controlled by each other as a system control (coordinated control) will be adopted.

Table 3.4-9 Signal Phase

Station Code	Peak hour	Cycle Length	Green time (NR1)
SP-1	Morning (7:00)	139 sec	99 sec
	Night (17:00)	167 sec	116 sec
SP-2	Morning (7:00)	139 sec	105 sec
	Night (17:00)	141 sec	105 sec
SP-3	Morning (7:00)	148 sec	84 sec
	Night (17:00)	140 sec	81 sec
SP-4	Morning (7:00)	139 sec	83 sec
	Night (17:00)	131 sec	76 sec
SP-5	Morning (7:00)	137 sec	85 sec
	Night (17:00)	126 sec	58 sec
SP-6	Morning (7:00)	130 sec	79 sec
	Night (17:00)	130 sec	80 sec
SP-7	Morning (7:00)	134 sec	58 sec
	Night (17:00)	134 sec	58 sec

4) Travel Speed Survey

The survey was conducted from the Monivong-Hun sen Blvd Flyover Bridge Intersection on NR1 to the Tsubasa Bridge. Travel speeds were measured during the morning peak (7:00-9:00 AM) and evening peak (17:00-19:00 PM). The survey days were weekdays on Thursday, excluding Saturdays, Sundays, and holidays.

Table 3.4-10 shows the results of the travel speed survey. The slowest travel speed was from the Monivong-Hun sen Blvd Flyover Bridge Intersection to the Prek Eng Intersection (RR2) during the evening peak, with an average travel speed of 11.3 km/h. Travel speeds in both directions were comparable in the morning peak. From the Prek Eng Intersection (RR2) to the Tsubasa Bridge and back were similar in both the morning and evening peaks.

Table 3.4-10 Results of the Travel Speed Survey

Section Code	Direction		Average Travel Speed (km/h)	
	From	To	Morning (7:00-9:00)	Evening (17:00-19:00)
TS-1	Monivong-Hun sen Blvd Flyover Bridge Intersection	Prek Eng Intersection (RR2)	17.0	11.3
	Prek Eng Intersection (RR2)	Monivong-Hun sen Blvd Flyover Bridge Intersection	16.5	33.2
TS-2	Prek Eng Intersection (RR2)	Tsubasa Bridge	46.5	44.5
	Tsubasa Bridge	Prek Eng Intersection (RR2)	48.1	46.5

5) Logistics Survey in PPAP

PPAP operates 365 days a year and employs approximately 450 stuffs. 50% of the workers commute to work by motorcycle, and 30% walk to work. Approximately 60% of the employees live in Kien Svay District, where PPAP is located, with 20% commuting from Banteay Daek and 15% from Dei Edith.

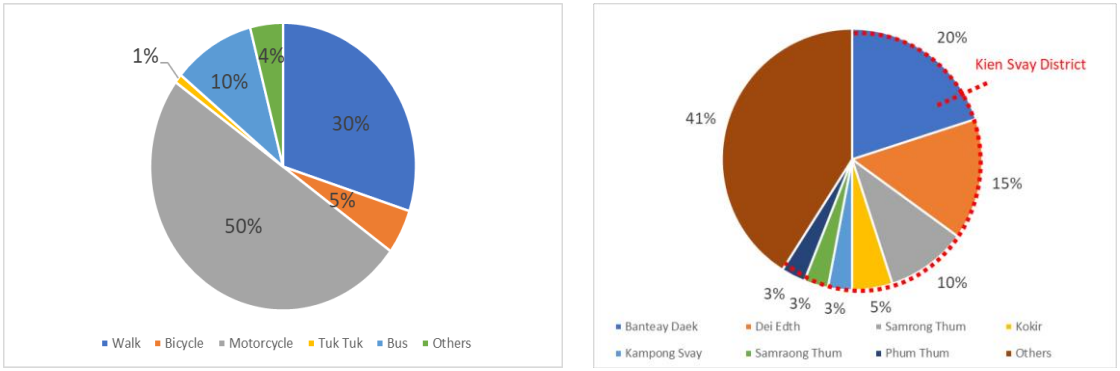


Figure 3.4-6 Worker's Mode of Transportation and the Commune

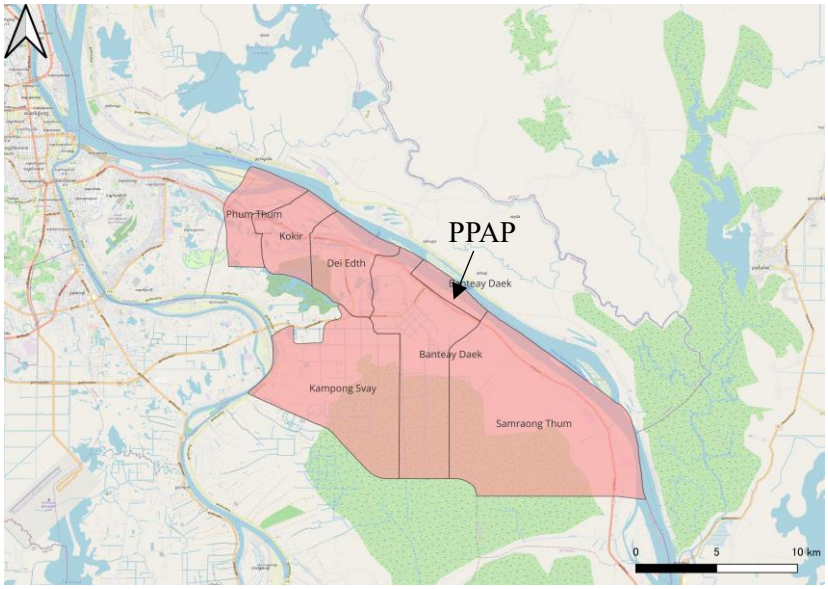


Figure 3.4-7 The Commune Where the Employee Lives (Kien Svay District)

Figure 3.4-8 shows a desire line of logistics OD entering and exiting the PPAP. There are few long-distance trips into and out of the PPAP with the main ODs being traffic that connects factories and industrial estate in Chaom Chau Ti3 (Zone No. 83) and Chaom Chau Ti1 (Zone No. 68) on the west side of Phnom Penh. The Phnom Penh Special Economic Zone (PPSEZ) is located in these areas, and PPAP plays an important role in logistics.

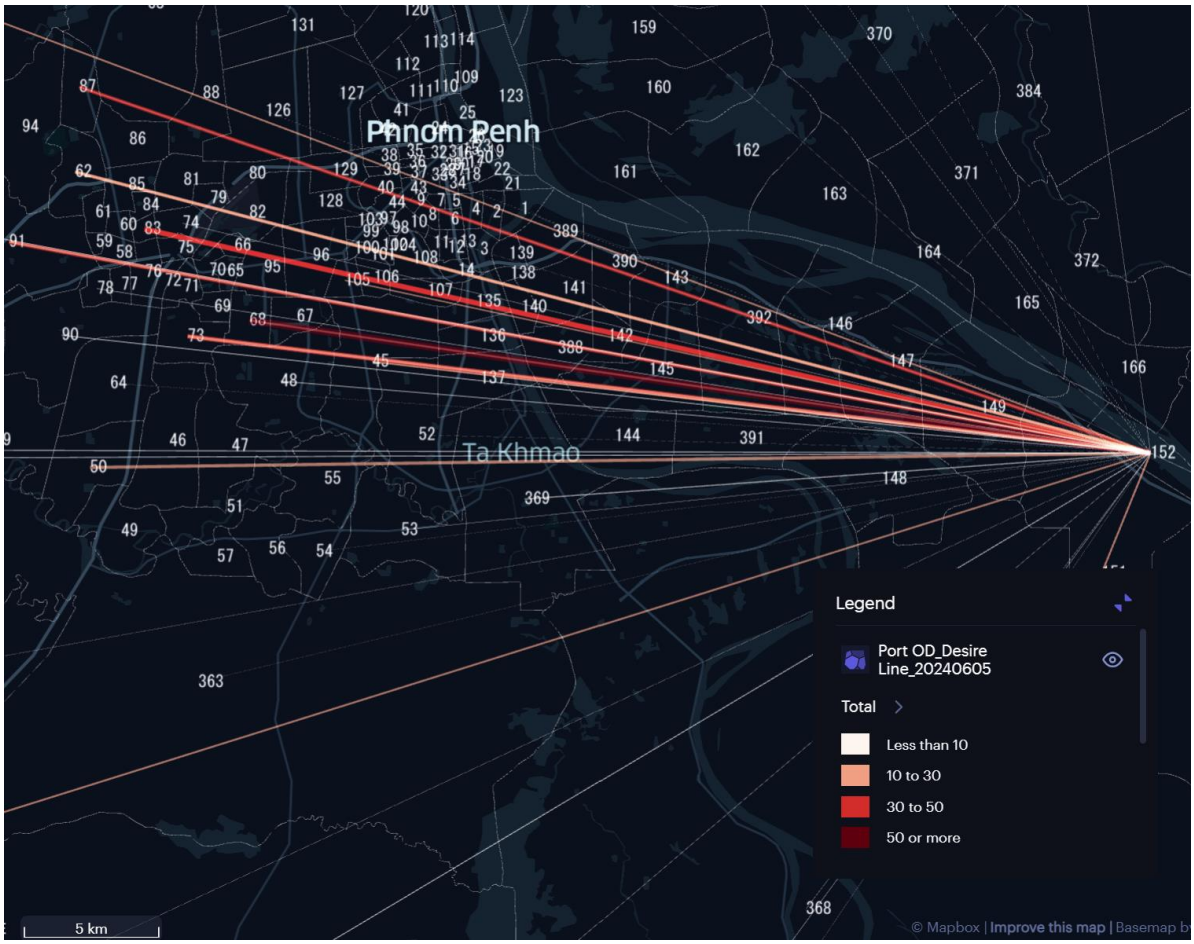


Figure 3.4-8 Desire Line of Logistics OD (Unite : Vehicle)

3.4.2 Traffic Conditions and Issues on NR1

(1) NR1 (0-4km)

1) Around Monivong Intersection

The traffic condition near the Monivong intersection is shown in Figure 3.4-9. During the morning peak, there are a lot of cars heading toward the Central Business District of Phnom Penh. Traffic polices conduct traffic control on traffic heading from the Monivong Bridge to Norodom Street (To Phnom Penh), which causes a congestion. JICA study team confirmed that this congestion extended to the Monivong Bridge (about 600 m). The traffic from Yothapol Khemarak Phoumin (271st Street) to Norodom Street (To Phnom Penh) is also restricted by the traffic police.

【Morning Peak】Traffic Polices conduct traffic control (From Monivong Bridge to Norodom Street)

【Morning Peak】Queue length (From Monivong Bridge to Norodom Street)

【Morning Peak】Many cars are making U-turns from the Monivong Bridge, blocking the cars going straight ahead.

【Morning Peak】Traffic Polices conduct traffic control (From Yothapol Khemarak Phoumin (271st street) to Norodom Street)

Figure 3.4-9 Traffic Condition Near Monivong Intersection

2) The Section from the Monivong Intersection to Entry of Koh Norea Bridge

Heavy congestion occurs at the Park Community Mall Intersection (From Phnom Penh to Kien Svay) during the evening peak. Because there is no dedicated left-turn lane, and left-turning vehicles are blocking vehicles proceeding straight ahead and making a bottleneck.

【Morning Peak】The sidewalk is occupied by vegetable and breakfast vendors. Motorcycles are also parked, leaving no space for pedestrians to walk.

【Evening peak】Park Community Mall Intersection, where left-turning vehicles are blocking ones going straight (From the Monivong Bridge to the Tsubasa Bridge)

【Evening peak】 Traffic police controlling traffic at the Park Community Mall Intersection

【Evening peak】Queue length (From the Monivong Bridge to the Tsubasa Bridge)

【Evening peak】No traffic congestion after Park Community Mall Intersection (From the Monivong Bridge to the Tsubasa Bridge)

Figure 3.4-10 Traffic Condition from the Monivong Intersection to Entry of Koh Norea Bridge

The following figure summarizes the results of the traffic survey and the traffic condition.

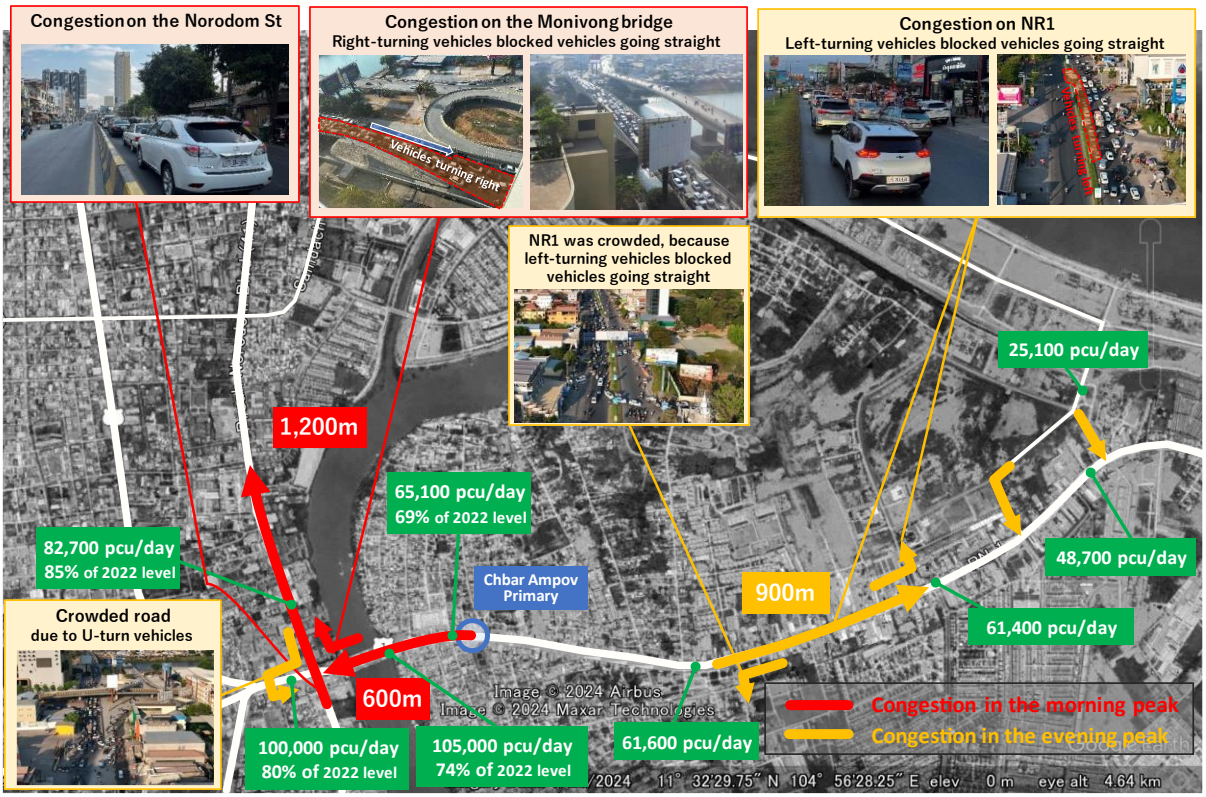


Figure 3.4-11 Results of the Traffic Survey and the Traffic Condition

3) Traffic Issues

Traffic issues the viaduct construction section(0-4km) are as follows

- Traffic congestion has occurred on Norodom Street, and it is extending all the way to Monivong Bridge.
- Many U-turns from the Monivong Bridge block traffic going straight ahead.
- There is no dedicated left-turn lane, and left-turning vehicles are blocking vehicles proceeding straight ahead and making a bottleneck at evening peak.

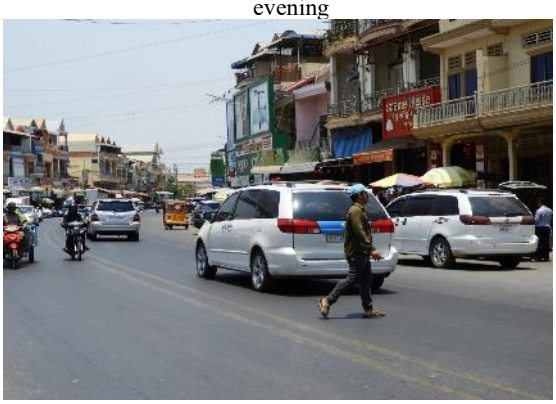
(2) NR1 (4-20km)

1) Traffic Condition

Currently, NR1 (4-20 km) is not particularly congested in both the morning and evening peak. However, diminished velocity is occurring at the Kokir market and at the Prek Eng market due to parked vehicles and crossings outside of a crosswalk. In addition, trucks with many passengers on the back of the trucks are driving, which is highly dangerous.

Prek Eng Market is overflowing with shoppers in the evening

children riding a bicycle across NR1 in front of Prek Eng Market



Pedestrian crossing outside of a crosswalk in front of Kokir Market

Parking on both sides of the road in Kokir Market

Standing on the back of a commuter truck

Large vehicles entering the PPAP

Figure 3.4-12 Traffic Condition on NR1 (4-20 km)

The following figure summarizes the results of the traffic survey and the traffic condition.

Figure 3.4-13 Traffic Survey Results and Traffic Conditions from Koh Norea entry Intersection to Prek Eng Intersection (RR2)

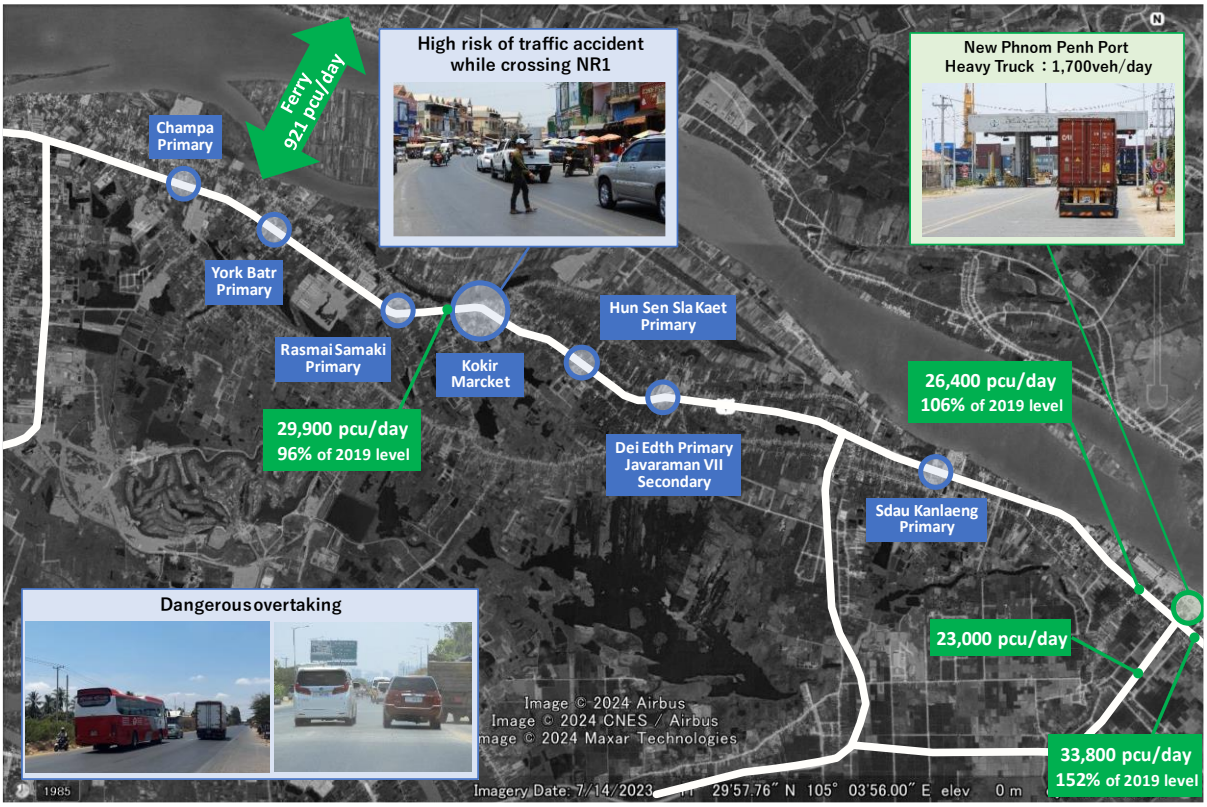


Figure 3.4-14 Traffic Survey Results and Traffic Conditions from Prek Eng Intersection (RR2) to Phnom Penh Autonomous Port

2) Traffic Issues

- Diminished velocity is occurring at the Kokir market and at the Prek Eng market due to parked vehicles and crossings outside of a crosswalk.
- There are many primary schools and secondary schools on NR1. Those students frequently cross outside of pedestrian crossings. Therefore, they are more likely to be involved in traffic accidents
- There is concern that the road will become a bottleneck in the future due to many large vehicles entering and leaving the PPAP.

(3) NR1 (20 - 54km)

1) Traffic Conditions

Currently, there is no particular traffic congestion in both the morning and evening peaks. A mix of students on foot and motorcycles, with motorcycles riding the wrong way on the sidewalk. In addition, students are always spreading out across the road, which increases the likelihood of being involved in traffic accidents.

A mix of students on foot and motorcycles, with motorcycles riding the wrong way on the sidewalk

Pedestrians and bicyclists mixing. Bicyclists overhanging the roadway to avoid pedestrians

Figure 3.4-15 Traffic Conditions on NR1 (20-54km)

The following figure summarizes the results of the traffic survey and the traffic condition.

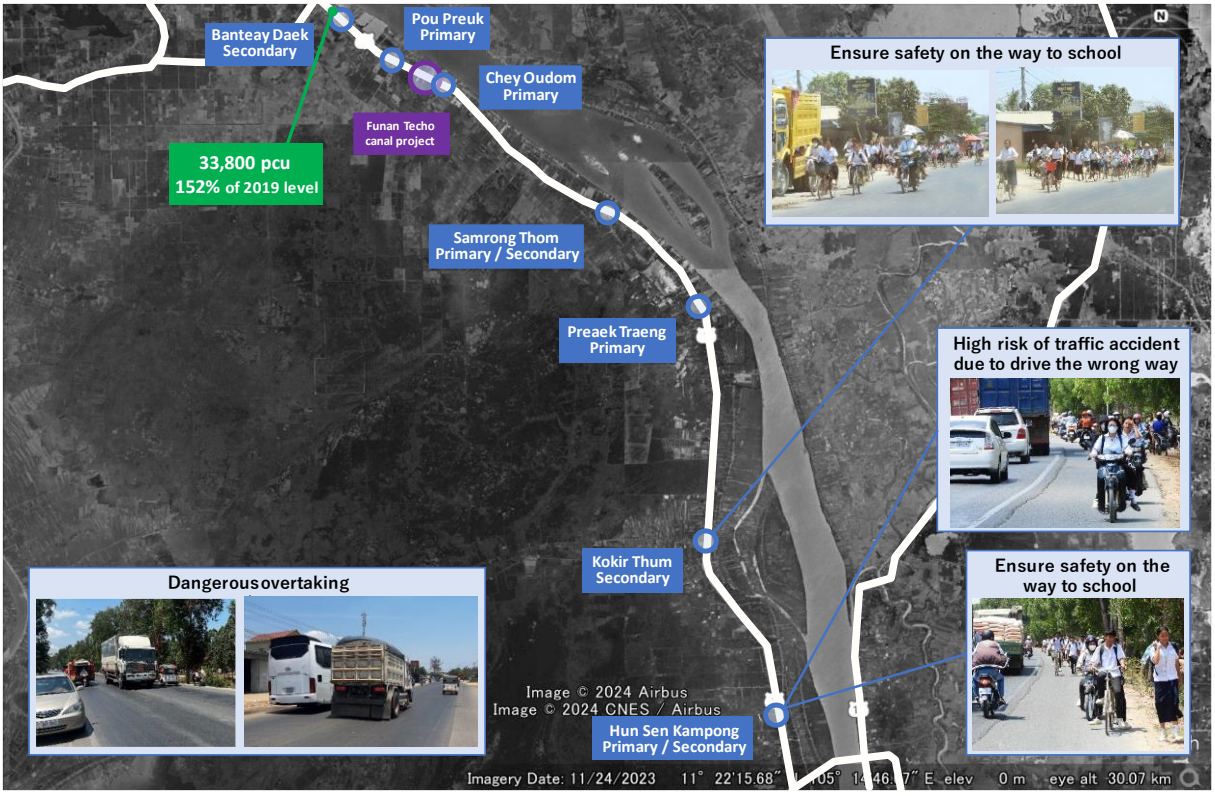


Figure 3.4-16 Traffic Survey Results and Traffic Conditions on NR1 (20-54 km)

2) Traffic Issues

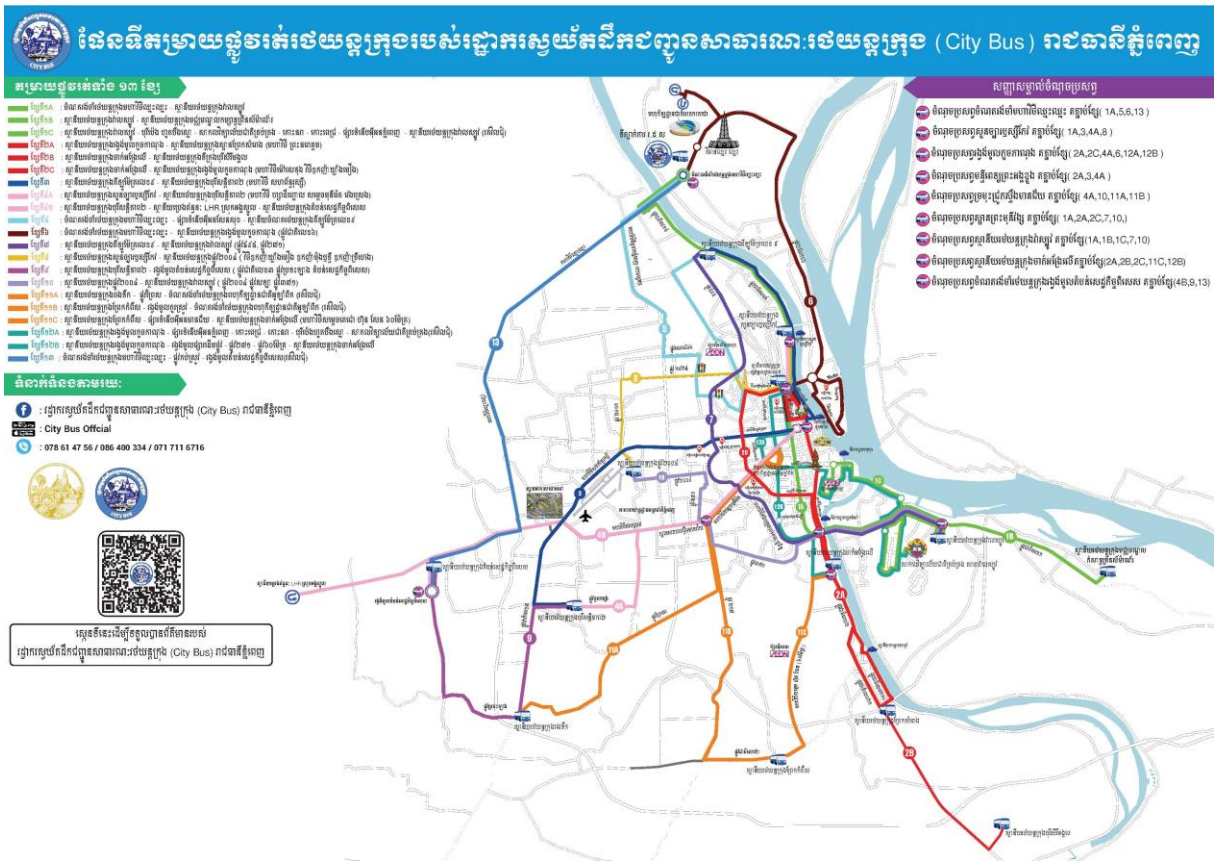
- A mix of walking, bicycling, and motorcycling on the way to school. Safety measures and safety education need to be taken on school routes to prevent motorcycles from riding in the wrong direction or running out onto the roadway due to the mix of walking, bicycling, and motorcycling.
- The traffic of large vehicles increases after RR3. Many vehicles overtake slower vehicles, stray into oncoming lanes, and overtake unreasonably, increasing the likelihood of head-on collisions.

3.4.3 City Bus

(1) Bus Route

To prevent the spread of COVID-19, bus service was suspended for 20 months beginning in March 2020. After scaling back, bus service resumed on November 2, 2021, with five routes and 60 buses on four routes (Routes 1A, 2, 3, and 4A/B) As of 2024, buses were in service on 13 routes and 21 routes.

Figure 3.4-17 shows the latest map of city bus routes.



City bus route

1A: Win-Win Boulevard Bus Station-Veal Sbov Bus Station
1B: Veal Sbov Bus Station-Prince Manor Center Station
1C: Veal Sbov Bus Station-Bory Pheng Huoth the Star Platinum Rosato/Kos Norea/Kos Pich/Aeon Mall Phnom Penh
2A: Cannon Roundabout Bus Station-Prek Somrong Bus station
2B: Chak Angre leu Bus station-Borey Sereymongkul Bus station
2C: Chak Angre leu Bus station-Kouch Cannon Roundabout Bus Station
3: KM 9 Bus Station-Borey Sonthipheap II Bus Station
4A: Russey Keo Garden Bus Station-Borey Sonthipheap II Bus Station
4B: Borey Sonthipheap II Bus Station-Phnom penh Special Economic Zone Bus Station
5: Win-Win Boulevard Bus Station-KM 9 Station
6: Win-Win Boulevard Bus Station-Russey Keo Garden Bus Station
7: KM 9 Station-Veal Sbov Bus Station
8: Russey Keo Bus Station-Sr.2004 Bus Station
9: Borey Sonthipheap II Bus Station-Phnom phenh Special Economic Zone Bus Station
10: Sr.2004 Bus Station-Veal Sbov Bus Station
11A: Pong Teuk Bus Station-Olympic Staduim Bus Station
11B: Praek Kompoeus Bus -Station-Olympic Staduim Bus Station
11C: Chak Angre leu Bus station-Praek Kompoeus Bus Station
12A: kouch Cannon Roundabout Bus Station
12B: Kouch Cannon Roundabout Bus Station-Chak Angle leu Bus station
13: Win-Win Boulevard Bus Station-Phnom phenh Spetial Economic Zone Bus Station

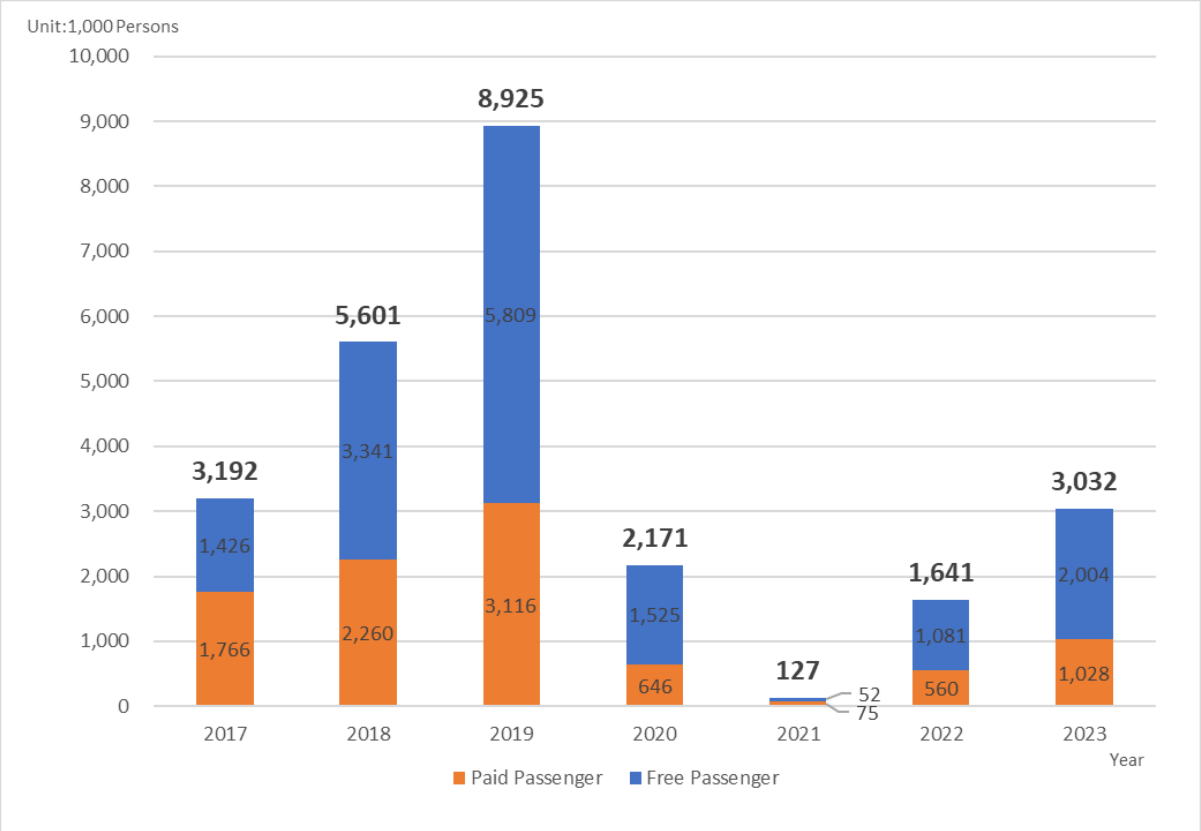
Source：City Bus Authority Facebook (2024/04/25)

Figure 3.4-17 Transit Map of City Bus

(2) Number of Passengers

Until 2019, the number of passengers grew steadily, and the number of passengers on city buses in 2019 was approximately 8.9 million/year. However, after 2020, due to the suspension of bus service, the number of passengers declined significantly to about 2.1 million/year in 2020 and about 120,000/year in 2021. The number of passengers in 2023 is about 3 million/year, but the speed of recovery of

passengers is slow. Monks, disabled persons, senior citizens (over 70 years old), and students are exempt from the fare. In 2023, the free service will account for about 66% of the total number of passengers.



Source：JICA Study Team prepare the diagram based on City Bus Authority Data

Figure 3.4-18 Number of Bus passengers

3.4.4 Truck Ban Policy

To reduce traffic congestion and traffic accidents, PP regulates the time zones and target roads that truck movement is allowed by type of trucks in Phnom Penh based on the following regulations.

- Instruction on Public Orders of Traffics of All Types of Cargo Trucks Entering and Existing Phnom Penh (Phnom Penh Municipality, No 19 INS.RK, 16 December 2013)
- Notification dated 16 October 2013 on banning the Heavy Cargo Trucks to Travel in and out of Phnom Penh City, Instruction/ Guideline no.19 INS.RK Dated 16 December 2013 on Banning Heavy Cargo

Regulation Area and Contents

The CBD area consisting of five Khans, Chamkar Mon, Doun Penh, Prampir Makara, Toul Kouk and Boeung Keng Kang and the ring road on the outer edge of CBD are covered by the regulations. In this area, trucks are basically prohibited during daytime, 5:00 am -9 pm. However, trucks with “Trucking Permit” are allowed to pass with following conditions by type of permit.

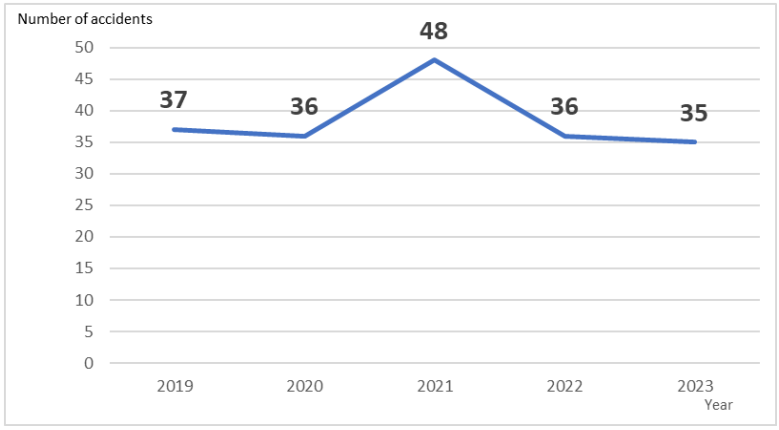
- Type A to C：Passable at times other than 6:00am to 9:00 am and 4 pm to 8:00 pm
- Type D：Passable only from 8:00 pm to 6:00 am

In addition to the above-mentioned regulations. Trucks are not allowed to pass through the following roads anytime.

- Russian blvd (Norodom blvd – Airport)
- Norodom blvd (Wat Phnom – Kbal Thnol Flyover)
- Sisowat Quay (Chuon Nat roundabout – CDC)
- Sihanouk blvd, Nehru blvd, Charles de Gaulle blvd and Kampuchea Krom blvd
- Monivong blvd (Old stadium roundabout – Bokor intersection)
- Mao Tse Toung blvd. (Tep Phan intersection – Deum Kor market)
- Cambodia – Japan Friendship Bridge, Monivong Bridge, Kbal Tnal Flyover, 7 Makara flyover, 5 Makara flyover and Steong Mean Chey flyover (Trukcs loading 5 tons and more)

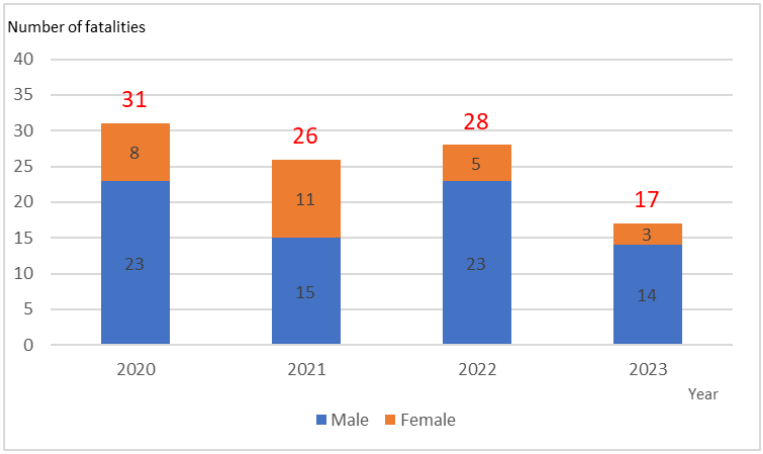
3.4.5 Number of Traffic Accidents Along NR1

The number of traffic accidents and fatalities along NR1 Kien Svay District from 2019 to 2023 (published April 22, 2024) are shown in Figure 3.4-19, Figure 3.4-20. The number of traffic accidents increased to 48 in 2021, but has remained generally flat since 2019. The number of fatal accidents is decreasing, but the proportion of fatal accidents involving males is higher than that of females.



Source：MPWT

Figure 3.4-19 Number of Traffic Accidents Along NR1 in Kien Svay District



Source：MPWT

Figure 3.4-20 Number of Fatalities in Traffic Accidents Along NR1 in Kien Svay District

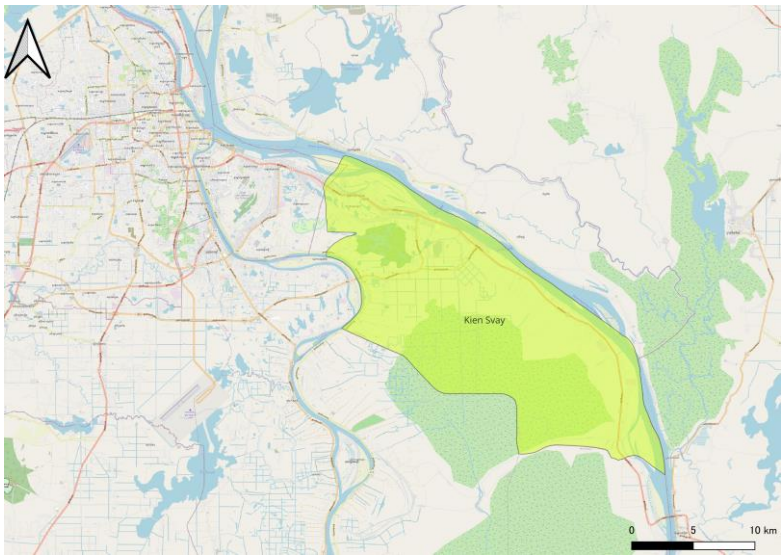


Figure 3.4-21 Location of Kien Svay District

3.5 Future Traffic Conditions and Challenges

3.5.1 Future Traffic Conditions in Phnom Penh

The results of the traffic demand forecast with all requested projects in 2035 and 2050 are shown below. The reason for setting the target years as 2035 and 2050 is that (1) the target year for PPUTMP is 2035, (2) the target year for CITL-MP (2023-2033) is 2033, and (3) "Final report of the Feasibility Stady for Cambodia-Korea Friendship Bridge Construction Project (2022)" estimates the year 2028 (Cambodia-Korea Friendship Bridge operation), 2037 (10 years after operation), and 2048 (20 years after operation). Therefore, considering all of the above, the target years are 2035 and 2050.

In 2035, most of the radial arterial roads leading to the center of Phnom Penh will have VCR (Vehicle Capacity Ratio) of 1.50 or higher, and chronic traffic congestion is expected to occur on these roads. Even in the suburbs of Phnom Penh, there are many radial arterial roads with VCR exceeding 1.25, and traffic congestion is expected to occur mainly during peak hours.

Although NR1 has a VCR above 1.25 near the Phnom Penh city center, most of sections of NR1 have a VCR below 1.00, and road improvements will ensure smooth road traffic.

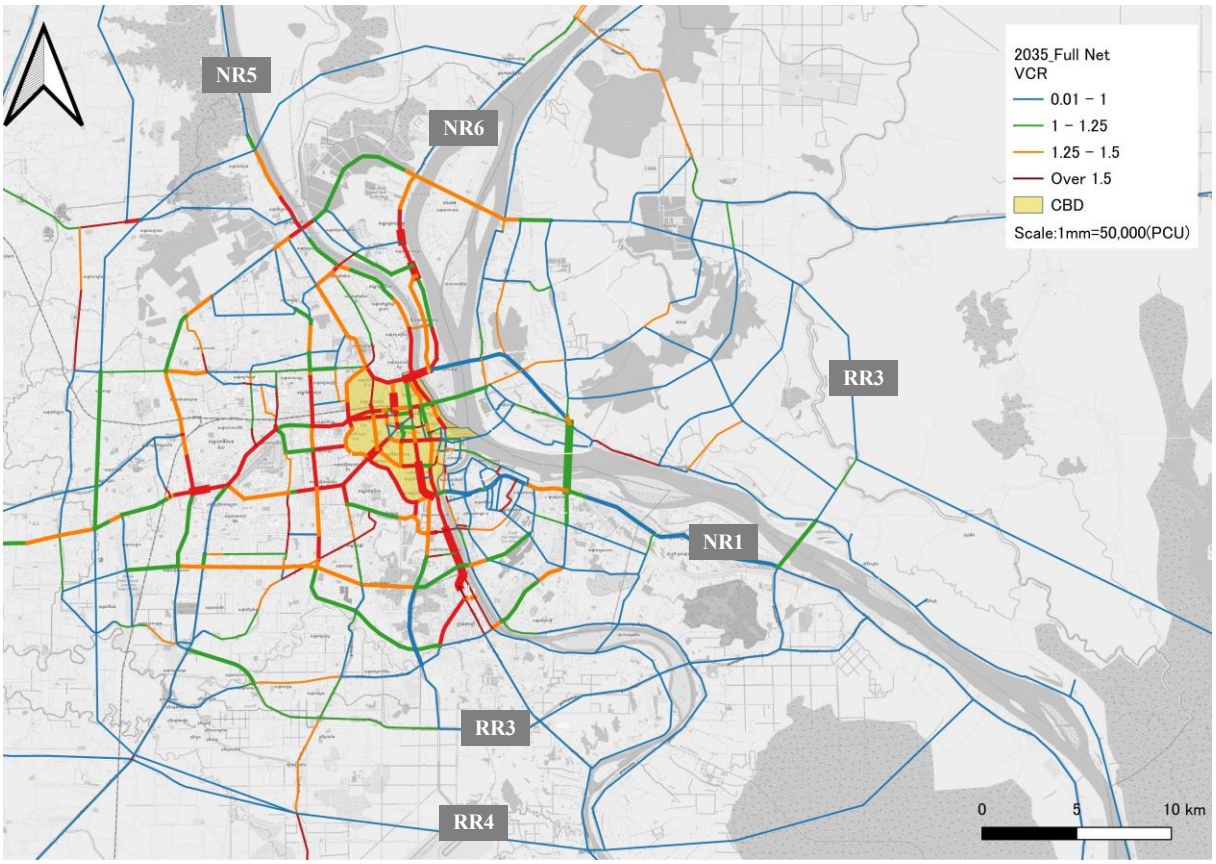


Figure 3.5-1 The Result of the Traffic Demand Forecast with All Requested Projects in 2035 (100 PCU / Day)

In 2050, the VCR of most roads in Phnom Penh's city center is above 1.50, resulting in chronic traffic congestion throughout the entire city center. Chronic traffic congestion will also spread to arterial roads in the suburban areas. Chronic congestion extends to the suburban arterials, with congestion levels exceeding 1.5 from the confluence of the Koh Norea Bridge and NR1 to near RR2.The VCR of NR1 exceeds 1.25 up to the intersection with RR2. The traffic demand for automobiles is excessive compared to the future road network, and it is difficult to relieve congestion in the city center by only road construction and improvement. In order to resolve traffic congestion, it is necessary to consider a comprehensive urban transport plan that includes a shift from automobiles to public transport to reduce traffic congestion.

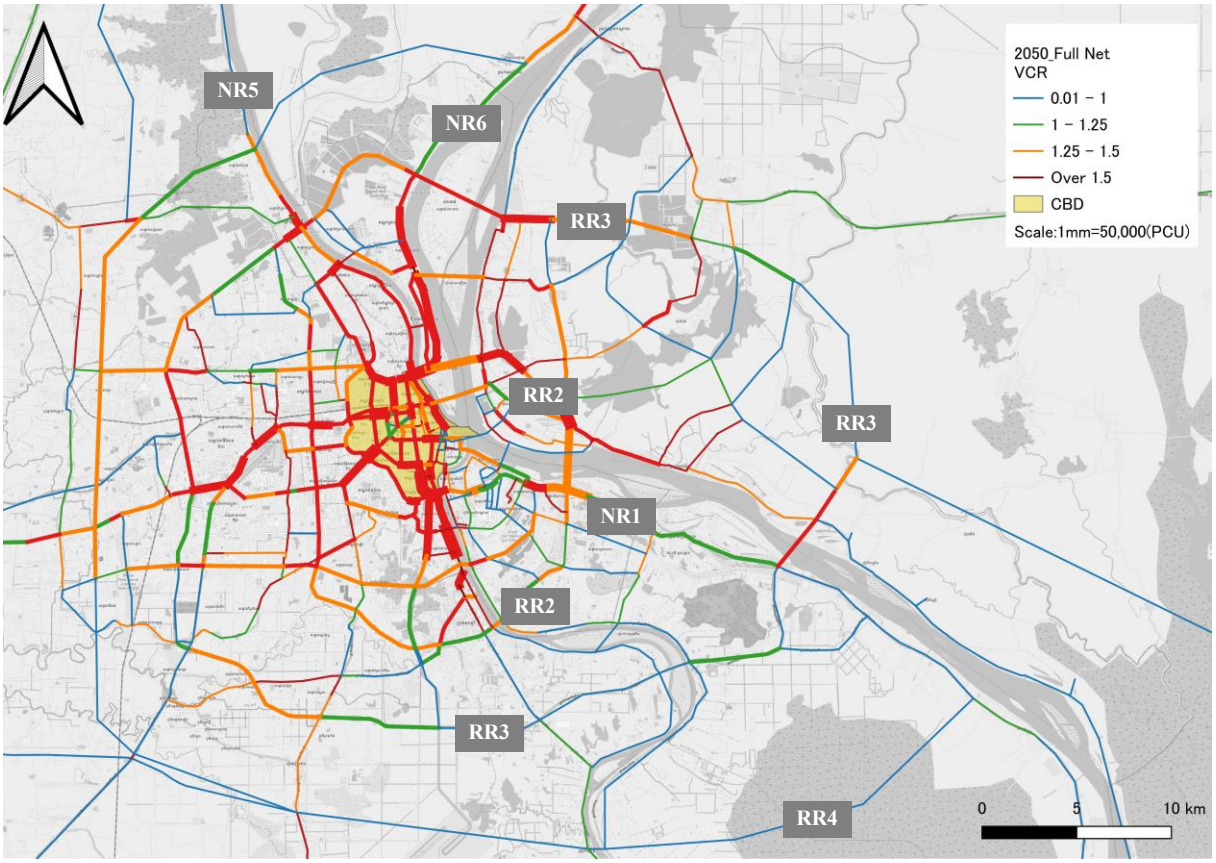


Figure 3.5-2 The Result of the Traffic Demand Forecast with All Requested Project in 2050 (100 PCU / Day)

Future traffic volumes for NR1 and the Mekong River Bridge in each estimation year are shown in the table below. Traffic volumes on NR1 tend to increase as it gets closer to Phnom Penh city center.

Table 3.5-1 Future traffic Volume in the Requested Projects

Bridge Name	Traffic volume in 2035	Traffic volume in 2050
NR1 Flyover （0.0～4.0km）	Existing Road (Six lanes)： 56,000～95,500 PCU/day Flyover：42,400 PCU/day	Existing Road (Six lanes)： 81,800～117,600 PCU/day Flyover：54,900 PCU/day
NR1 （4.0～20.0km）	52,500～94,200 PCU/day	69,300～114,700 PCU/day
NR1 （20.0～54.0km）	28,000～37,100 PCU/day	32,000～47,100 PCU/day
The Mekong River Bridge	100,400 PCU/day	113,500 PCU/day
The Mekong River Tunnel	31,100 PCU/day	44,300 PCU/day

3.5.2 The Role of the Phnom Penh-Bavet Expressway and National Road 1

The results of the traffic demand forecast with all requested projects in 2035 and 2050 are shown below. The reason for setting the target years as 2035 and 2050 is that (1) the target year for PPUTMP is 2035, (2) the target year for CITL-MP (2023-2033) is 2033, and (3) "Final report of the Feasibility Stady for Cambodia-Korea Friendship Bridge Construction Project (2022)" estimates the year 2028 (Cambodia-Korea Friendship Bridge operation), 2037 (10 years after operation), and 2048 (20 years after operation). Therefore, considering all of the above, the target years are 2035 and 2050.

The Phnom Penh - Bavet expressway project, which was initiated by a Chinese company in June 2023, will eventually run partially parallel to NR1. This section will outline the roles and functions of these two roads.

According to the future traffic assignment for 2050, the traffic volume on the Phnom Penh-Bavet expressway at the screen-line shown below is projected to be 22,100 PCU/day (31% of the screen-line traffic volume), while the traffic volume on NR1 is projected to be 39,000 PCU/day (57% of the screen-line traffic volume).

When analyzing the traffic utilizing the Phnom Penh-Bavet expressway with origins or destinations east of the screen-line shown below, it was found that traffic originating from areas more than 100 km away from Phnom Penh, such as Vietnam (13%), Bavet (18%), and Svay Rieng (25%), accounted for more than half of the total. Next, the remaining half was comprised of Tboung Khmum (27%) and Prey Veng (16%), located between 50 km and 100 km from Phnom Penh, while the share from Kandal Province was only 0.3%. The Phnom Penh-Bavet expressway is primarily utilized for long-distance travel, serving the role of connecting major cities in Cambodia quickly. Traffic originating from Vietnam (13%), Bavet (18%), Svay Rieng (25%), and Prey Veng (16%) is considered to have converted from NR1 due to the availability of Phnom Penh-Bavet expressway. Since the expressway has tolls, users are generally limited to drivers with relatively higher economic capacity.

Regarding traffic utilizing NR1, an analysis of origins or destinations east of the screen-line shown below revealed that Kandal Province (45%), located less than 50 km from Phnom Penh, accounted for nearly half of the traffic. Following that, Prey Veng (31%), located between 50 km and 100 km from Phnom Penh, made up a significant portion. It is worth noting that the distance to Tboung Khmum from NR1 results in a lower share of traffic compared to the expressway. Traffic with origins or destinations more than 100 km away from Phnom Penh, such as Vietnam (1%), Bavet (6%), and Svay Rieng (14%), accounted for 20% of the total, a smaller proportion compared to the expressway.

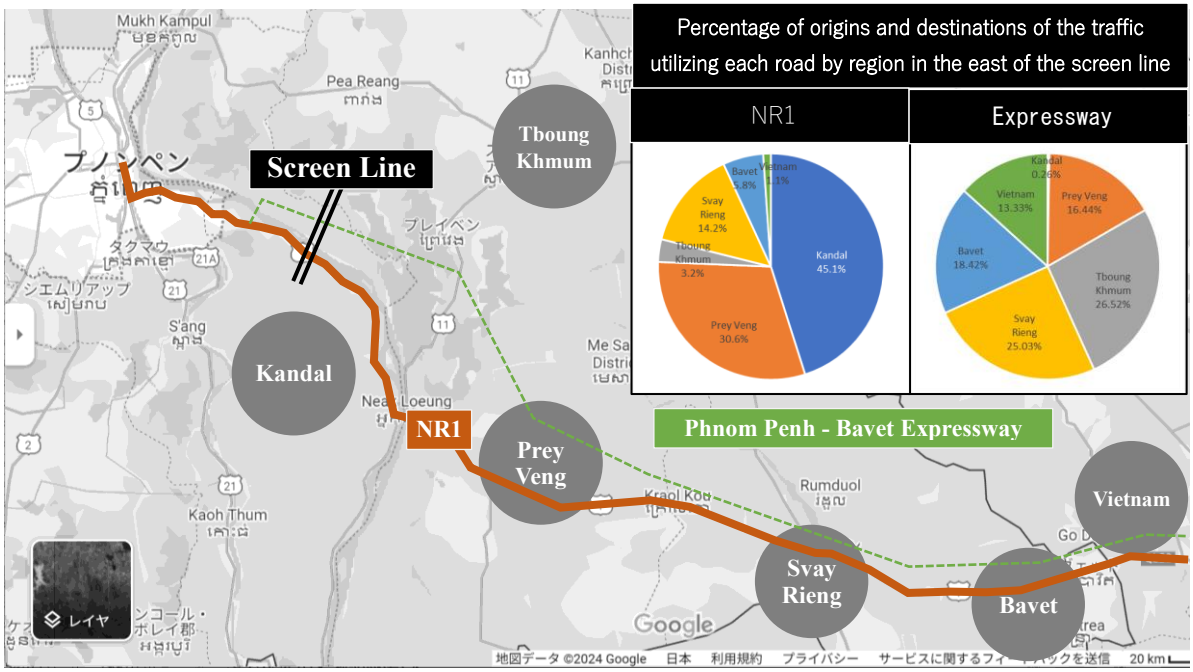


Figure 3.5-3 Percentage of Origins and Destinations by Region for Traffic Utilizing the Phnom Penh-Bavet Expressway and NR1 in 2050

NR1 serves not only as a major trunk road that efficiently connects major cities and regions in Cambodia but also supports the foundation of everyday traffic over relatively short distances within and between neighboring regions. NR1 needs to ensure intercity rapidity on a road accessible to everyone, stimulating the regional economy, and adequately consider traffic safety and the comfort of residents along its route to ensure a high quality of life.

3.5.3 Future Traffic Conditions in the Requested Project

(1) Section 0km to 4km on NR1

The result of traffic assignment without expansion of traffic capacity in 2050 is shown below. In addition to the Koh Norea Bridge, which was opened in 2021, three bridges are planned to cross the Bassac River by 2050. The expansion of the urbanized area will increase traffic demand, however the construction of new roads across the Bassac River will disperse traffic that concentrate on NR1. Therefore, the future traffic volume on this section will be 1.2 times more than the current one. However, no major road improvements are planned on the arterial roads leading to the city center, apart from the Monivong flyover, which is under construction. Therefore, traffic will be concentrated on Norodom and Monivong streets, and traffic congestion will be severer than the current one.

Nevertheless, the Volume to Capacity Ratio (VCR) on this section increases the closer to the Monivong Bridge. VCR exceeds 1.5 until near the Park Community Mall intersection. It means there is a high risk of chronic traffic congestion. In order to avoid chronic traffic congestion around Park Community Mall, it is necessary to expand the traffic capacity of this section.

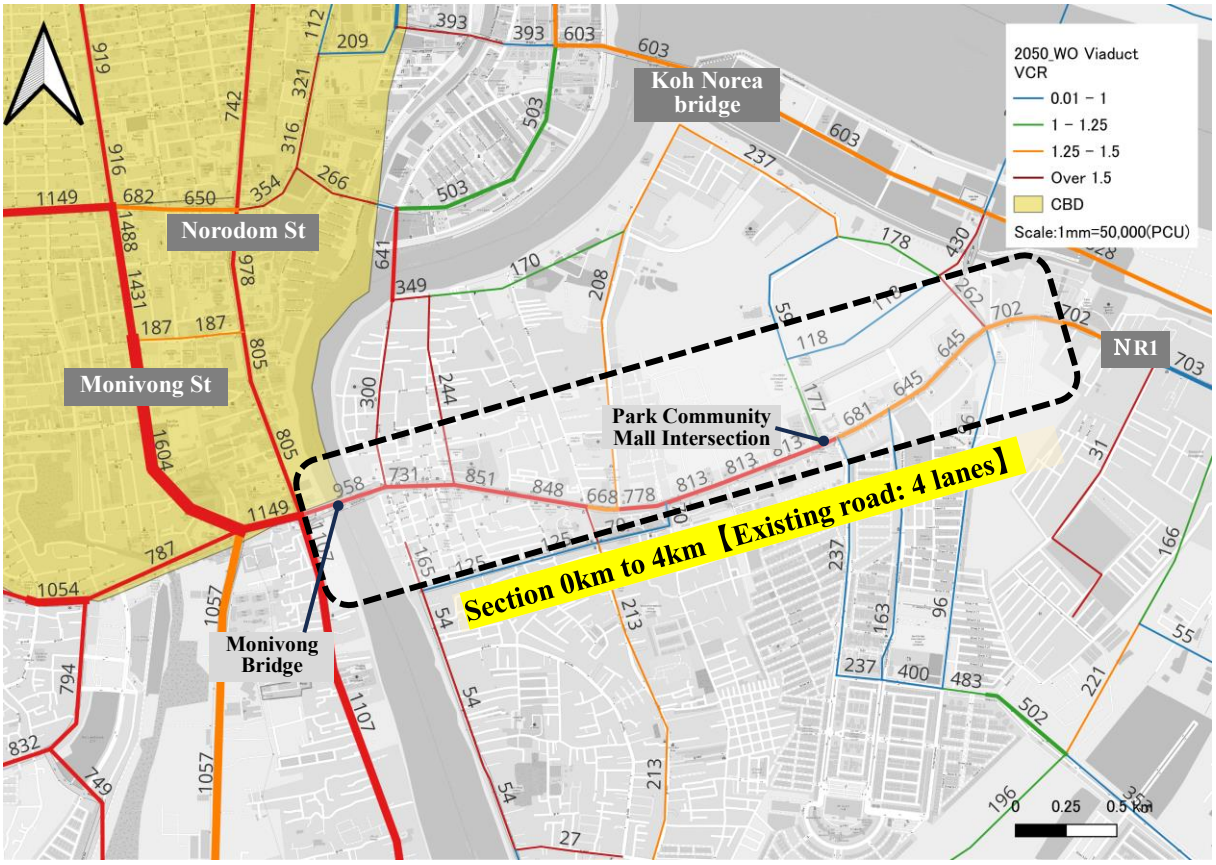


Figure 3.5-4 Traffic Volume in 2050 without the Expansion of Traffic Capacity in the Section 0km to 4km on NR1 (100 PCU / Day)

The result of traffic assignment with a viaduct in this section in 2050 is shown below. If a viaduct is constructed in this section, most of traffic passing through this section will use the viaduct. Therefore, traffic congestion in this section caused by right- and left-turning traffic blocking straight traffic will be mitigated. The mitigation of the traffic congestion will also improve travel speeds in this section.

On the other hand, since there is a high risk of traffic concentration and chronic congestion near the Park Community Mall intersection, it is necessary to develop countermeasures based on detailed intersection simulation during the FS. The construction of the viaduct will increase traffic through Norodom Street to the city center, which will further worsen traffic congestion on Norodom Street. When Norodom and Monivong streets become congested, it is assumed that traffic congestion will occur on NR1 as well, with the Monivong bridge at the head of the road, because vehicles will not be able to enter these streets from NR1 although this is not reflected in the below figure. Therefore, it would be effective to construct the viaduct in this section after the traffic congestion on Norodom and Monivong Streets has been resolved.

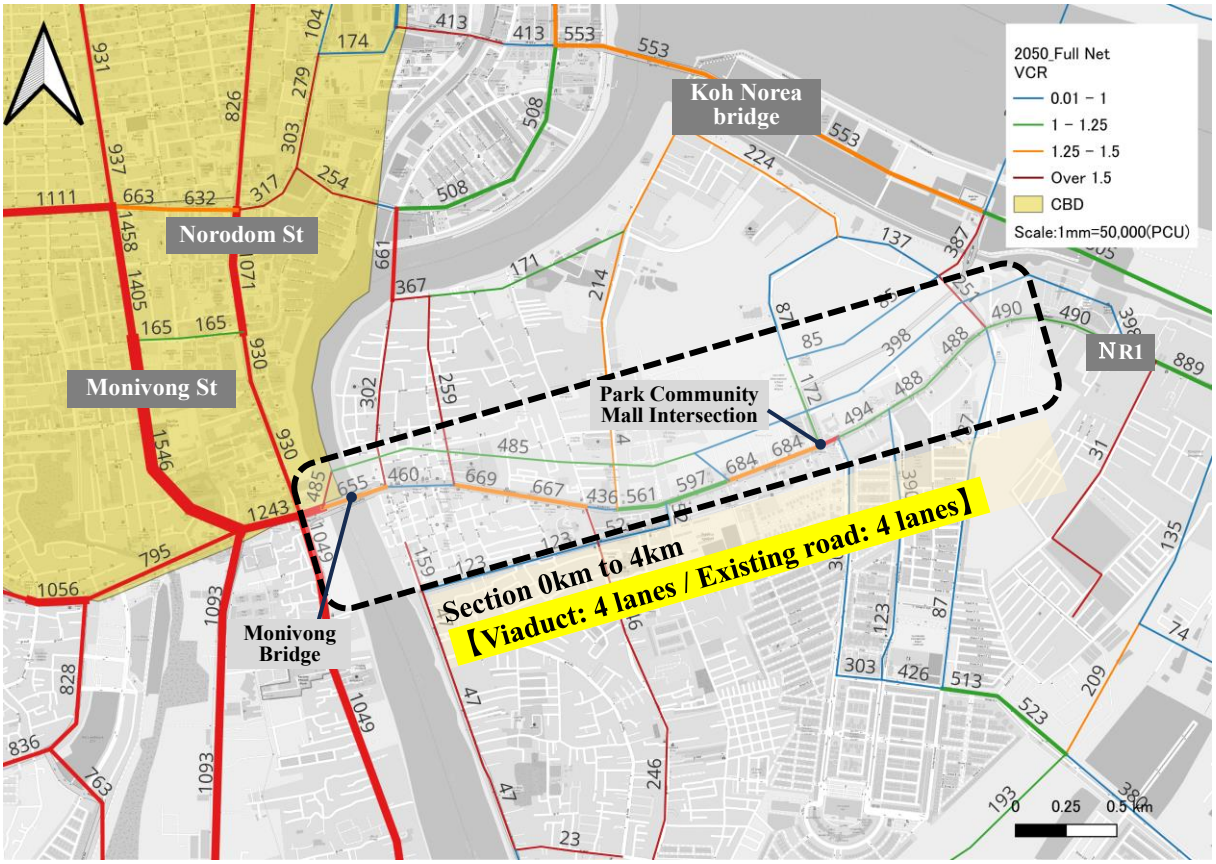


Figure 3.5-5 Traffic Volume in 2050 with All Requested Projects in the Section 0km to 4km on NR1 (the Viaduct Case) (100 PCU / Day)

The future traffic assignment in 2050 with a flyover at the Park Community Mall intersection, which is the starting point of traffic congestion in the current situation, and six-lane widening is shown below. The traffic volume on the west side of this section is approximately 10,000 PCU/day to 20,000 PCU/day lower than in the "Viaduct case". Compared to the "Viaduct case", the reduced traffic amount to the AZ Green City development road, RR2, and the New east-west arterial road. This is because the total number of lanes in this case is six, whereas in the viaduct case there are four lanes for the viaduct and four lanes for the existing road, making a total of eight lanes. Although it is expected to mitigate traffic congestion on this section, it is concerned that traffic congestion will occur at the head of the Monivong Bridge because Norodom and Monivong streets will become congested.

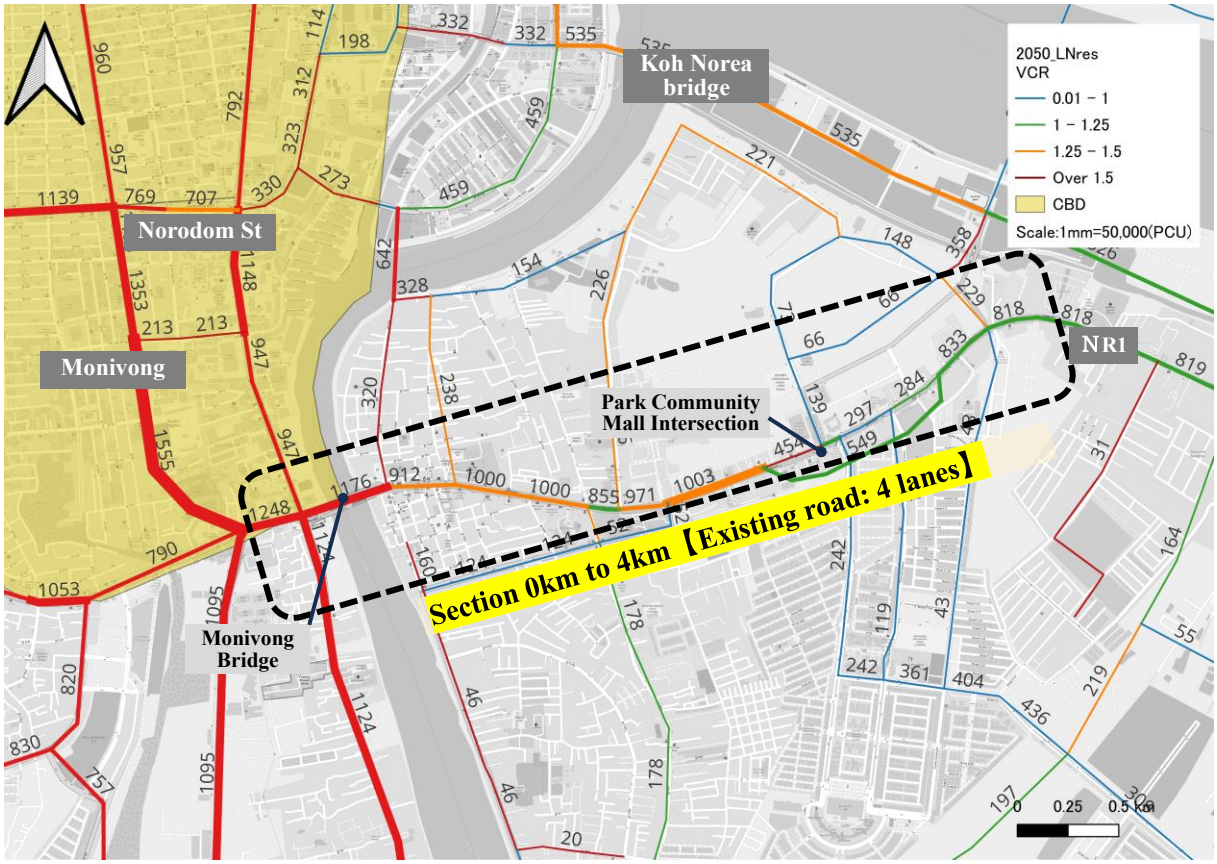


Figure 3.5-6 Traffic Volume with All Requested Projects in 2050 in the Section 0km to 4km on NR1(the Flyover Case) (100 PCU / Day) (100 PCU / Day)

(2) Section 4km to 20km on NR1

Future traffic assignment in 2050 without requested project in this section is shown below. Future traffic volumes are projected to exceed 40,000 PCU/day on most segments, with VCR exceeding 1.5.

Traffic is likely to be concentrated on the western section of RR2 for following two reasons. The first reason is that the Koh Norea Bridge extension over the Bassac River and the new east-west arterial road intersect NR1 on the west side of RR2. The second reason is that traffic bypassing the city center via the Mekong River Bridge will use this section. If a road improvement is not implemented in this section, 60,000 PCU/day are expected on this section, with the VCR exceeding 2.0. There is a high risk of chronic traffic congestion in this section, and therefore, road traffic capacity expansion is necessary.

Traffic on the section east of RR2 tends to increase as it approaches Phnom Penh due to the large volume of traffic originating from or terminating at Phnom Penh. Future traffic volume in this section in 2050 is expected to range from 33,000 to 63,700 PCU/day, which exceeds the capacity of the current two-lane road. The VCR on this section is expected to exceed 1.5, indicating a high risk of traffic congestion outside of peak hours if road improvements are not implemented. Therefore, expanding the road traffic capacity in this section is necessary.

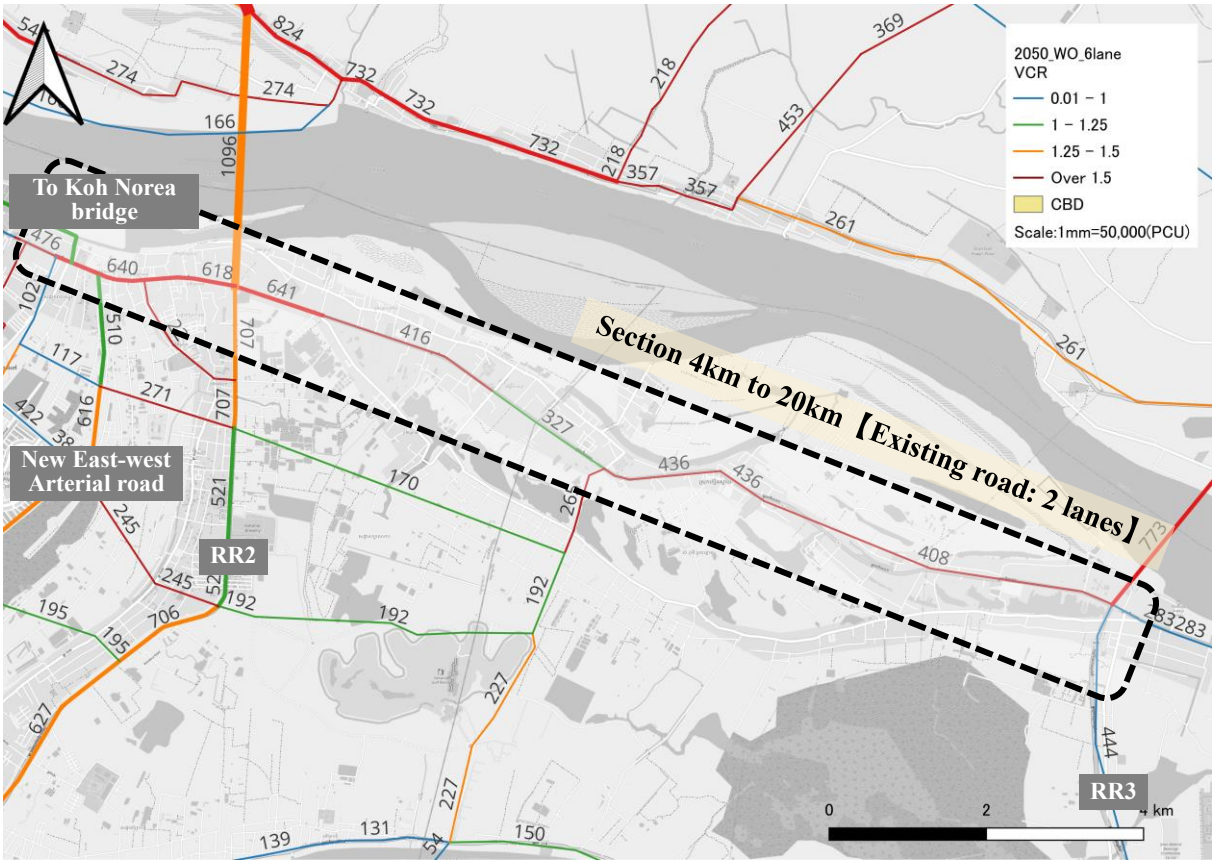


Figure 3.5-7 Traffic Volume in 2050 without the Expansion of Traffic Capacity in the Section 4km to 20km on NR1 (100 PCU / Day)

The future traffic volume in 2050 with all requested projects, including the six-lane widening of the section, is shown below. The traffic volume on the west side of RR2 would increase to a maximum of approximately 110,000 PCU/day due to the increase in traffic detouring across the Mekong Bridge instead of through the city center, resulting in the VCR of over 1.5 even after the six-lane widening. Measures to control traffic volume, such as by encouraging people to shift from automobiles to public transportation, need to be implemented in collaborate with road planning.

The VCR in the section east of RR2 is generally between 1.0 and 1.25. Although traffic congestion occurs mainly during peak hours, it is unlikely to lead to chronic traffic congestion. The travel speed is also expected to improve in this section due to reduced traffic congestion.

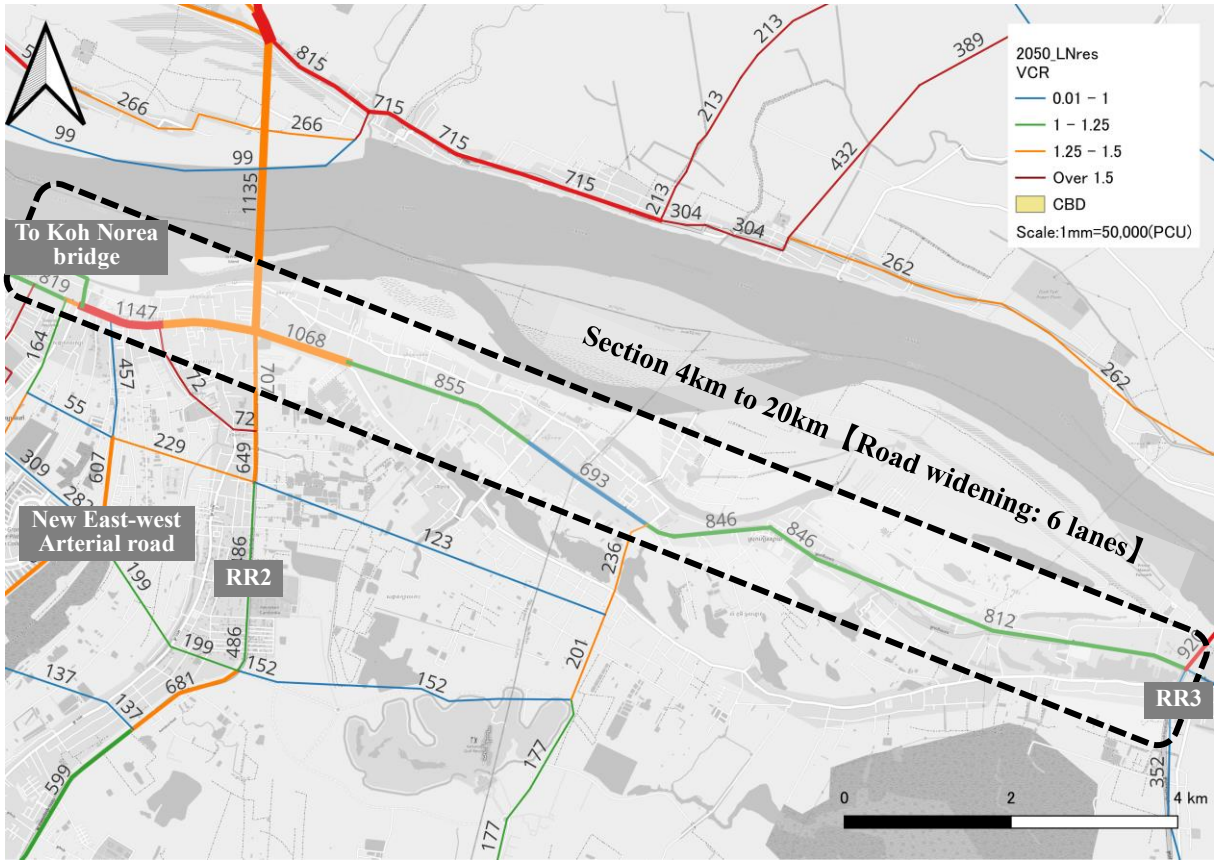


Figure 3.5-8 Traffic Volume in the Section 4km to 20km on NR1 in 2050 without Road Improvement Case (100 PCU / Day)

From the viewpoint of traffic safety, the following issues need to be considered. There are many schools along this section, and many students walk or ride bicycles to and from school. Since there are no sidewalks along this section, the safety of students is not sufficiently ensured. In addition, traffic volume decreases and travel speed increases in this section compared to the 0-4 km section. The mix of vehicles traveling at high speeds and those traveling at low speeds, such as tuk-tuks, frequently leads to reckless overtaking, which is one of the main causes of traffic accidents. Road improvement is necessary to ensure pedestrian safety and safe overtaking.

(3) Section 20km to 54km on NR1

The future traffic volume in 2050 without four-lane widening in this section is shown below: East of RR3, the Phnom Penh-Bavet Expressway runs parallel to NR1, resulting in a decrease in traffic volume in this section. As in the "4-20km section" the traffic volume on NR1 tends to increase as it approaches Phnom Penh due to the large volume of traffic originating and terminating in Phnom Penh. However, the traffic volume decreases due to the dispersion of traffic at the intersection with RR3 and RR4. The future traffic volume on this section is 24,000 PCU/day to 38,000 PCU/day and the VCR is above 1.0, therefore the traffic capacity needs to be expanded.

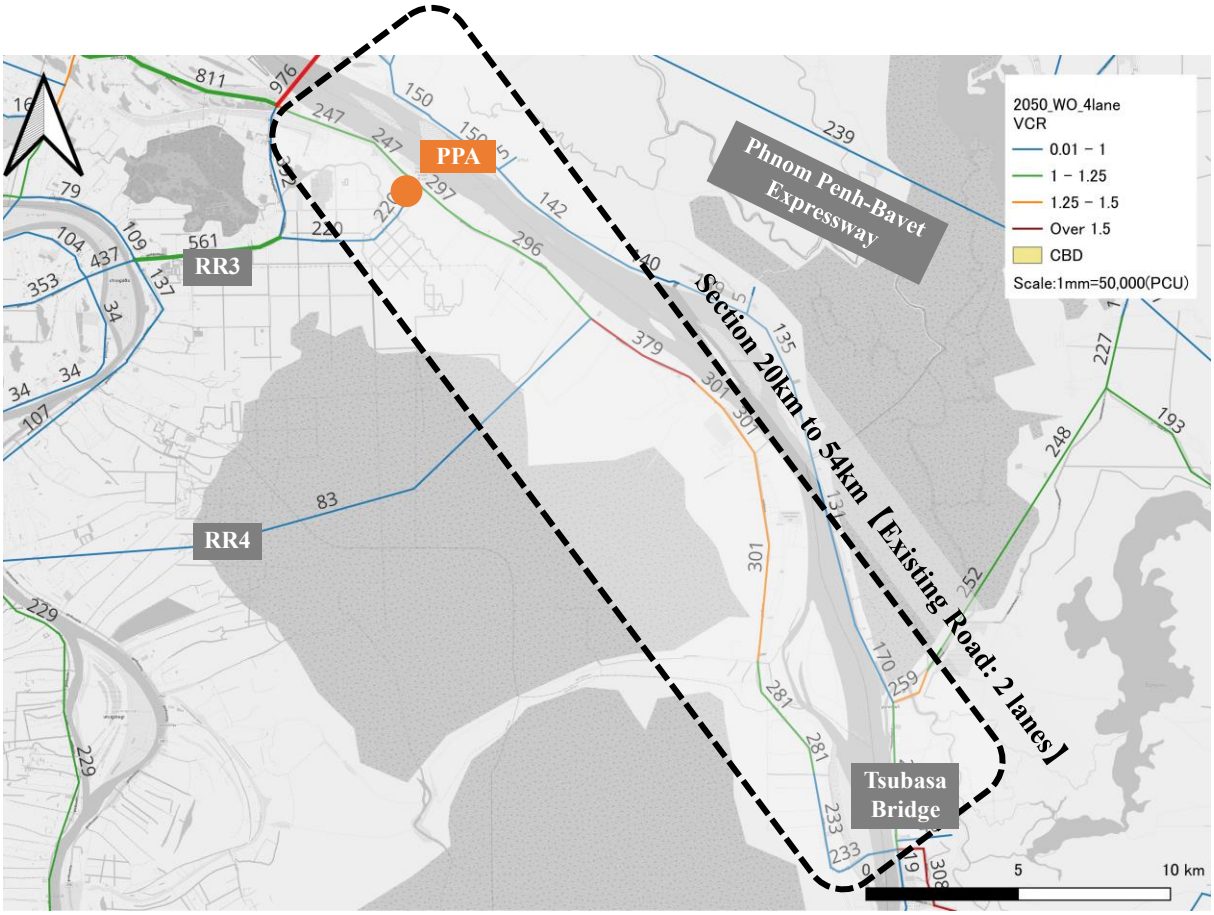


Figure 3.5-9 Traffic Volume in the Section 20km to 54km on NR1 in 2050 without Road Improvement (100 PCU / Day)

The future traffic volume in 2050 with all requested projects, including four-lane widening in this section, is shown below. Traffic on this section will increase by approximately 10,000 PCU/day compared to the without four-lane widening case, due to the diversion of traffic from the parallel Phnom Penh-Bavet Expressway and the road on the opposite side of the Mekong River. The future traffic volume in 2050 will be 32,000-48,000 PCU/day, and the VCR will be less than 1.0 on most sections. It means that smooth traffic flow will be ensured in this section.

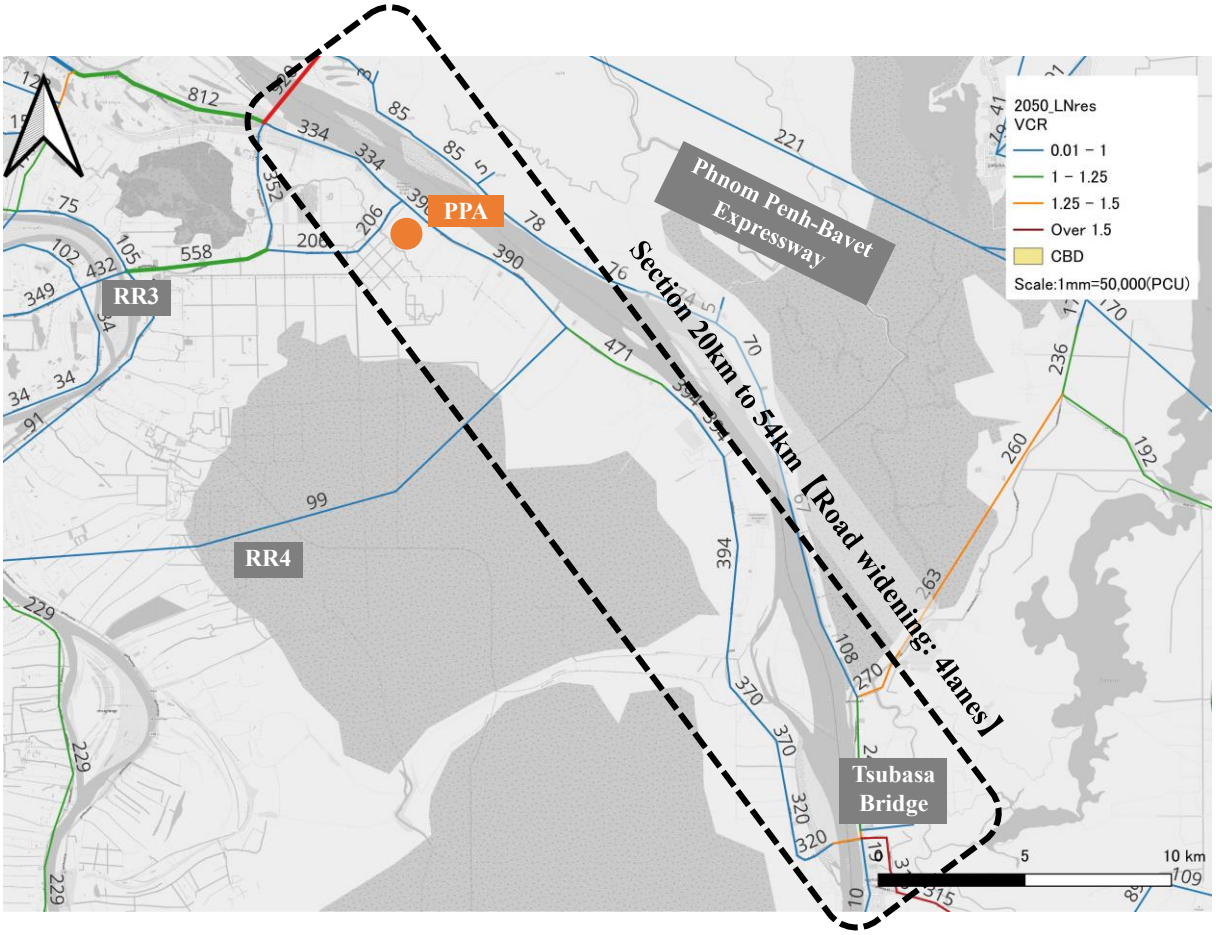


Figure 3.5-10 Traffic Volume in 2050 in the Section 20km to 54km on NR1 (100 PCU / Day)

In terms of traffic safety, this section has more large vehicles than other sections because of the location of PPAP, a logistics hub, and the junction with RR3, which is used by many large vehicles. As with the section 4km to 20km east of RR2, there are many schools along this section and the risk of dangerous overtaking is high, so road widening is useful for pedestrian safety and safe overtaking.

CHAPTER 4 URBAN DEVELOPMENT IN AKREIY KSATR CITY

4.1 Current Situation

4.1.1 Survey Area

In conducting the survey on urban developments on the other side of the Mekong River, the survey area was defined.

The survey area was the entire Akreiy Ksatr City (AKC). The survey area is an area that needs to be surveyed, adjusted, and harmonized for the study of future bridge projects, and generally covers the area from RR2, which connects to the bridge, to the planned RR3 on its periphery, considering that the area is being studied for the implementation of planned urban development as a single administrative unit. AKC is a newly established city with an area of 214.7 km2 created in December 2022 by the merger of six communities in the Kandal Province.

AKC has two islands located in the middle of the Mekong River, and the whole area is divided into 11 quarters (sangkat).

According to the 2022 survey data of the Ministry of Planning of Cambodia, there are 19,674 households and 86,534 residents (42,317 males and 44,217 females) in AKC, with three high schools, eight middle schools, 20 primary schools, and 11 hospitals.

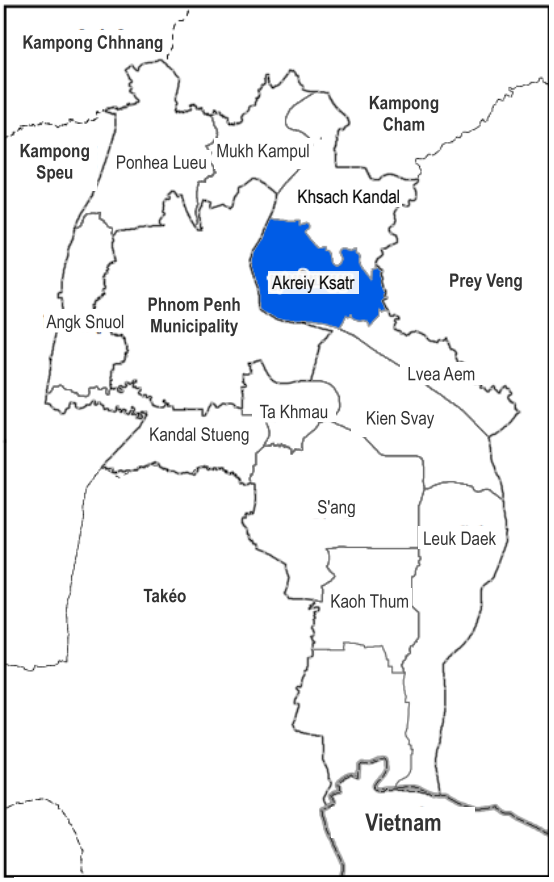
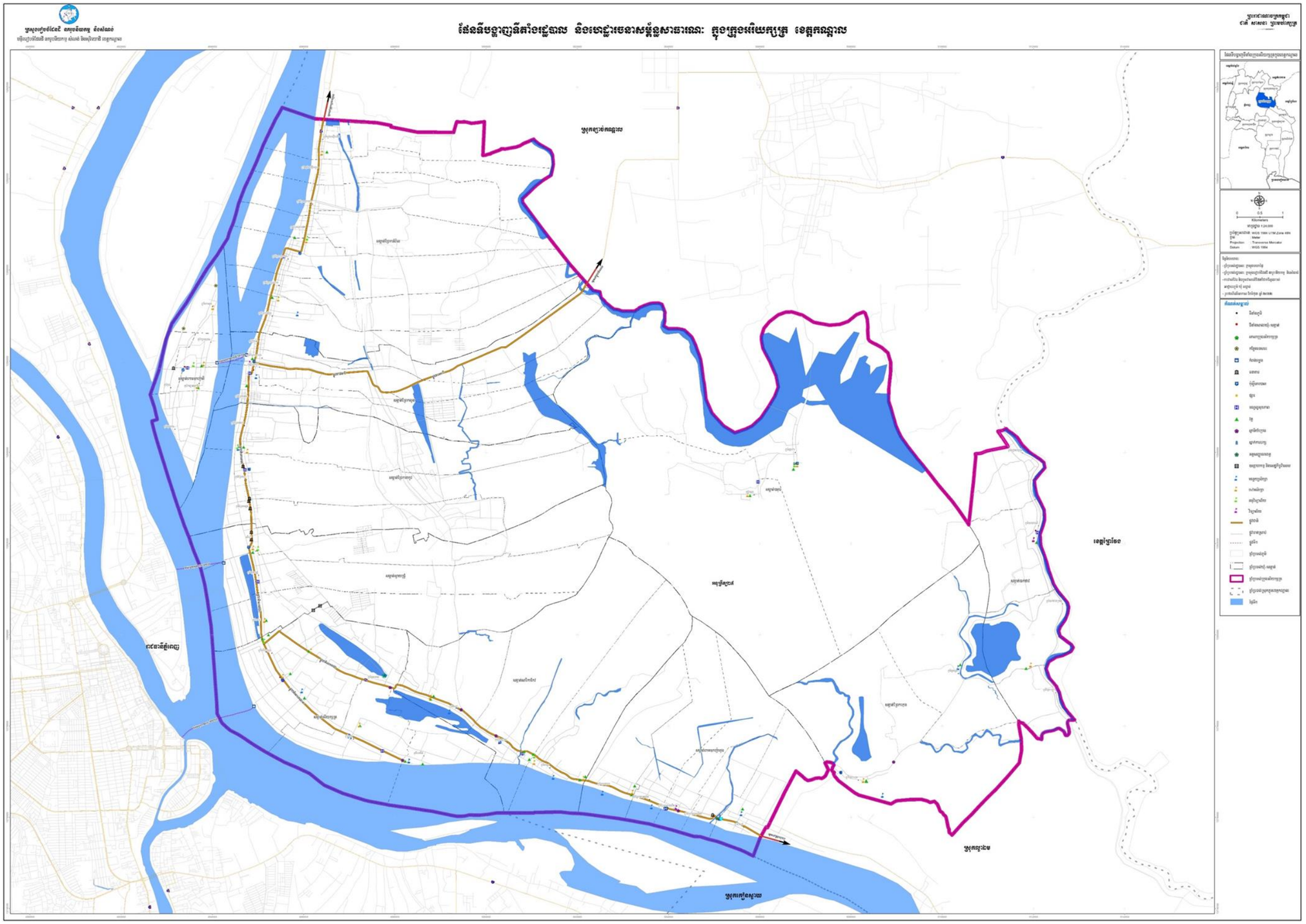


Figure 4.1-1 AKC Location

Figure 4.1-2 AKC Aerial View



Source: Draft AKC Master Plan from MLMUPC (Ministry of Land Management, Urban Planning and Construction)

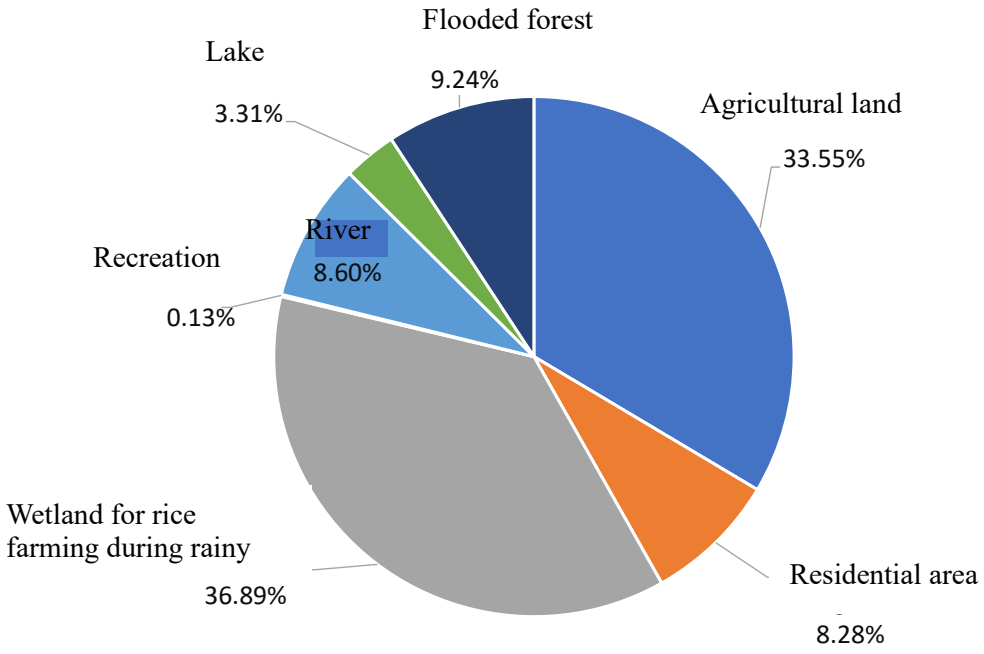
Figure 4.1-3 AKC Area Map

4.1.2 Current Land Use

According to AKC's current land use status, the urban area extends along the well-developed national road to the west and south of the district along the Mekong River. The remaining areas are agricultural land or wetlands/water surfaces, and the majority of the survey area is undeveloped.

The total area of the district is 21,470 ha, of which 8.3% (1,782 ha) is residential, 33.6% (7,214 ha) is agricultural land, and 36.9% (7,922 ha) is wetlands where rice is grown in the rainy season.

The remainder is low-lying or undeveloped land, including submerged forests, rivers, and lakes, which comprise 21.2% (4,552 ha) of the total area.

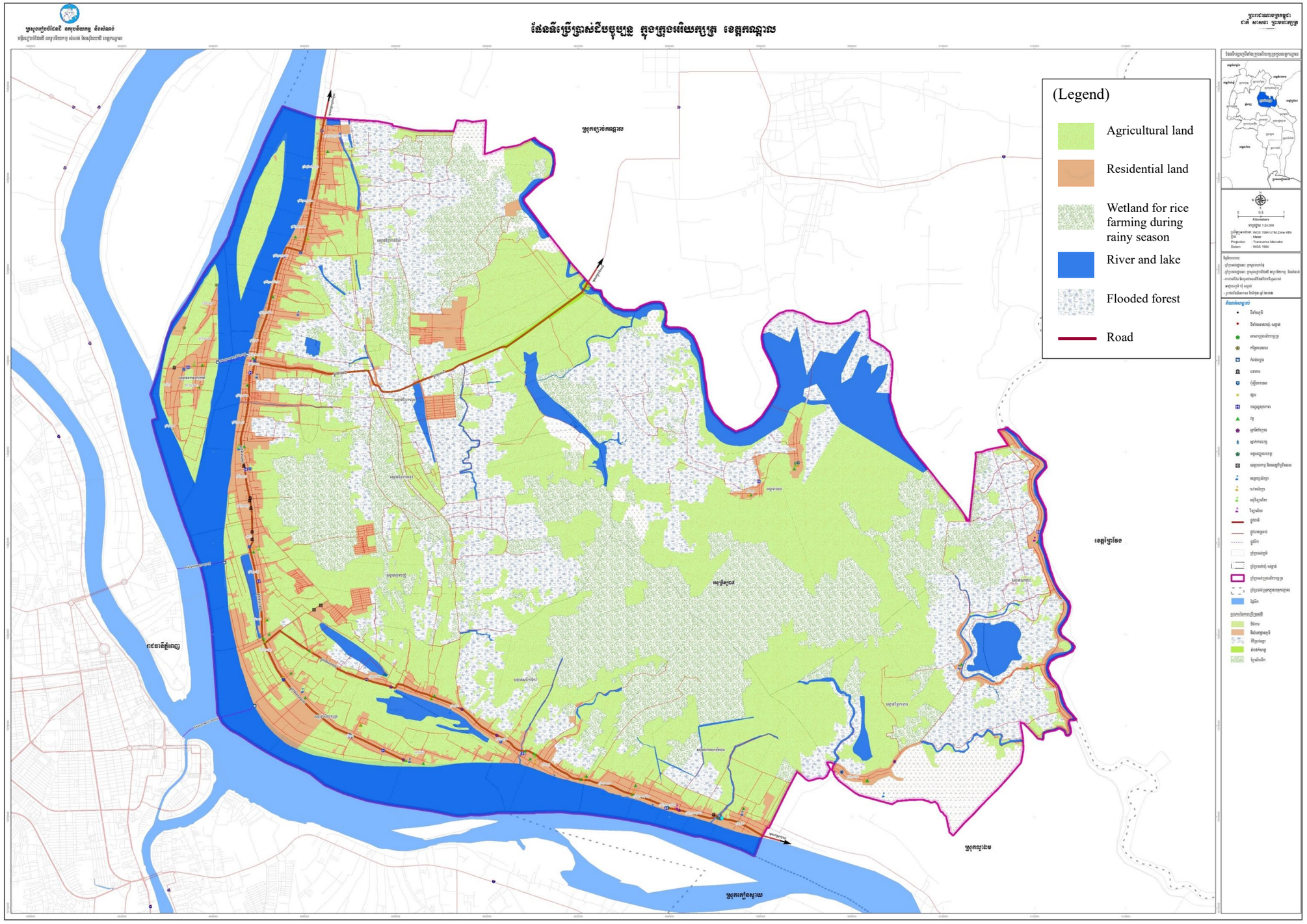


Source: AKC Master Plan (Draft), MLMUPC

Figure 4.1-4 AKC Current Land Use Area Graph

Figure 4.1-5 Well-Developed Area along the Mekong River

Figure 4.1-6 Wetland within the District



Source: AKC Master Plan (Draft), MLMUPC

Figure 4.1-7 Current Land Use Plan of AKC

4.1.3 Current Road Conditions

There are a total of three national and major roads within the AKC.

The most major road is NR380 (asphalt-paved, 24.5 km, 9 m wide), which starts from NR8 and runs southeastward along the Mekong River. Another is NR380A (asphalt-paved, 4.1 km, 9 m wide), which branches off from NR380 and runs on the southeast side of the province. In the northern part of the province, the 7NG road (concrete-paved, 8.3 km, 10 m wide) runs east-west between NR380 and NR8.

The above roads are paved 9m or 10m wide, but are planned to be 20m wide, leaving about 5m of expansion room on both sides of each road.

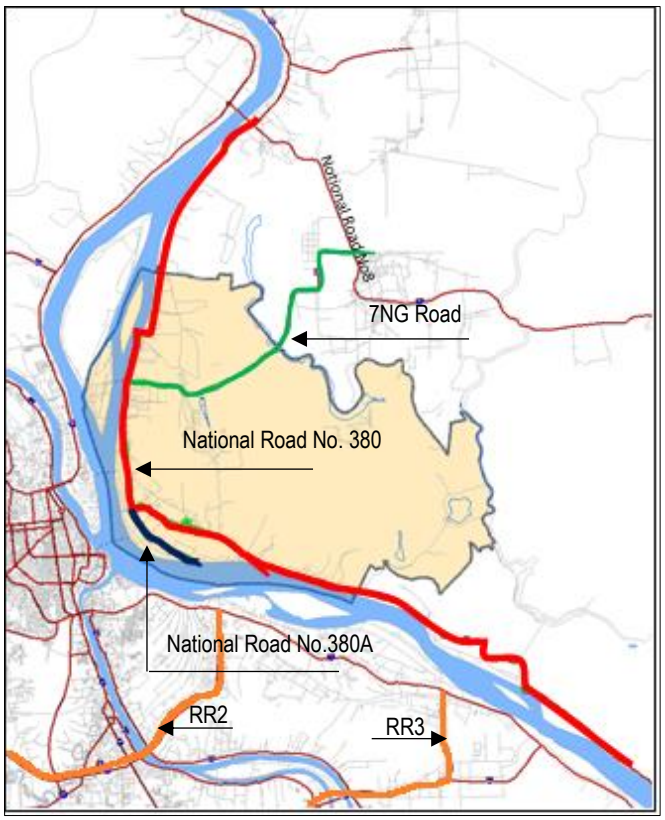


Figure 4.1-9 Location of Current Major Roads in AKC

Figure 4.1-8 National Road No. 380

Figure 4.1-10 7NG Road

In addition to the three major roads mentioned above, the AKC has a total of 747 existing roads with a total length of 464.3 km. Among these roads, about 17.8% are narrow roads with a width of 4.5 m or less (225 lines, 82.8 km), about 48.0% are small-scale roads with a width of 5.0 to 7.0 m (332 lines, 222.8 km), and about 33.5 % are wide roads with a width of 9.0 m or more (186 lines, 155.6 km).

For road structure, about 8.0% are asphalt paved (37.2 km), 31.3% are concrete pave (145.5 km), and 4.3% are gravel paved (19.9 km). The remaining is unpaved road, accounts for 56.4% (261.7 km) of the total.

Table 4.1-1 Current Roads by Width

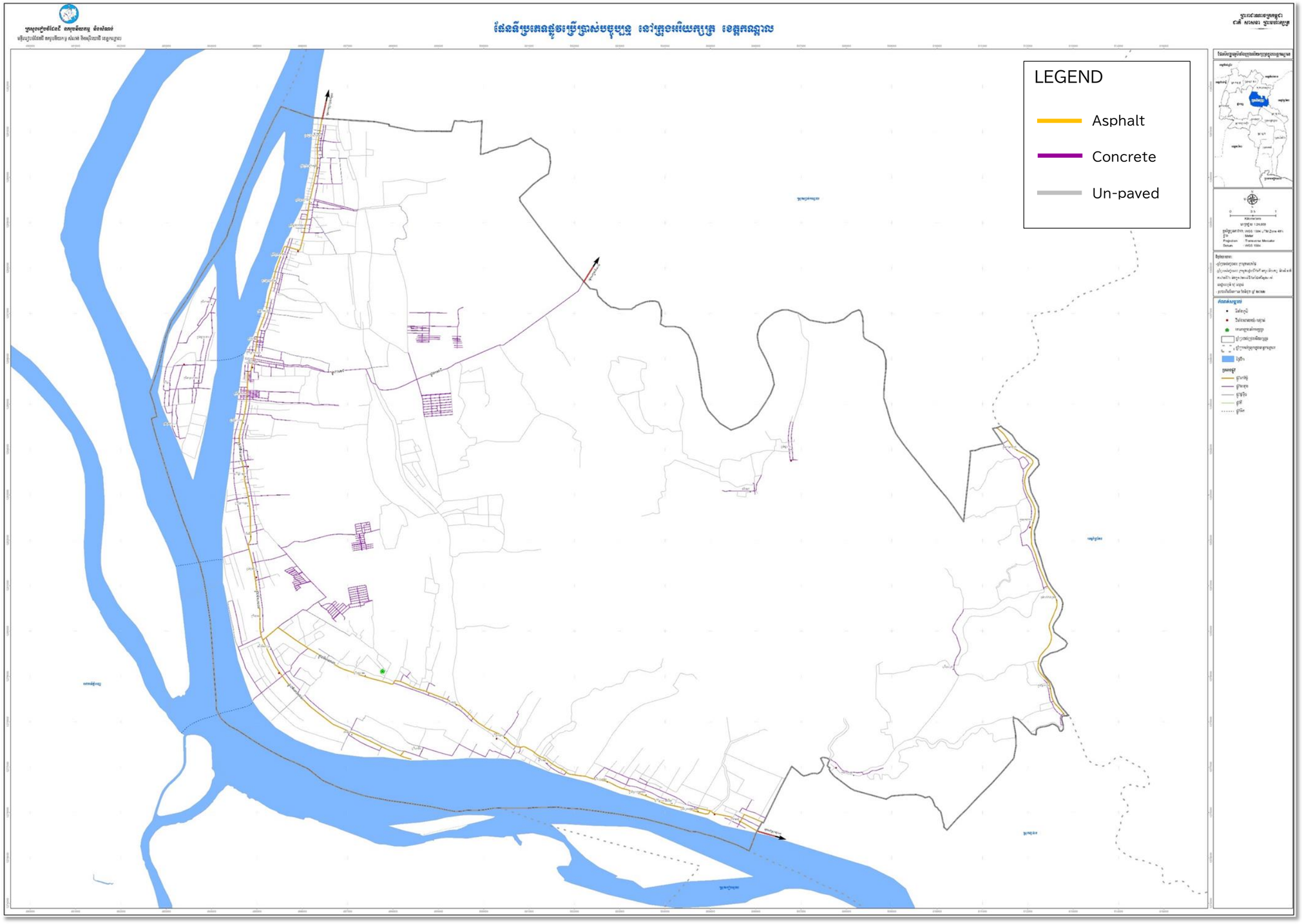
Width	Number of lines	Length (km)	Percentage
1.5m～4.5 m	225	82.8	17.8%
5.0m～7.0 m	332	222.8	48.0%
9.0m～12.0 m	186	155.6	33.5%
15.0m～20.0 m	4	3.1	0.7%
	747	464.3	100.0%

Table 4.1-2 Current Roads by Pavement

Pavement	Length (km)	Percentage
Asphalt	37.2	8.0%
Concrete	145.5	31.3%
Gravel	19.9	4.3%
Unpaved	261.7	56.4%
	464.3	100.0%

Figure 4.1-11 Existing Roads (Unpaved)

Figure 4.1-12 Existing Roads (Asphalt-Paved)



Source: AKC Master Plan (Draft), MLMUPC

Figure 4.1-13 Current Road Plan of AKC

4.1.4 Completed Development Projects

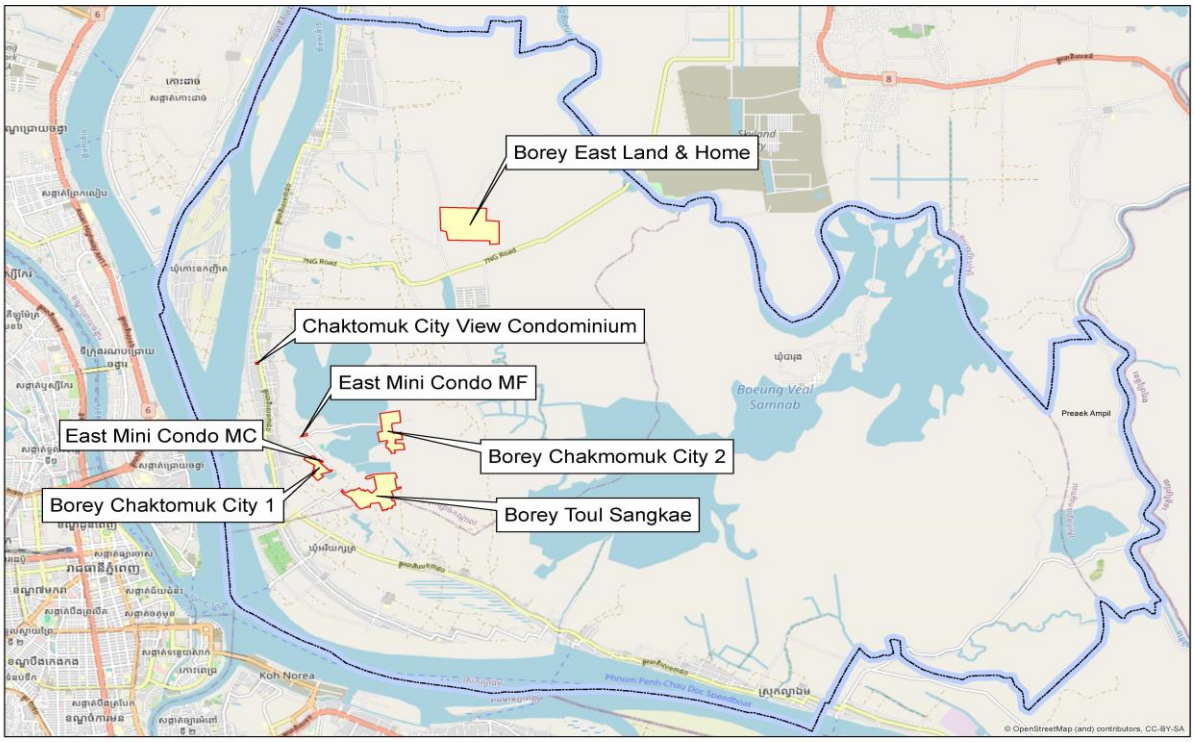
Several real estate projects by private developers are already underway in AKC in anticipation of the future construction of a bridge over the Mekong River.

Currently, four terrace house (borey) and three housing complex (condominium) development projects have been completed, and the plots are being sold to customers. Six of the seven properties are being developed by private developer BS Land & Homes, which is promoting the properties through advertisements on its website, touting their proximity to the new bridge to be built and AKC's potential as a new city.

The total area already developed is approximately 180 hectares, and more than 2,600 units have already been sold, of which 85% to 95% have already been sold.

Prices in Borey are relatively inexpensive, with the lowest price starting at about US$35,000 per unit and the highest price at about US$268,000 per unit. Most of the condominiums are studio type with relatively small floor areas, with prices ranging from US$26,000 to US$86,000 per unit.

As mentioned above, most of the properties have already been sold, but the number of units actually occupied is few. This suggests that a significant number of investment buyers are anticipating price fluctuations due to future bridge construction.



Source: JICA Survey Team

Figure 4.1-14 Borey Project Location Map

Table 4.1-3 List of Completed Development Projects in AKC

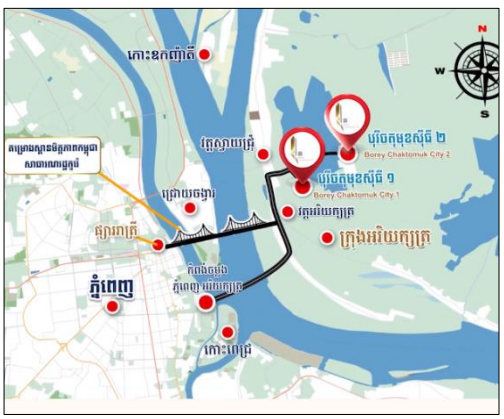
No.	Name	Developer	Area (ha)	Plan unit	Current status	Price (USD)	Percentage of Unit Sold	Photograph
1	Borey Villa Toul Sangke	BTS	52		1125	$75,000 - $268,800	85%	 
2	Borey Chaktomuk City 1	BS Land and Home	14	543	342	$72,000 - $131,499	95%	
3	Borey Chaktomuk City 2	BS Land and Home	29	1764	720	$62,499 - $134,499	95%	 
4	Borey East Land & Home	BS Land and Home	83	2028	1200	$35,500 - $ 54,500	95%	 
5	Chaktomuk Cityview Condominium	BS Land and Home	0.3	12 Storey 254 units	12 Storey 254 units	$1064/ SQM	95%	
6	East mini condo MF	BS Land and Home	0.41	No Data	No Data	$820/SQM	95%	 
7	East Mini Condo MC	BS Land and Home	0.2	8 storey, 160 units	8 storey, 160 units	$712.6/ SQM	95%	

Source: JICA Survey Team

Table 4.1-4 Summary of Condominium Projects

Name	Type	Area (sqm)	Resell Price	Developer Price
East Mini Condo MC	Studio	34	$24,500	$26,566
East Mini Condo MF	Studio	28	$18,000	(sold out)
		56		$56,295
Chaktumok City view condominium	2-bedrooms	71		$55,300
	2-bedrooms	85		$73,000
	2-bedrooms	99		$86,000

Source: JICA Survey Team



Source: BS Land & Home

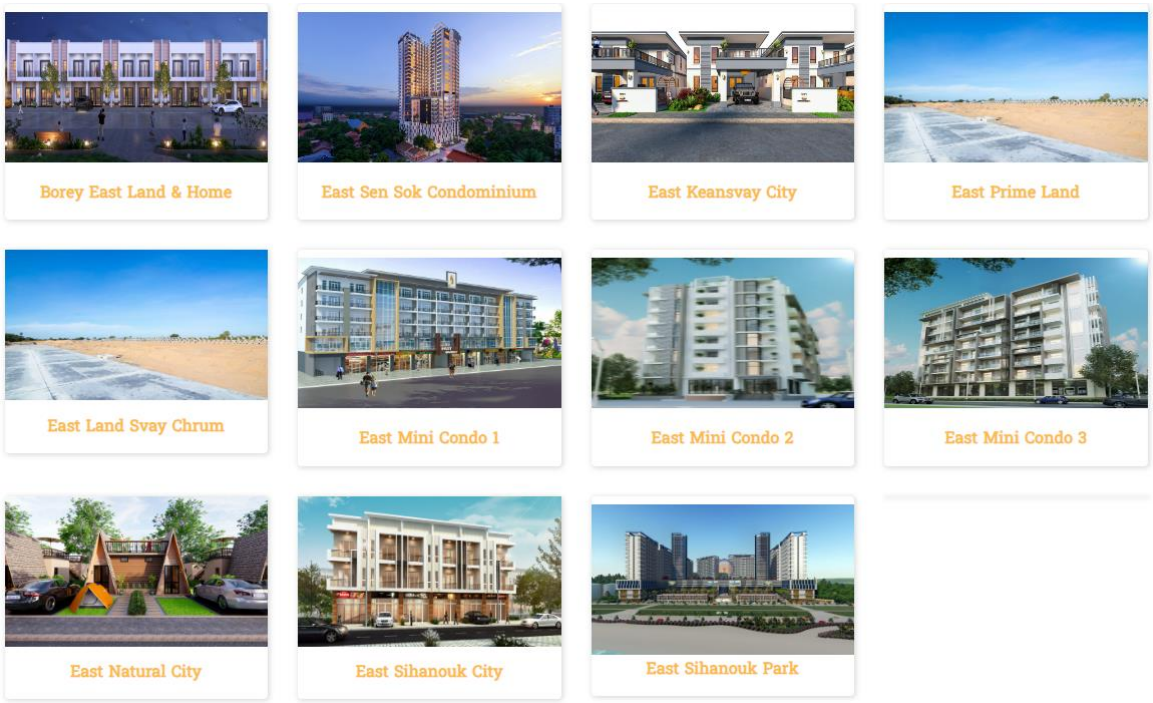
Figure 4.1-15 Borey Project Advertisements

Source: BS Land & Home

Figure 4.1-16 Borey Project Status

BS Land & Homes, the company handling the above project, was established in 2008 and is one of Cambodia's leading real estate developers with 16 years of experience in the real estate development business.

BS Land & Homes has been involved in a number of projects in Sihanoukville, Svay Thuram, and Kampot, including the development of boreys and condominiums, and the sale of land for residential development, as shown below.



Source: BS Land & Home

Figure 4.1-17 BS Land & Homes' Development Experience

4.2 Government Developments in Land Use Planning and Master Plans

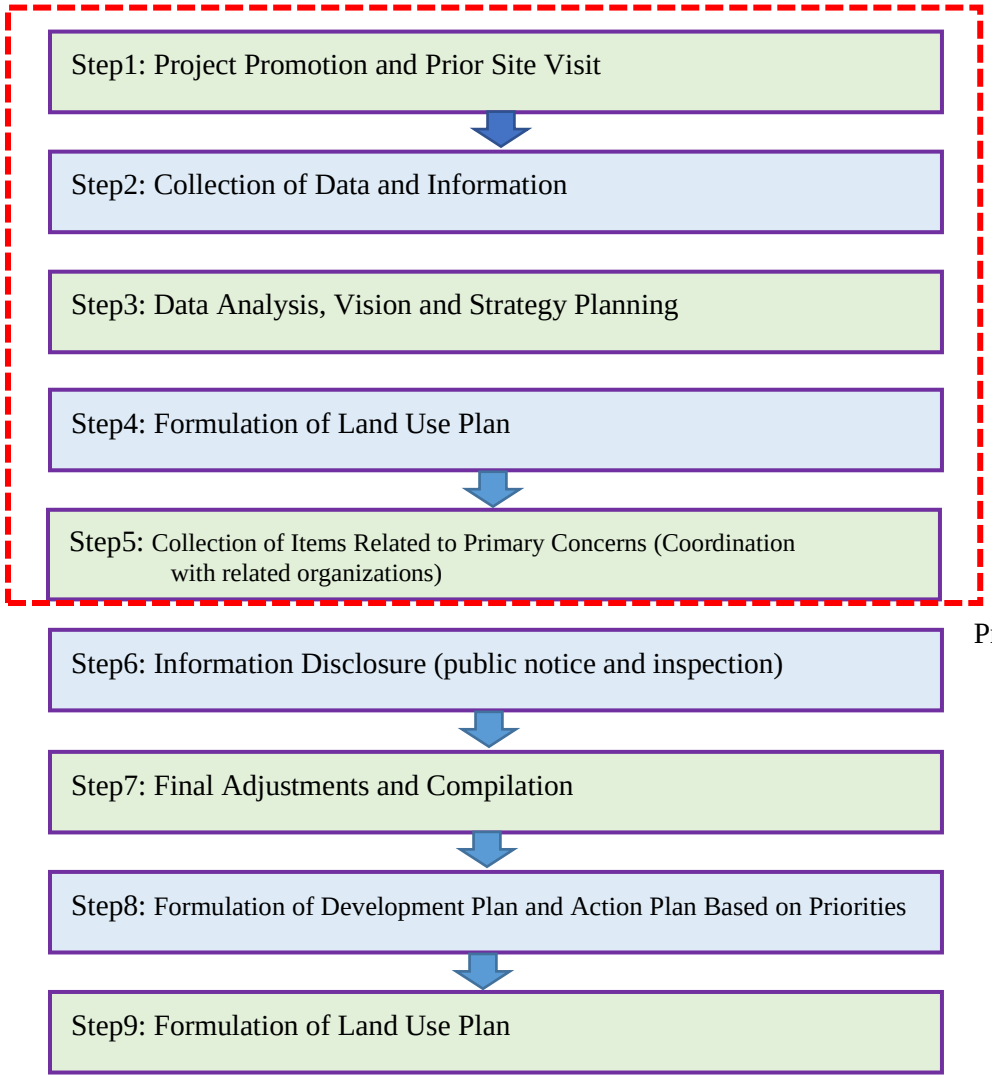
4.2.1 Progress on Master Plan Study

Under the leadership of the MLMUPC (Ministry of Land Management, Urban Planning and Construction) and in cooperation with Kandal Province, the development of an urban planning master plan for AKC with a target year of 2040 is underway. The master plan is being prepared in nine steps as shown in the following flow chart. As of the end of August 2024, the master plan is in Step 5, "Collection of Items Related to Primary Concerns (Coordination with related organizations)".

The Master Plan itself is undergoing various adjustments and procedures with the aim of finalizing the plan by the end of 2024, and is scheduled to enter the Step 6 "Information Disclosure (Public Notice and Inspection)" by June or July 2024. As part of the Step 6, workshops for the Kandal Province, local communities, and major developers are also planned.

The master plan will be approved as the official plan after all preparatory work has been completed and approved by the Minister.

Master plans are generally updated every five years after completion.



Source: JICA Survey Team

Figure 4.2-1 Master Plan Preparation Flow

4.2.2 Future Land Use Plan

The AKC Master Plan establishes the future land use plan.

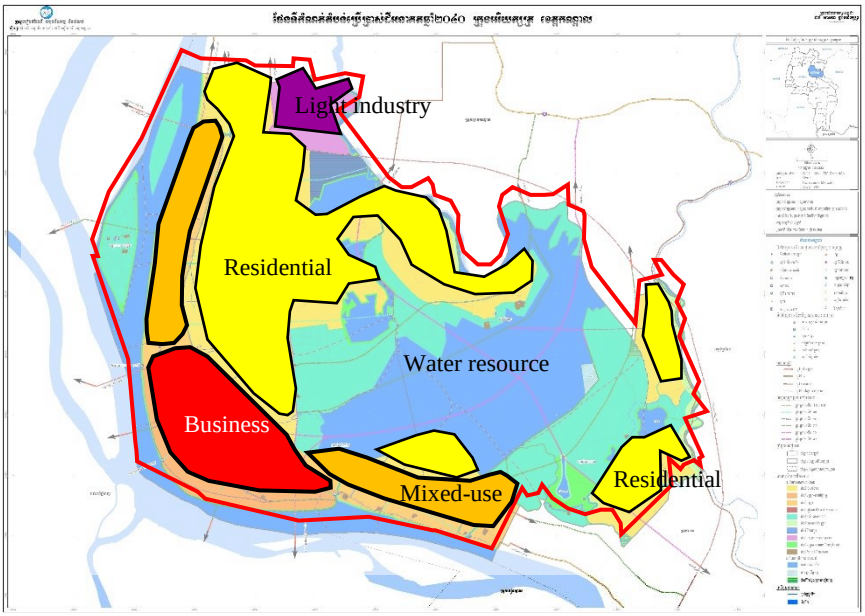
The land use plan is essentially prepared by MLMUPC (Ministry of Land Management, Urban Planning and Construction) based on current land use conditions in the urban area, existing development projects, and wetlands, as well as input and suggestions from Kandal Province and the local community.

With respect to the overall land use policy, the area to the southwest of the district, directly across from the Phnom Penh city center and the Mekong River, is collectively designated as a Business Use Area, while the area to the north and east of the Business Use Area is designated as a Mixed Use Area.

The central part of the district, where several residential development projects already exist, is planned for residential use. The eastern portion of the district, consisting of large bodies of water that help to protect the existing wetland environment and its surroundings, is zoned Agricultural and Tourism.

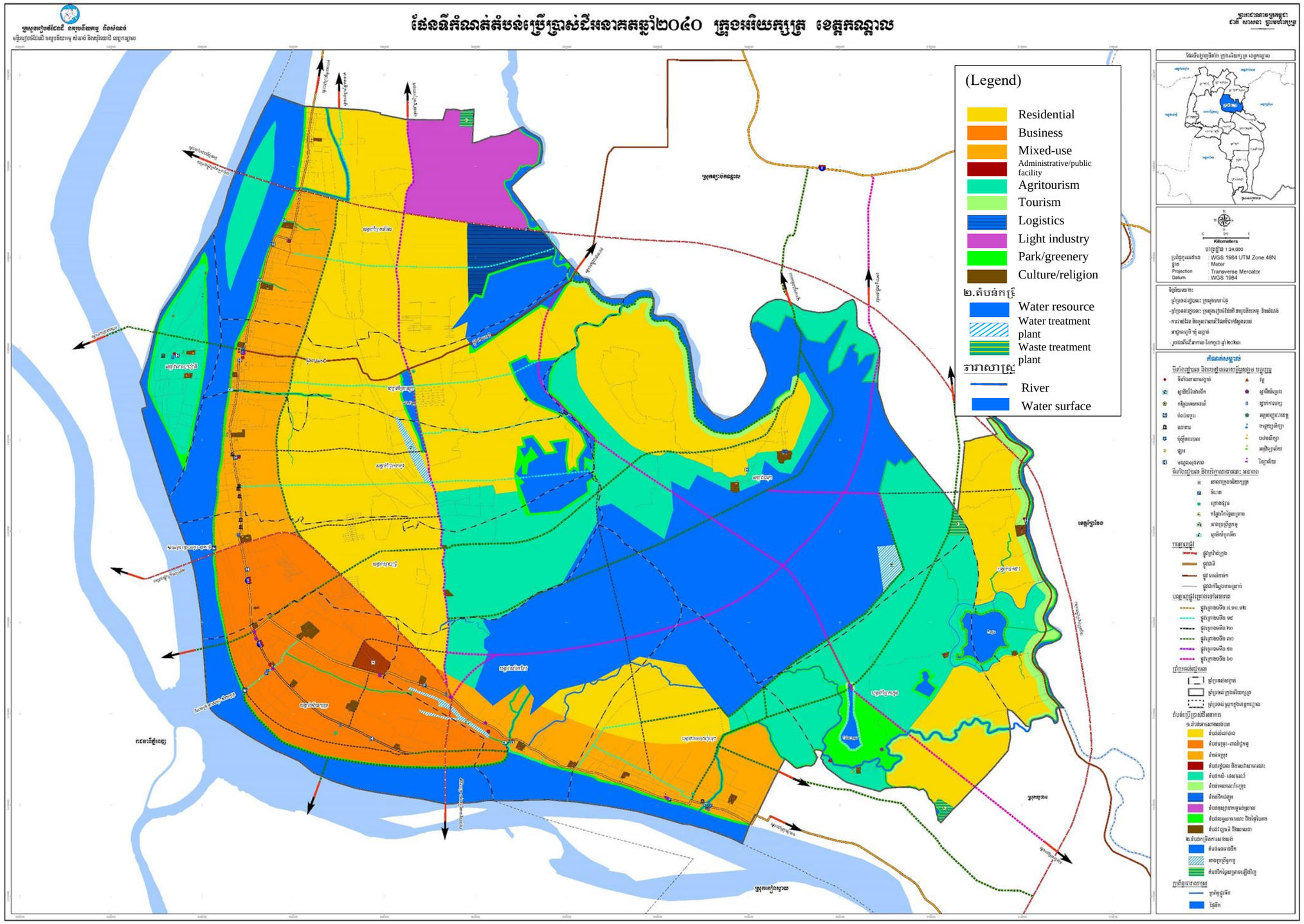
The northern part of the district is zoned for light industrial uses and is separated by RR3.

These designated uses are essentially separated by the RR and major arterial roads planned for the district.



Source: JICA Survey Team

Figure 4.2-2 Land Use Zoning



Source: AKC Master Plan (Draft), MLMUPC

Figure 4.2-3 Future Land Use Plan

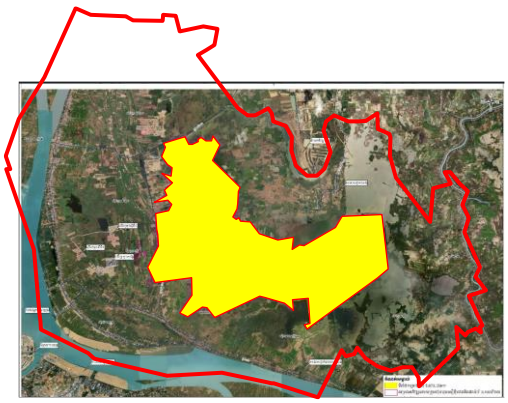
4.2.3 Large Landowners in the District

As mentioned above, there are several residential development projects already completed in AKC. Meanwhile, large-scale land acquisitions by private real estate developers are underway in other areas. Particularly, a major local real estate developer has reportedly already acquired land in the central and eastern parts of the district, extending from the yellow area shown in Figure 4.2-4.

Regarding the future land use plan, most of the areas already acquired by the local real estate developers are wetlands, lands for agriculture and tourism land, which cannot be effectively used for residential development.

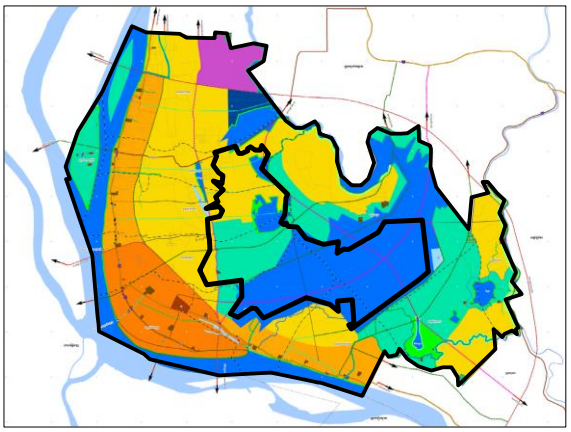
According to the MLMUPC, the master plan is currently in the finalization stage, and discussions and coordination are underway between the large landowners and the MLMUPC. The land use plan will be adjusted in the future, and once an agreement is reached, the plan will be finalized.

Therefore, depending on the details of coordination with the real estate developers, the future land use plan indicated in the previous section may significantly.



Source: JICA Survey Team

Figure 4.2-4 Status of Lands Owned by Large Landowners (Current Status Overlay)



Source: JICA Survey Team

Figure 4.2-5 Status of Lands Owned by Large Landowners (Land Use Plan Overlay)

4.2.4 Issues Related to Land Use Planning

As mentioned above, AKC is in the process of preparing a master plan with the goal of finalizing the plan by the end of 2024. This master plan is being prepared to establish the general framework of the city, including a development policy for the entire 21,470-ha AKC and a plan for the layout of major roads. Therefore, it is not sufficient to lead planned and controlled urban development in the future when bridges are constructed and urbanization progresses.

In order for AKC to lead Cambodia's economic development as a new sub-center, AKC should be subdivided into several districts from the viewpoint of location conditions, development stage, future vision, etc., and each district should have detailed district development plans, including land use plans, public facility layout plans, building-to-land ratio, floor-area ratio, building setbacks, etc., need to be developed for each district.

Furthermore, in order to ensure that these master plans and each district development plan are not mere plans, but are actually implemented and effectively put into practice, and to steadily regulate and guide the development of AKC, it is necessary to simultaneously improve the technical skills of administrative staff and to make efforts to develop human resources in Kandal and AKC.

4.3 Future Road Network Plan (Regulatory Planning)

4.3.1 Future Road Plan

The AKC Master Plan is currently preparing a future road plan.

The road plan was planned based on the existing road conditions and current land uses, including urban areas and development projects, with roads located primarily on agricultural land and underutilized land to avoid impacting existing buildings as much as possible.

The roads are categorized into two currently planned ring roads, RR 2 and RR3 (red dotted line), national roads consisting of the existing NR380 and NR380A (orange line), arterial roads, local roads, and existing roads.

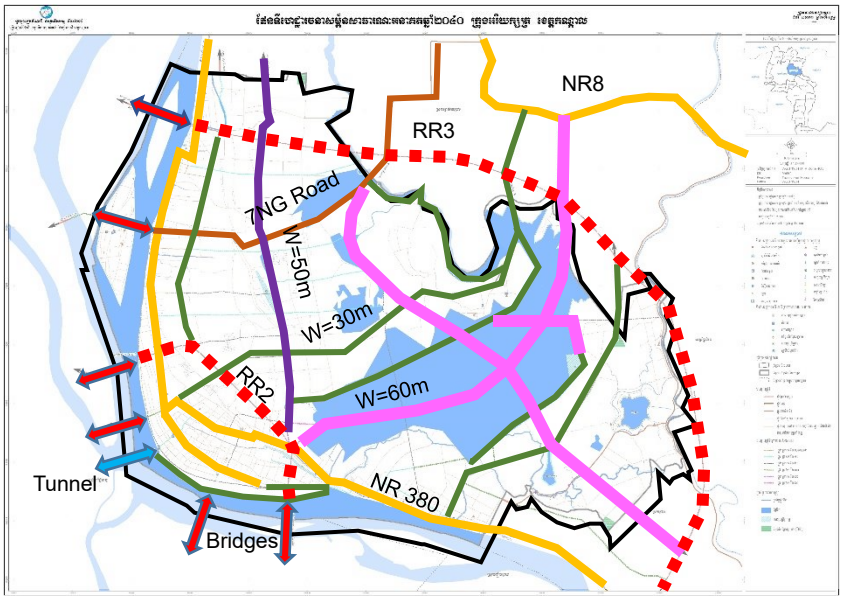
The widest planned roads are 60-m-wide roads (pink line) located mainly on the existing water surface in the eastern part of the district connecting RR2 and 3, followed by a 50-m (purple line) running north-south in the western part of the district.

For arterial roads, 30-m-wide roads (green line) running north-south in the western part of the district and several roads extending east-west from the central to the eastern part of the district are planned.

In addition, 20-m-wide roads (black line), 15-m-wide roads (light blue line), and roads with 12-m wide or less (brown line) are planned to connect between the aforementioned arterial roads, forming a road network as a whole.

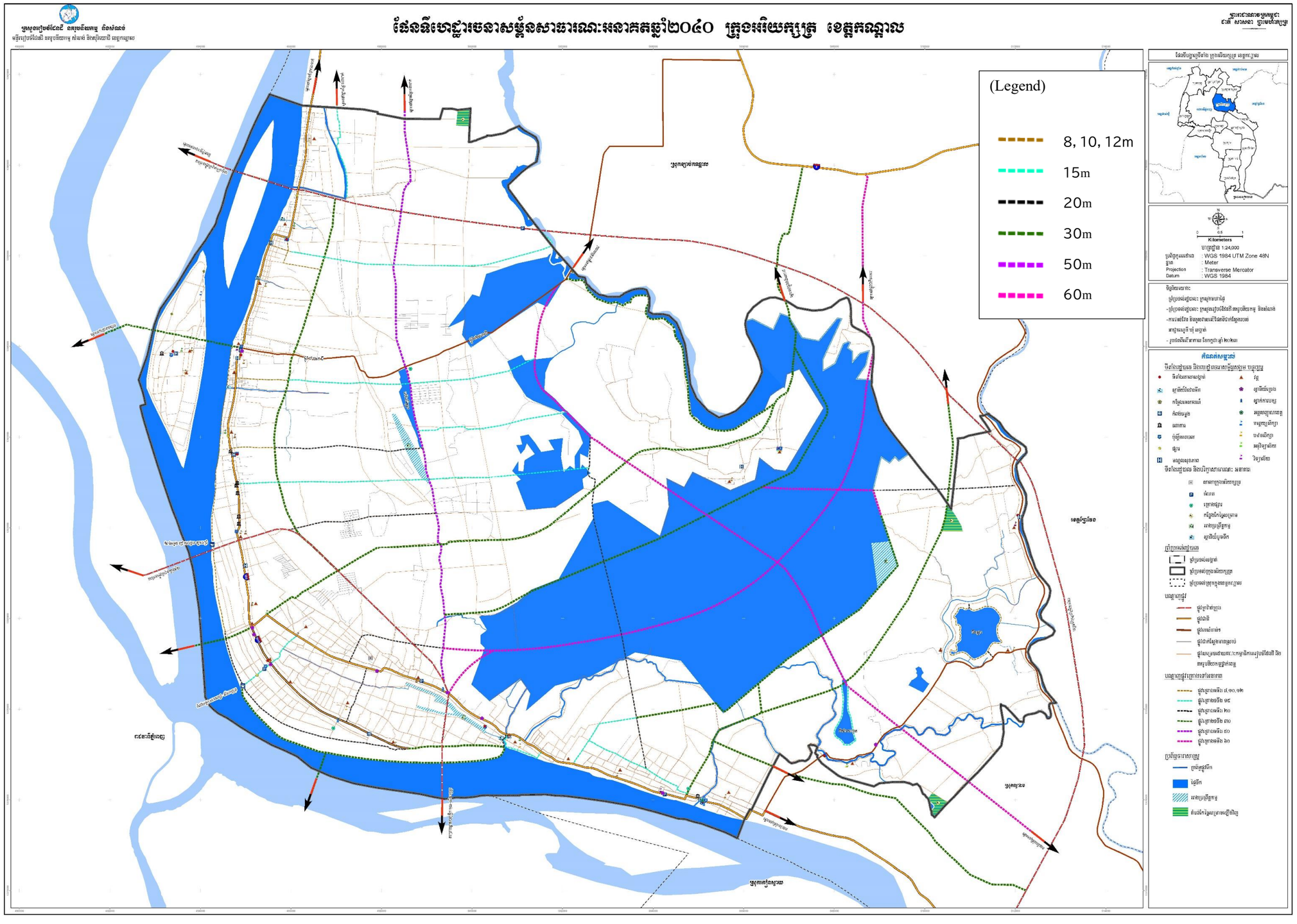
The implementation entities for the above roads will be MPWT for RR and wide-area arterial roads, Kandal Province for other arterial roads, and AKC for small regional roads.

For the crossing of the Mekong River, a total of seven crossings, six bridges and one tunnel, are planned, which will be networked with ring roads, national roads, and arterial roads within AKC.



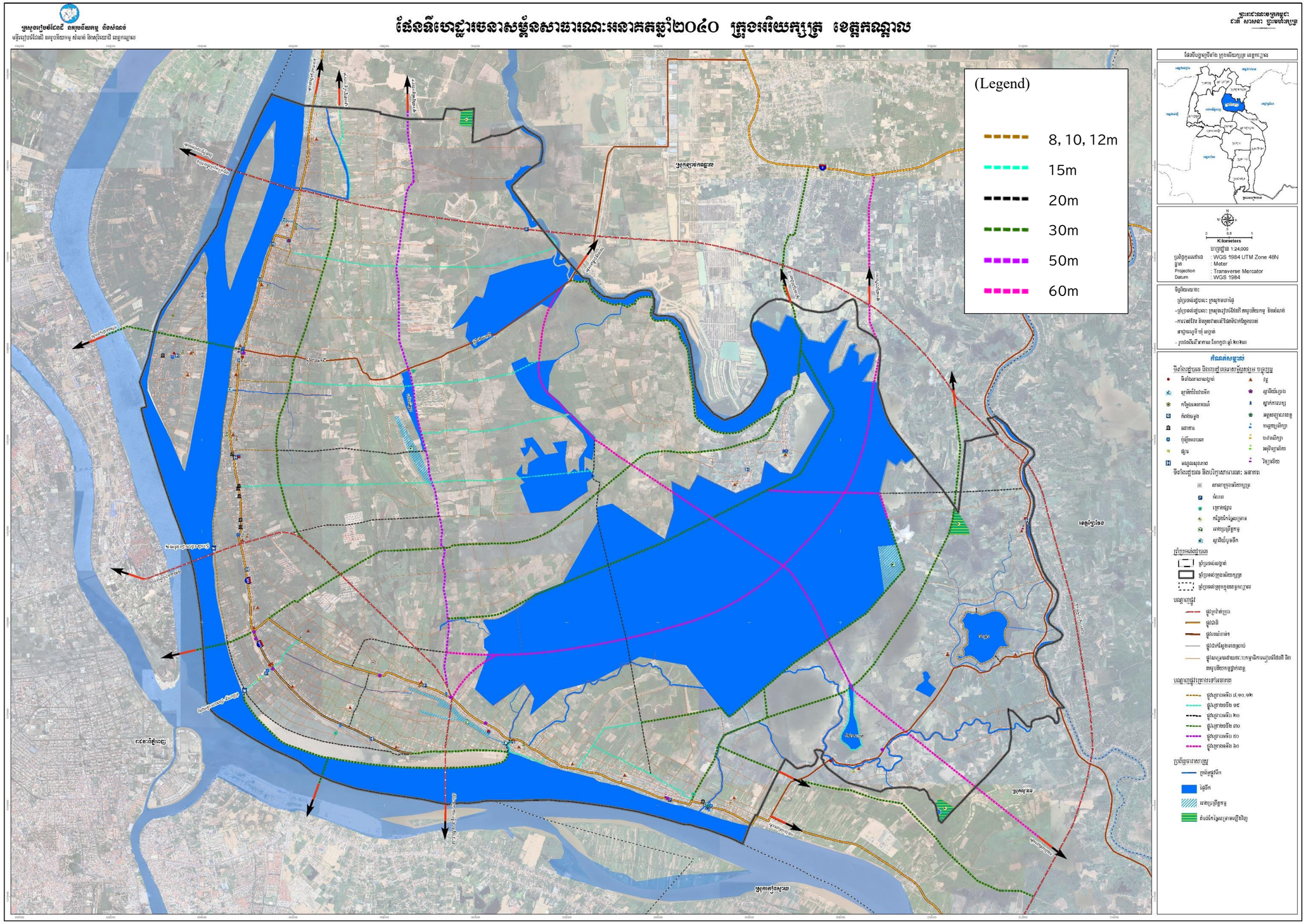
Source: JICA Survey Team

Figure 4.3-1 Future Road Network Plan in AKC



Source: AKC Master Plan (Draft), MLMUPC

Figure 4.3-2 Future Road Plan



Source: AKC Master Plan (Draft), MLMUPC

Figure 4.3-3 Future Road Plan (with Current Status Overlay)

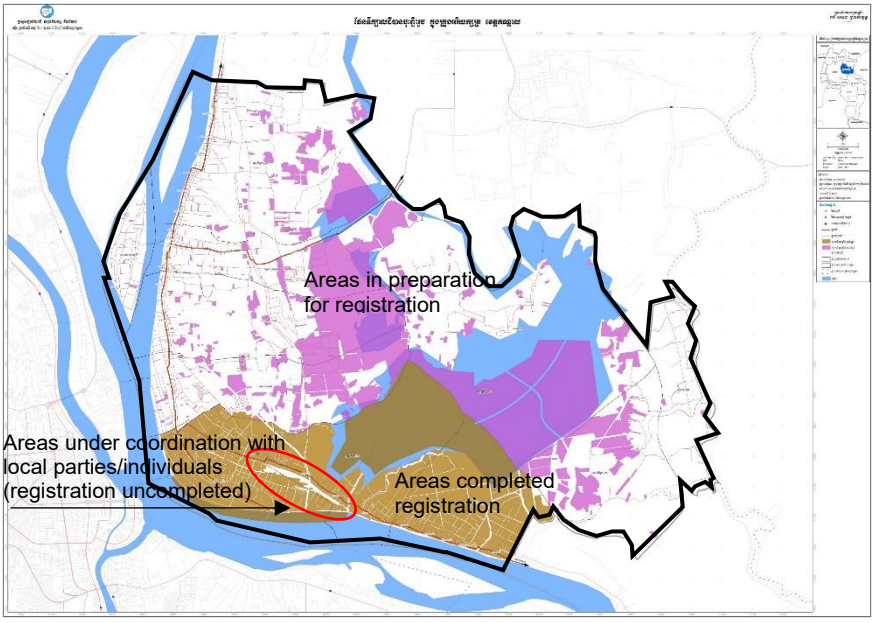
4.3.2 Progress of Land Registration

Under the direction of the Deputy Prime Minister of Cambodia, AKC is proceeding with surveying procedures, coordination with local officials, and registration work in order to complete all land registration procedures in the district by the end of 2024.

As of the end of April 2024, approximately 53% of the land in the district has been registered in the registration system, and approximately 20% of the area is under surveying and other registration preparations.

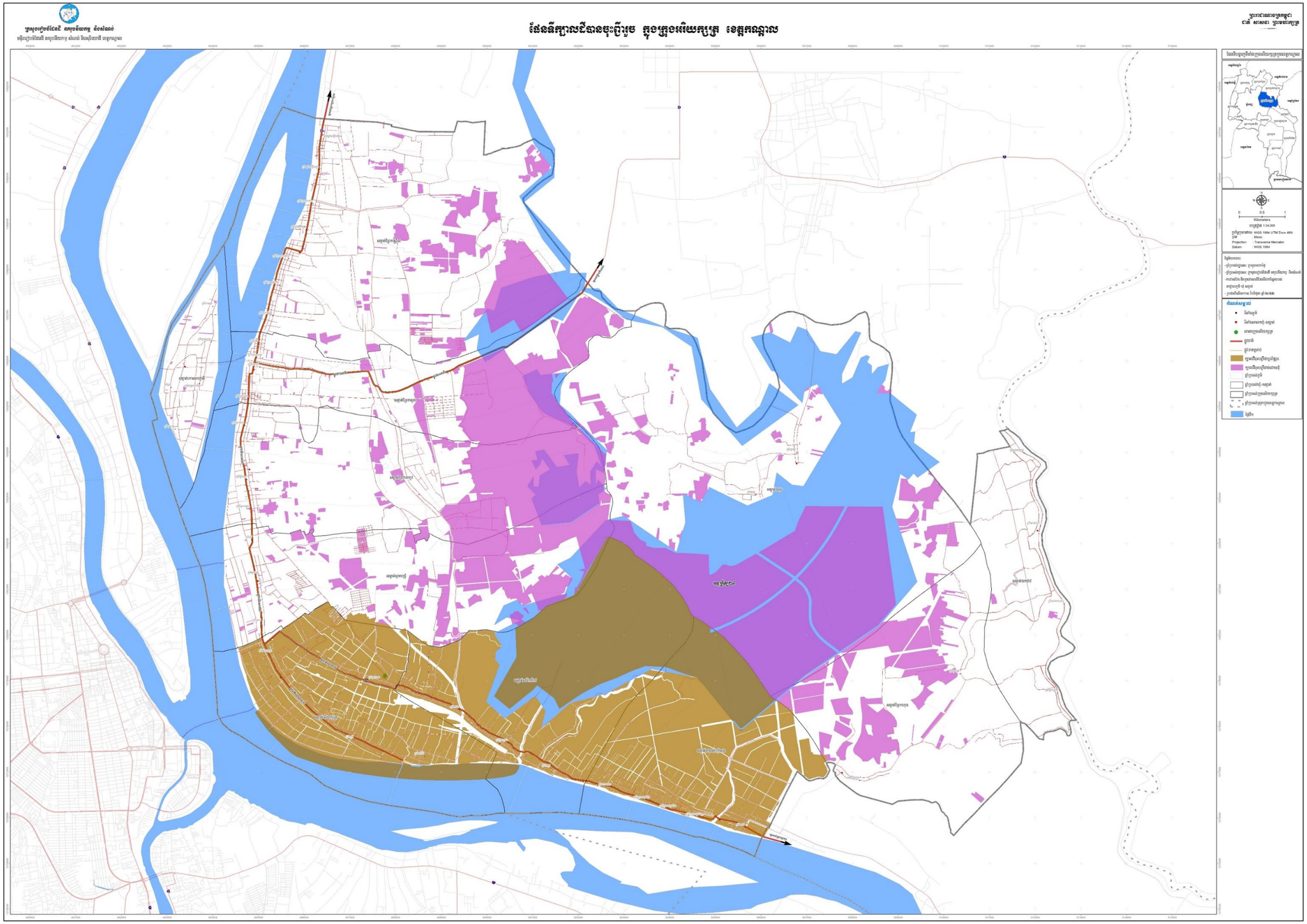
The map on the next page shows the registration status. The dark brown areas in the southern part of the map show areas where registration procedures have been completed, the purple areas are under preparation, and the white areas indicate areas where procedures and road use have not yet begun.

Registration procedures require the consent of residents in the area where the planned road is located, but in some of the areas where RR2 is planned, registration procedures have not progressed because residents' consent has not been obtained.



Source: JICA Survey Team

Figure 4.3-4 Registration Status Map



Source: AKC Master Plan (Draft), MLMUPC

Figure 4.3-5 Registration Progress Status Map

4.3.3 Issues

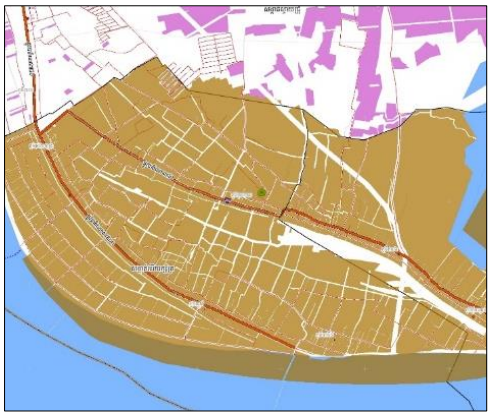
The following is a summary of the issues that have been identified with regard to future road planning in AKC.

(1) Schedule for Master Plan Development and Land Registration Procedures

As summarized in the previous sections, the urban master plan, including land use plans and road plans, is being reviewed and coordinated by AKC with the aim to obtain approval from the prime minister by the end of 2024. This indicates that the land use plans and road plans collected and confirmed in this survey are likely to be subject to changes due to future adjustments.

At the same time, the land registration procedure for the entire area within the district is being carried out for completion by the end of 2024, and as of the end of April, land registration is completed for more than 50% of the land in the district based on the current road layout plan.

Therefore, if the road alignment is changed in the future as a result of various surveys or adjustments following consultation with the local officials and individuals, it will be necessary to carry out registration procedure again for areas subject to change.



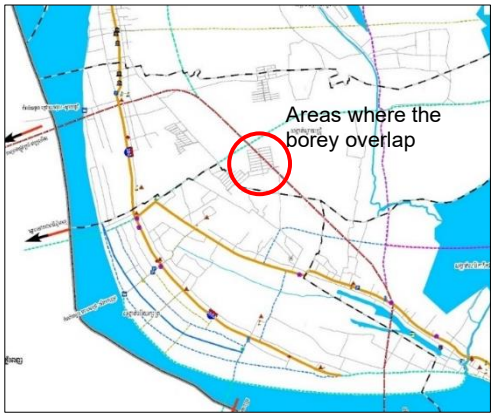
Source: AKC Master Plan (Draft), MLMUPC

Figure 4.3-6 Registration Status of Land for Road Uses

(2) Road Alignment of RR2

The road plan formulated in the Master Plan is based on a road layout that does not affect existing residential areas and development projects. However, for RR2, the road alignment overlaps with the existing borey housing development project, and the road cannot be developed with the current plan.

Therefore, it is necessary to change the road alignment of RR2 to avoid the borey residential area in the future.



Source: AKC Master Plan (Draft), MLMUPC

Figure 4.3-7 Road Alignment of RR2

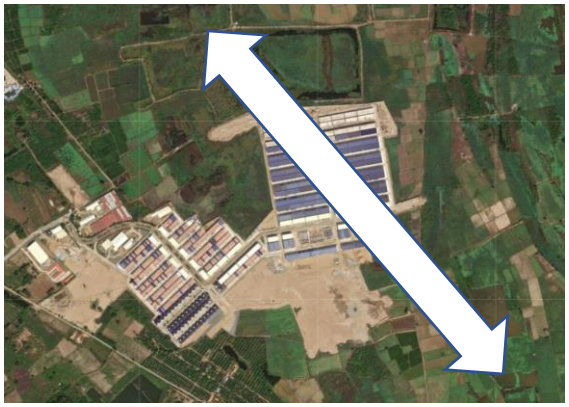


Figure 4.3-8 Aerial Overlay (RR2)

(3) Large-Scale Reclamation Project along the Mekong River

In the southern part of AKC along the Mekong River, a land reclamation project is underway by a major local conglomerate, and an urban development project is scheduled to be implemented by the conglomerate that implemented the reclamation project.

Currently, there are no development plans for the land reclamation project, but when the project reaches the planning stage in the future, sufficient consideration and coordination should be given to the location of bridges, piers, and other structures.

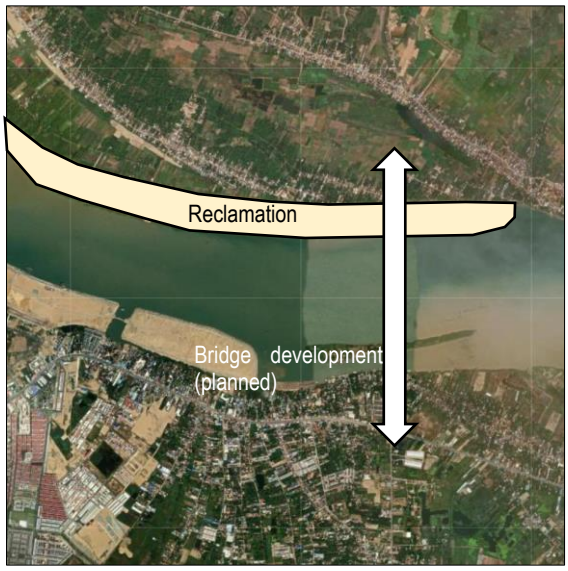


Figure 4.3-9 Large-Scale Reclamation Project