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SIEM REAP SMART

Siem Reap Smart City Roadmap

English version



Unofficial Translation

SIEM REAP SMART

Siem Reap Smart City Roadmap

Siem Reap Provincial Administration

SIEM REAP SMART CITY ROADMAP

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ABBREVIATIONS

Abbreviation	Official Name
ADB	Asian Development Bank
AI	Artificial Intelligence
APSARA National Authority	The Authority for the Protection of the Site and the Management of the Region of Angkor
AR	Augmented Reality
ASCN	ASEAN Smart Cities Network
ASEAN	Association of Southeast Asian Nations
BOD	Biochemical Oxygen Demand
CCTV	Closed-Circuit Television
CDC	The Council for the Development of Cambodia
CDIA	Cities Development Initiative for Asia
COD	Chemical Oxygen Demand
COVID-19	Coronavirus Disease 2019
DLMUPC	Siem Reap Provincial Department of Land Management, Urban Planning and Construction
DoE	Siem Reap Provincial Department of Environment
DoT	Siem Reap Provincial Department of Tourism
Do	Siem Reap Provincial Department of Planning
DPT	Siem Reap Provincial Department of Post and Telecommunication
DPWT	Siem Reap Provincial Department of Public Works and Transport
DRD	Siem Reap Provincial Department of Rural Development
EDC	Electricite du Cambodge
EV	Electric Vehicle
GAEA	Global Action for Environment Awareness Waste Management Company
GPS	Global Positioning System
ICT	Information and Communications Technology
IoT	Internet of Things
IT	Information Technology
JICA	Japan International Cooperation Agency
LED	Light Emitting Diode
MaaS	Mobility as a Service
MCFA	Ministry of Culture and Fine Arts
MLMUPC	Ministry of Land Management, Urban Planning and Construction, the Kingdom of Cambodia
MoE	Ministry of Environment, the Kingdom of Cambodia
MEF	Ministry of Economy and Finance, the Kingdom of Cambodia

Abbreviation	Official Name
MoH	Ministry of Health, the Kingdom of Cambodia
MoI	Ministry of Interior, the Kingdom of Cambodia
Mott	Ministry of Tourism, the Kingdom of Cambodia
MPWT	Ministry of Public Works and Transport, the Kingdom of Cambodia
NGO	Non-Governmental Organization
NR6	National Road No. 6
PIN	People in Need
PIP	Public Investment Program
PoC	Proof of Concept
SCC	Smart City Committee
SDGs	Sustainable Development Goals
SPC	Special Purpose Company
SPV	Special Purpose Vehicle
UNESCO	The United Nations Educational, Scientific and Cultural Organization
USD or US\$	United States Dollars
UNDP	United Nations Development Program
VR	Virtual Reality



Preface

Dear Samdech, Excellencies, Ladies and Gentlemen!

First of all, on behalf of the Provincial Council, the Board of Governors and on my own behalf, please allow me to present the development of Siem Reap City of Siem Reap Province as a smart city through the Siem Reap Smart City Roadmap.

Siem Reap Province is one of the 25 provinces and capitals of the Kingdom of Cambodia located in the northwest of the country and 314 kilometers from Phnom Penh. Currently, Siem Reap Province has 1 city, 11 districts, 12 Sangkats, 88 communes and 910 villages. Siem Reap City was listed as a member of the ASEAN Smart Cities Network at the 2018, Association of Southeast Asian Nations (ASEAN) Summit in Singapore. In preparing the development of Siem Reap City to become an ASEAN Smart City, the Royal Government of Cambodia under the wise leadership of Samdech Akka Moha Sena Padei Techo Hun Sen, Prime Minister of the Kingdom of Cambodia, launched the development policy for Siem Reap Province to become one of Cambodia's economic poles among other economic poles of the country. In the development policy, the 38 Road Construction Project in Siem Reap city is a considerable development that has turned Siem Reap City into an attractive and comfortable tourist city. In addition, the 38 Road Construction Project greatly contributed to make Siem Reap City a smart city.

Along with developing Siem Reap City into a smart city by Cambodia itself, Siem Reap Province has also received technical assistance from the Japan International Cooperation Agency (JICA) to help prepare Siem Reap City to become a smart city among ASEAN Smart Cities as well. Since 2020, despite being in the epidemic stage of Covid-19, the JICA Expert Team has been working closely with the provincial administration in preparing Siem Reap City to be a smart city in the future. In the three years of this cooperation, we have achieved many proud achievements, the biggest of which is the development of a Siem Reap Smart City Roadmap. This Roadmap is for building Siem Reap City into a smart city with a vision to be achieved by 2035. The preparation of the roadmap has also been harmonized with the relevant policy documents of the Royal Government of Cambodia, including: Tourism Development Master Plan Siem Reap 2021-2035, the 38 Road Construction Project, Siem Reap City land use master plan vision 2035, national smart city roadmap of the Royal Government of Cambodia and other related plans. In addition, the roadmap also describes the strategies, implementation measures and key priority projects to become an ASEAN Smart City for the vision of 2035.

Through this roadmap, I sincerely hope that this document will be a good policy document of the Siem Reap Provincial Administration in preparing Siem Reap City as well as Siem Reap Province as a whole to become an ASEAN Smart City in accordance with the vision set by the ASEAN for the 26 cities of the ASEAN member states. At the same time, I also hope that through the roadmap, it will be an attractive document for investment in both public and private sectors to contribute to the development of Siem Reap City to become a smart city for the vision of 2035 in order to promote tourism in Siem Reap with the Royal Government and improve the quality of life.

On behalf of the Provincial Council, the Board of Governors and on my own behalf, I would like to request all stakeholders to prioritize the implementation of the roadmap to contribute to the development of the tourism sector, promotion of the public service provision and improvement of the quality of life. *ST*

Siem Reap, Thursday, 2 March 2023

Provincial Governor

Tea Seiha

Introduction

Siem Reap City, the capital of Siem Reap Province, is a city centered on the tourism industry with the World Cultural Heritage Site of Angkor. The population of Siem Reap City is 245,494 according to the 2019 General Census, while the number of tourists has increased dramatically from 2.86 million in 2010 to 4.26 million in 2019. Siem Reap City attracts 70% of all foreign tourists visiting Cambodia.

On the one hand, infrastructure, social services, and other improvements have not been sufficient to accommodate the increase in the number of tourists. The challenges for citizens and tourists are the deterioration of urban life and the urban environment. These include, for example, worsening traffic congestion due to the rapid increase in the number of automobiles, environmental degradation due to increased waste and sewage emissions, and increased crime. Cambodia's overall tourism performance in 2020 was US\$1 billion from US\$4.9 billion (-79.4%) in 2019 and the number of tourists from approximately 6.61 million to 1.3 million (-80.2%) compared to the previous year in terms of tourism revenue due to the impact of COVID-19. This has had a very significant economic and employment impact on Siem Reap as a tourist city. On the other hand, Siem Reap is projected to increase the number of tourists to approximately 11 million by 2035 (Siem Reap Province Tourism Development Master Plan (2020-2035)). To meet the various demands of future tourists in post-COVID-19, there is a strong need to develop the urban environment. The "smart city" approach has been analyzed as an effective means to develop such an environment.

In recent years, due to the rapid digitalization of civic and economic activities, smart cities have become a trend as a new urban tool around the world. However, detailed definitions and approaches vary by region, country, and subnational administration. The movement of smart city in Siem Reap was accompanied by the adoption of the ASEAN Smart City Network (ASCN) framework document at the ASEAN Summit in 2018, which launched a platform for cities from ASEAN member countries to cooperate, and Siem Reap. In 2019, the Siem Reap Smart City Committee was established under the Provincial Government as the entity to steer the direction of Siem Reap Smart City.

In 2020, the Siem Reap Smart City Roadmap was initiated its preparation by the Siem Reap Provincial Administration with the support from the Japan International Cooperation Agency (JICA), aiming at realizing a smart city of Siem Reap. The preparation phase was conducted in consultation with citizen representatives, the private sector, universities, development partners, and experts. The first edition of this roadmap was drafted and broadly approved in 2021.

This roadmap is updated in February 2023. The updated roadmap consists of Volume 1 and Volume 2. Volume 1 represents the vision and direction of Siem Reap, and Volume 2 represents the action plan. Since Volume 1 describes the philosophy of Siem Reap Smart City, no major changes are envisioned. Volume 2 will need to be updated accordingly, as the action plan needs to keep up with ever-evolving technologies. As mentioned above, the first edition of this roadmap was developed in 2021, therefore, Volume 2 (the action plan) shows the current progress as of February 2023.

The roadmap is intended to be a living document to accommodate changes in priority projects and action plans and will include a variety of smart city initiatives in Siem Reap.

SIEM REAP SMART

Siem Reap Smart City Roadmap

Volume 1: Smart City Approach

Chapter 1 Objective and Vision

1.1 Objective of the Roadmap

The Siem Reap Smart City Roadmap aims to establish a vision for a smart city of Siem Reap and to outline steps and strategies to achieve the vision. The roadmap is developed with input from Siem Reap citizens, the private sector, government officials, and development partners.

The roadmap will serve as a communication tool to inform stakeholders about the plan and its progress. In other words, the roadmap allows for the coordination of initiatives between different departments and divisions within the provincial administration, the private sector, and other stakeholders. The roadmap will also serve as a tool to disseminate information to the other cities, both nationally and internationally. It is expected that this communication and dissemination will enable the city to stimulate innovation for its development.

Specific and measurable targets and indicators will be set on the basis of the roadmap. By tracking progress against these, it will be possible to identify areas where additional resources or adjustments are needed. The roadmap can also be used to monitor and evaluate smart city initiatives by updating and revising the roadmap as needed as a living document.

Thus, the roadmap is designed to guide Siem Reap in effectively planning, implementing, and evaluating its development efforts in line with the vision.

1.2 The Smart City Vision

With 2035 as the target year, the vision namely “SIEM REAP SMART” is set up for the realization of Siem Reap’s smart city. The figure below shows the vision with the important components.



The Vision for SIEM REAP SMART

The vision consists of four pillars: FOR, WITH, TOWARD, and BY. The four pillars support the objective stated in the Siem Reap tourism masterplan (Realize high-quality tourism industry including cultural tourism and sustainable tourism), as well as other important legal documents in Cambodia as mentioned in Chapter 2. This vision is also consistent with the Cambodia’s National Smart City Development Framework, which states that smart cities ensure quality of life, economic growth, sustainable development, resilience, environment, and inclusiveness.

The first pillar is “FOR”, which stands “for whom”, emphasizing the objective of realizing a smart city for citizens and tourists. Inclusiveness is also important, and therefore, the perspective of considering vulnerable social groups, including gender, should be incorporated.

The second is the important value “WITH”, emphasizing that the culture, nature, and history represented by the Angkor heritage site, which Siem Reap has preserved from the past to the present, should be properly inherited for the future while accepting advanced technology.

The third is “BY”, which emphasizes that it is not only technology-oriented approaches but also a solution-oriented approach of how to solve urban issues is important. There are many technologies available today, and it is important to select the appropriate technology for each sector and local context, and to use it Smartly.

The fourth is “TOWARD”, which emphasizes that the goal is not the introduction of smart technology, but the realization of a sustainable society, a comfortable urban environment, and tourism infrastructure for citizens and tourists.

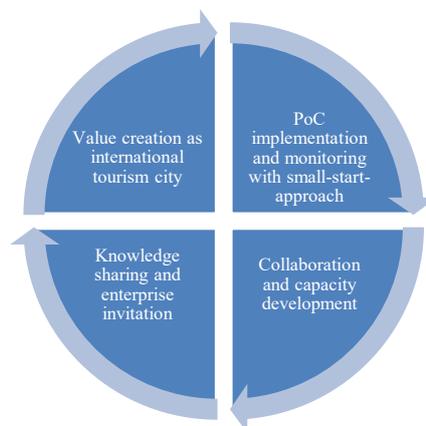
1.3 Smart City Approach

According to the Cambodia Digital Economy and Society Policy Framework 2021-2035, smart city in Cambodia is defined as “cities equipped with and using digital and state-of-the-art technology to increase operational capacity throughout the city by sharing information with the public and improve the quality of public services as well as social welfare”. On the other hand, approaches for smart city implementation vary from city to city, given geographic, economic, social, and cultural factors.

The Smart City Approach in Siem Reap identified key sectors and conducted analysis on sectoral issues. A vision for the future was then clarified, and a roadmap has been developed.



In the implementation phase of the roadmap, the analysis of existing information and the transformation of the necessary assets into data is the first step and the foundation of the smart city initiative. The establishment of the system and the implementation of actions for each sector will start from the possible areas and be refined by reflecting the lessons learned. Through the implementation of actions, collaboration with industry, government, academia, and the community will be accelerated, and the results of the actions will be shared with domestic and international society. The sharing of information will encourage new entrants, including private businesses who will be able to create new value for Siem Reap as an international tourist city. Through these efforts, smart city initiatives will ensure sustainable development, ultimately achieving the Sustainable Development Goals (SDGs) and improving the well-being of the people of Siem Reap.



Chapter 2 Relevant Plans and Project

2.1 The Tourism Development Master Plan Siem Reap 2021-2035

2.1.1 The long-term tourism vision for 2021-2035

The Tourism Development Master Plan Siem Reap 2021-2035 was developed by the Ministry of Tourism in 2021. The long-term vision of the master plan is identified as “Siem Reap will become an attractive international tourist destination with quality, offers a variety of tourism resources, with global recognition of cultural heritage and natural asset conservation and protection, and attract tourist to visit again and again, linked with the local economic development, poverty alleviation, and climate change responses”. The vision of the Siem Reap Smart City Roadmap has been developed based on the long-term vision.

2.1.2 Tourism Demand Frame

According to the Tourism Development Master Plan Siem Reap 2021-2035, the annual number of visitors to Siem Reap Province is expected to increase from about 4.26 million in 2019 to about 18.41 million in 2035. In 2020, the number of tourists decreased to about 1.1 million due to COVID-19, but according to the Master Plan for Tourism Development in Siem Reap (2021-2035), it is expected to increase after 2021.

Tourism related Numbers Forecast (until 2035)

Item		2019	2023	2028	2030	2035
Annual Visitor Arrival	Total	4,262,306	3,359,585	7,772,446	10,536,489	18,413,140
	Foreigner	2,205,697	1,326,319	3,682,821	5,127,960	7,534,656
	Domestic	2,056,609	2,033,266	4,089,625	5,408,529	10,878,484
Average Length of Stay	Foreigner	2.8	2.8	4.5	4.5	4.5
	Domestic	1.0	2.5	2.5	2.5	2.5

Source: Tourism Development Master Plan Siem Reap 2021-2035 ¹.

2.2 38 Road Construction Project

In accordance with the Siem Reap Tourism Development Master Plan, the Royal Government of Cambodia implemented the Siem Reap 38 Road Construction Project in 2021 with a national budget of \$149.21 million. The project includes the construction of 38 roads totaling more than 106 km and 250 km of drainage and sewerage systems. In addition, 200 CCTV cameras, 20 traffic signals, 5,300 streetlights and 3,125 trees were installed.

2.3 Land Use Master Plan of Siem Reap City 2035

The first edition of the Land Use Master Plan of Siem Reap City 2035 was formulated in 2018. The plan projected the population of Siem Reap City in 2035 to be 440,099 based on the results of the nationwide census.

¹ According to the Tourism Development Master Plan Siem Reap 2021-2035, assumptions for the change in the number of visitors for scenario 1 (with implementation of the actions listed in the master plan) are as follows:

Foreigner

2020: 78% decrease from the previous year due to COVID-19

2021 ~ 2022: 45% increase per year as recovery period

2023 ~ 2025: 30% increase per year as recovery period

2026 ~ 2030: 18% increase per year

2031-3035: 5% increase per year

Domestic

2020: 55% decrease from the previous year due to COVID-19

2021 ~ 2023: 30% increase per year as recovery period

2024 ~ 2035: 15% increase per year

On the other hand, the labor force by sector in 2008 and 2035 is estimated as shown below. Among all types of industries, the labor force for the secondary industry, which includes handicrafts, is expected to increase the most drastically.

Table 2.1: Labor Force by Sector of Siem Reap City in 2008 and 2035

Type of Industry	Labor Force in 2008	Labor Force in 2035	Increase Ratio
Primary	21,153	34,328	+62%
Secondary	16,599	76,894	+363%
Tertiary	63,459	117,630	+85%

Source: Land Use Master Plan of Siem Reap City 2035²

2.4 National Smart City Roadmap

A national smart city roadmap, namely “Roadmap to Define the Concept of Smart City Development for Sub-national Administration”, will be developed in 2023 to define a framework for smart city policy, initiated by the Ministry of Interior. The Siem Reap Smart City Roadmap will also be aligned with the direction of national smart city development. In the national smart city roadmap, the enable factors are expected to be defined as “Institution and Policy, Technology and Innovation, Business and Finance, Digital Skill and Capacity, Planning and Coordination”, and the Siem Reap Smart City Roadmap covers all the enable factors. On top of that, the purpose of the national smart city development is to ensure the better quality of life, economic growth, sustainable development, resilience and environment and inclusiveness. The philosophy is consistent with Siem Reap Smart City Roadmap.

2.5 Other Main Relevant Plans

The table below summarizes the major relevant plans/laws/subdecrees and the contents to be incorporated for Siem Reap Smart City Roadmap.

Table 2.2 Other Main Relevant Plans

Law / Subdecree (Main organization)	Year	Contents to be incorporated
Laws and Regulations on Zoning and Environmental Protection in Siem Reap Angkor Archaeological Area (Royal Government of Cambodia)	1994	The Angkor Archaeological area and other environmental conservation areas are designated as areas to be preserved, and are divided into five zones, each with its own set of regulations.
Law on Administrative Management of Commune and Sangkat Law on Administrative Management of Capital, Provinces, Municipalities, Districts and Khans (Royal Government of Cambodia)	2001 2008	Defines the scope of work for each province, district, and commune.
Sustainable Development Goals (United Nations)	2015	Goal 11 (Making cities and settlements more environmentally safe, resilient to climate change and sustainable) and Cambodia focusing on per capita pollution reduction in cities, focusing on air quality and waste management in cities and other areas
Nationally Determined Contributions (NDCs) (Set out in the Paris Agreement)	2015	Cambodia set a mitigation target of 41.7% by 2030 compared to business as usual.
Rectangular Strategy, Phase 4 of the Royal Government, 6th Legislature of the National Assembly (Royal Government of Cambodia)	2018	Vision for 2030, Cambodia will leave the low middle income country to the high middle-income country and the vision for 2050 Cambodia will be A high-income country.

² The prediction was calculated before the COVID-19 epidemic. This prediction was calculated based on the number of labor force per sector in the 1998 National Census and the 2008 National Census. In the prediction, the labor force of the secondary industry is significantly increasing compared to other industries because there was a significant increase of labor force of the secondary industry between 1998 and 2008. However, in the land use masterplan, manufacturing and industrial land use is not allocated enough to accommodate the increase of secondary industry labor force calculated, and this prediction is not to be realized. In this survey, this increase of labor force is not considered as a precondition, but just as a reference.

Subdecree on construction permits “Sub-Decree No. 224” (Royal Government of Cambodia)	2020	Stipulates the procedures and approval entities for construction permits and approvals according to the scale of construction.
Cambodia Digital Economy and Social Policy Framework 2021-2035 (Royal Government of Cambodia)	2021	The policy describes the definition of the “Smart City”. It highlights the use of technology to improve growth, productivity and efficiency in various sectors of the economy and society through digital transformation. It highlights the importance of building a digital society with access to secure digital services and preserving national identity and culture.
Long-Term Strategy for Carbon Neutrality (Ministry of Environment)	2021	Climate change mitigation measures in agriculture, forestry, energy, transportation, industry, and waste sectors
Law on Investment in the Kingdom of Cambodia (Royal Government of Cambodia)	2021	Investment law indicates the licensing entity according to the investment amount and stipulates incentives for investment in 18 priority fields.
Digital Government of Cambodia Policy 2022-2035 (Ministry of Post and Telecommunications)	2022	The policy focuses on the modernization and integration of the government management system and public services to promote good governance and public services to meet the needs of the people with justice, equity, transparency, accountability, and environment.

Chapter 3 Issues

The roadmap covers administrative operations, tourism, mobility, security, and environmental management. These sectors were identified and agreed upon through discussion with Siem Reap Provincial Administration and related officials.

3.1 Issues Related to General Administrative Operation

Referring to the current condition of the general administrative operation in Siem Reap, the major issues are listed as below. The profiles of the priority projects in Chapter 8 of this roadmap were developed based on the issues shown the list.

Table: 3.1 General Administrative Operation Issues in Siem Reap (as of 2021)

Sector	Current Condition	Major Issue
Administrative Organizations	<ul style="list-style-type: none"> As the current (the year of 2021) Smart City Committee does not include the APSARA National Authority, DoT, and the provincial police, it is difficult for the committee to deal with multi-sectoral issues, especially those related to tourism. The Smart City Committee does not yet have detailed discussions on specific projects related to the Smart City. The committee has yet to play its role in driving projects forward. Officers of the Siem Reap Provincial Administration are not able to handle works that require technical knowledge 	1. Need for administrative organization structure for cross-sectoral collaboration
	<ul style="list-style-type: none"> The Siem Reap Provincial Administration does not have an organizational task force to promote smart city related activities. 	2. Need for a Smart City Promotion Division
	<ul style="list-style-type: none"> There has been no discussion between private companies and the Smart City Committee. There is no fundamental basis for the public sector and the private sector to collaborate on multi-sectoral projects or projects in new disciplines. Academic research or academic projects with active public sector participation are nearly absence in Siem Reap. 	3. Need for an organizational basis for multi-stakeholder collaboration
Legal Systems and Business Support	<ul style="list-style-type: none"> Although there are various laws to refer to and legal procedures to follow in terms of business operation, information regarding these are not collected. This makes private business hesitant to launch its business in Siem Reap. Procedures for launching multi-sectoral business or businesses in new disciplines are not clear, making private businesses hesitant to launch their businesses in Siem Reap. 	4. Need to clarify and ease the complex legal procedures
	<ul style="list-style-type: none"> There has been no discussion between private companies and the Smart City Committee. The public sector has not been successful in inviting public initiatives to provide public services as part of the private companies' business. 	5. Need for active promotion of private smart city business
Data Management	<ul style="list-style-type: none"> Lack of software Insufficient infrastructure for data storing and sharing 	6. Need for improvement of hardware and ICT circumstances
	<ul style="list-style-type: none"> Data storage formats are disparate among departments. Individual government officials lack experience with data, and their data management skills are inadequate. 	7. Need for multi-sectoral data sharing and utilization
	<ul style="list-style-type: none"> Decision making process of information disclosure is redundant, leading to slow information disclosure. 	8. Need for open data system, data security, and regulations

Source: Smart City Project Team

Note: Identification of Issues is based on the survey conducted in 2020.

3.2 Issues Related to Target Sectors

Referring to the current condition of target sectors in Siem Reap, the related issues are listed below.

Table 3.2: Issues of the Target Sectors in Siem Reap (as of 2021)

Sector	Condition	Major Issue
Tourism	<ul style="list-style-type: none"> Although Angkor Archaeological Site has been visited by huge number of visitors both international and domestic, other resources remain unknown or even undiscovered. This strong but limited image results to one time visit to the site. Tourist information is not centralized, making it difficult for individuals to consider combinations of tourist services that suit their preferences. As a result, the city has not become an attractive tourist destination for individual tourists. Failure to capture demand from non-tourist visitors, such as MICE. 	9. Need to strengthen promotion as a tourist city
	<ul style="list-style-type: none"> Mobility available to tourists is limited to tourism buses, tuk-tuk, and rental cars. In particular, there is a lack of short-distance mobility, which undermines the convenience of tourist behavior. Since information of various transportation is not centralized, tourists are not able to compare and select multiple transportation on site. It is not possible to optimize the choice of transportation for individual tourists according to the situation. In many cases, only cash payment is accepted. It is not convenient for purchasing. 	10. Need to improve the convenience of tourist behavior
	<ul style="list-style-type: none"> In the heritage area, additional information (history, etc.) to improve the attractiveness is not visually provided. Tourism services with added value (educational aspects of tourism services, community-based tourism, etc.) have not been sufficiently developed. Although some parts of the city, such as the streetscape of Pub Street, have potential as tourist attractions, they are not fully utilized. 	11. Need to improve the attractiveness of local experiences at tourist attractions
Mobility	<ul style="list-style-type: none"> Traffic congestion has been caused and the risk of traffic accident has been increased by inappropriate traffic signals and intersection configuration. Comfortability and safety of pedestrians have been impaired by on-street parking on sidewalks and roadside. 	12. Need for comfort against traffic congestion and on-street parking
	<ul style="list-style-type: none"> Road maintenance plan is existing but the budget for the maintenance is not enough. Road maintenance system considering life cycle cost is not practiced because adequate road management system is not introduced. 	13. Need for optimized road maintenance
	<ul style="list-style-type: none"> A lot of gas emission from old vehicles has caused air pollution and decreased comfortability of tourists and QOL of residents. 	14. Need for clean air and environmentally friendly mobility
Security	<ul style="list-style-type: none"> Crime rate is relatively low (compared to Phnom Penh), but international tourists are recommended to take sensible precautions against crime. Upgrade of crime prevention and crime detection is needed. Upgrade of prevention and detection of dangerous driving is needed. 	15. Need for more safety against risks of traffic accidents and crimes
	<ul style="list-style-type: none"> Facilities and systems for early fire detection and initial fire extinguishing by local residents and workers prior to the firefighting by the public sector is needed. Upgrade of warning system to citizens and tourists is needed. 	16. Need for more safety against disasters (fire, flood, etc.)
Waste	<ul style="list-style-type: none"> Citizens' and tourists' behavior towards garbage disposal and wastewater is damaging the environment. [Solid waste, Sewage] 	17. Need for enlightenment towards environmentally-friendly actions
	<ul style="list-style-type: none"> Responsibility demarcation among related organizations is unclear. As a result, private companies' waste management operation (including basic data, such as collected garbage amount and number of contracted households) is not fully monitored by the public sector. [Solid waste] The capacity of the public sector to manage and control waste management operation is lacking. [Solid waste] The toll collection system is not efficiently established, and the operation is not sustainable. [Solid waste, Sewage] 	18. Need for enforcement of the public initiative
	<ul style="list-style-type: none"> The environment of the landfill is unsanitary. [Solid waste] The capacity of the wastewater treatment plant is not enough for future wastewater. [Sewage] 	19. Need for engineering of infrastructure

3.3 Summary of Issues in Siem Reap

The 19 main issues of the general administration and the sectors in Siem Reap are listed as blow.



19 Major Issues

Figure 3.1: 19 Major Issues in Siem Reap

Chapter 4 Strategies

The strategic approach is proposed to achieve the vision of Siem Reap Smart. The strategic approach consists of the administrative approach and the sectoral approach. The chapter describes the strategic approach with the detailed implementation structure, methodology and the overall picture of the roadmap.

4.1 The Administrative Approach

The Administrative Approach is set out basic policies for refining the administrative structure to be implemented by the public. This approach is divided into three pillars. The "Administrative Organizations" pillar aims to strengthen the administrative organization, which plays the main role in the realization of the smart city and enhance the interaction among stakeholders for open innovation. The "Legal Systems and Business Support" pillar aims to improve the business environment in Siem Reap and clarify the role of the public in supporting smart city related businesses. The "Data Management" pillar lists measures to promote the collection and use of data, which is a fundamental aspect of the smart city concept.

4.2 The Sectoral Approach

The Sectoral Approach targets specific sectors, namely "Smart Tourism", "Smart Mobility", "Smart Security and Safety", and "Smart Waste Management". These four sectors were identified in the urban issues analysis, however, other sectors such as education and healthcare would be added to the roadmap in the future as needed. As with the Administrative Approach, Sectoral Approach is also define the basic policies, policy directions and short-term actions.

4.3 Implementation Structure

To promote the Siem Reap Smart City Roadmap, the roles and collaboration mechanism among four stakeholders including private sector (industry), public (government), academic institutions (universities and institutes), and citizens and tourists (communities) are described below.

- Private Sectors: are main actors to implement actions and projects of smart city as service providers. They contribute to urban service improvement and sustainable development by operating business for profit.
- Public: are facilitators of overall process including policy and legal formulation, planning, project implementation. They establish and operate a smart city platform for collaboration among stakeholders.
- Academic institutes: promote research and development of smart technologies, project implementation and monitoring in collaboration with private sectors, and collaborate with domestic and international academic institutions.
- Communities: are beneficiaries of urban environment improvement, as well as potential service providers for urban environment management and area management.

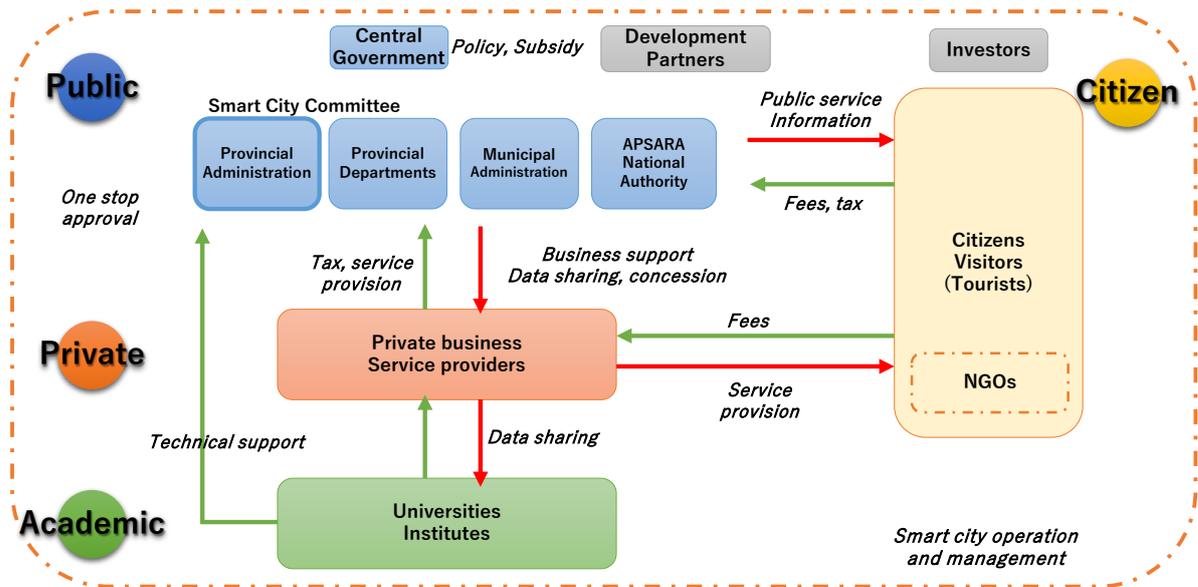


Figure 4.1: Collaboration Mechanism among Stakeholders

4.4 Methodology

The basis of this strategy is to extract a variety of information as data. An ecosystem will then be established to implement a smart city management approach, and sector approach initiatives will be implemented. These initiatives are steps to achieve the goals of SIEM REAP SMART, which includes wellbeing, tourist satisfaction, and business promotion.

On the other hand, since the operational and sector strategies will be compounded and related during the course of implementation, it will be necessary to reflect the learning from each into a separate category to enhance the content.

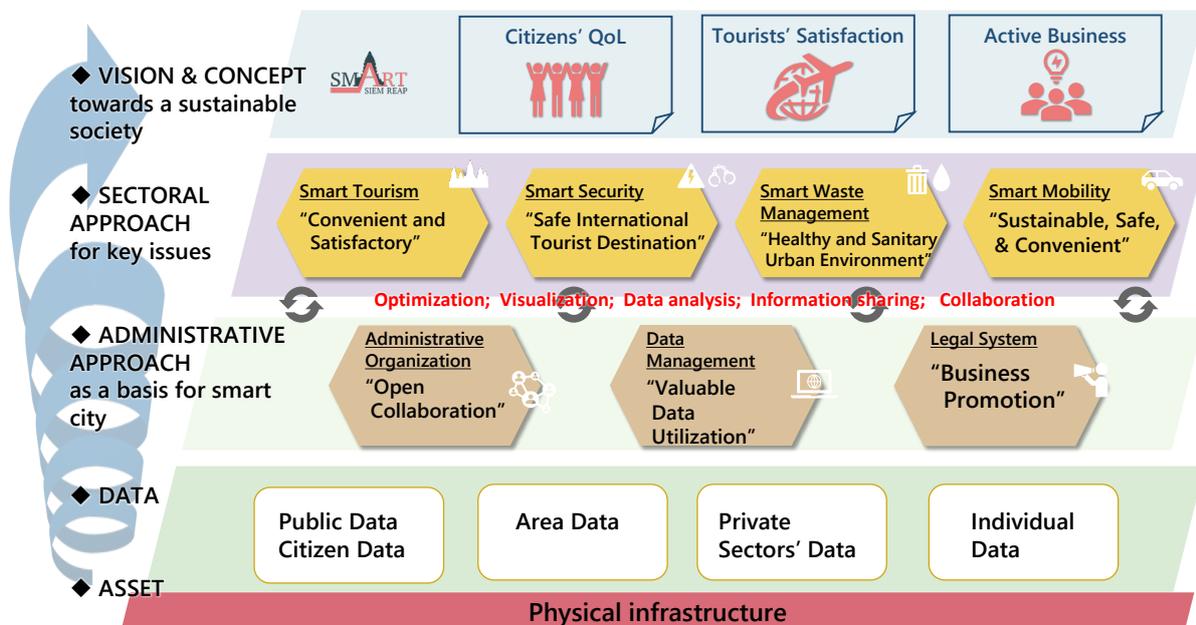


Figure 4.2: Linkage between Data, Vision, and the Approaches

4.5 The Overall Picture Roadmap

The figure below shows the overall roadmap to realize the vision and concept of SIEM REAP SMART.

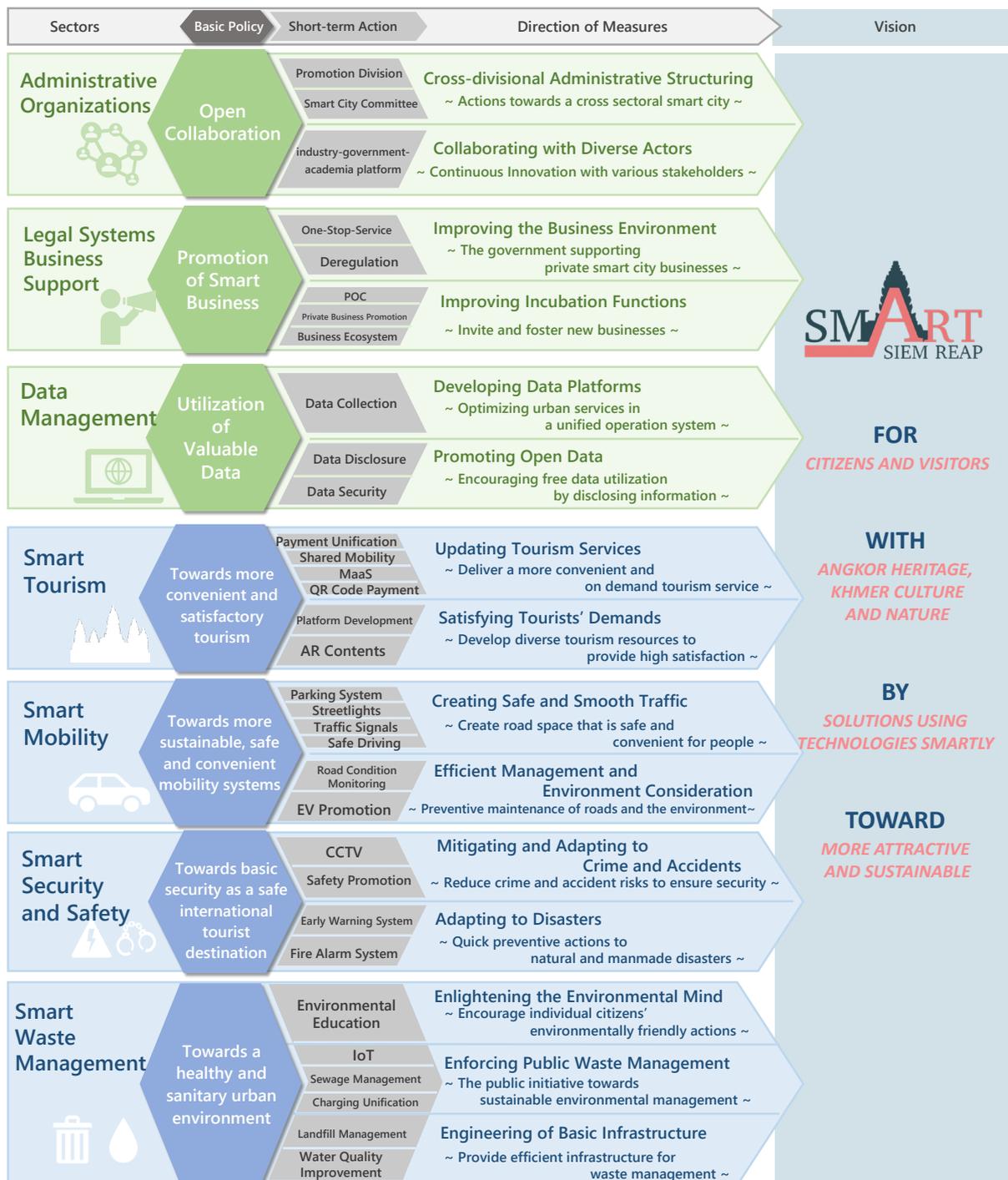


Figure 4.3: The Overall Roadmap for SIEM REAM SMART³

³ This roadmap is based on the four sectors that are considered important as a result of the analysis of urban issues, however, education, healthcare, and other sectors would be added to the roadmap in the future, as needed.

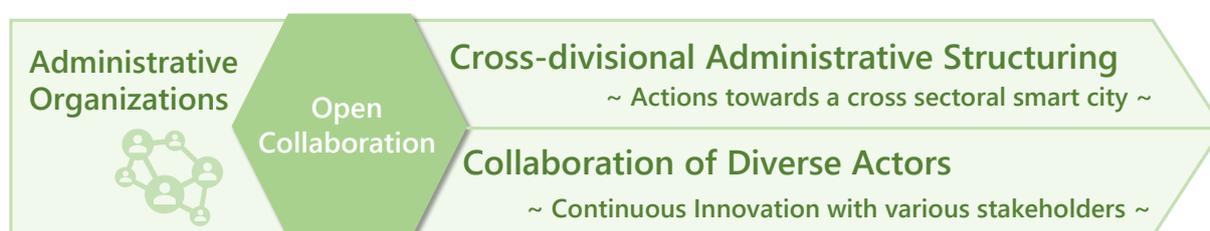
Chapter 5 Administrative Approach: Basic Policies and Directions of Measures

5.1 Basic Policies and Directions of Measures

The administrative approach consists of three pillars, namely: “Administrative Organizations”, “Legal Systems and Business Support”, and “Data Management”. These will be a fundamental basis for the implementation of the sectoral approach and the realization of the smart city. It shall be promoted by government organizations, while actively participated by academic and private entities.

5.2 Administrative Organizations

The basic approach for administrative organizations is “Open Collaboration”. The two main directions of measures are “cross-divisional administrative structuring” and “collaborating with diverse actors”.



Measure of “Administrative Organizations” aims to create an organizational structure that facilitates interaction across industry, government, academia, and the community, as well as information sharing and collaboration across sector departments within the local government. In order to promote interaction among stakeholders in the industry, government, academia, and the community, it is necessary to create opportunities and venues where they can gather in an industry-government-academia platform for the realization of the vision, exchange information and opinions on the roadmap and business development. Through such opportunities and venues, it is expected that open innovation will be induced. Within the government, in order to strengthen the organizational structure of the government that facilitates information sharing and collaboration across sector departments, it is required to strengthen the cross-departmental Smart City Committee within the government and establish a promotion division that will play a central role.

The correspondence between issues, direction of measures, and short-term actions are shown below.

Table 5.1: Issues, Direction of Measures, and Short-term Actions in the Administrative Organizations Pillar

Issues	Direction of Measures	Short-term Actions
1. Need for administrative organization structures for cross-sectoral collaboration <i>→The Smart City Committee does not include major organizations such as APSARA, DoT, and the provincial police. →There are no individual project-based discussions in the Smart City Committee yet.</i>	Cross-divisional Administrative Structuring ~Actions towards a cross sectoral smart city~	<ul style="list-style-type: none"> • Enhancement and Operation of the Smart City Committee • New Establishment of the Smart City Promotion Division

Issues	Direction of Measures	Short-term Actions
2. Need for a Smart City Promotion Division <i>→The provincial administration does not have the function to promote smart city-related projects</i>		
3. Need for an organizational basis for multi-stakeholder collaboration <i>→There are no discussions between the Smart City Committee and private business operators yet.</i> <i>→There are no proactive collaboration between the public sector and the academic sector yet.</i>	Collaborating with Diverse Actors ~Continuous Innovation with various stakeholders~	<ul style="list-style-type: none"> Formulation and Operation of the Private-Public-Academic-Citizen Platform

Source: JICA Survey Team

5.3 Legal Systems and Business Support

The basic approach for legal systems and business support is “**Promotion of Smart Business**”. The two main directions of measures are “**improving the business environment**” and “**improving incubation functions**”.



Smart business or smart city business is broadly defined as multi-sectoral business, new disciplines, or businesses that use data as a commodity. In the area of legal systems and business support, the public sector is required to promote business support for private businesses in order to promote and support the creation of new smart businesses related to smart technologies. The creation of a start-up ecosystem for private businesses will be the key to this. In addition, it is necessary to establish a one-stop service contact point within the government and to deregulate the system in order to facilitate private sector business. In addition, the promotion of Proof of Concept (PoC) is also an important approach, and it will be effective to create opportunities and places where PoC can be easily carried out. In order to appeal to residents and promote their understanding, priority areas that can serve as showcases, such as pub streets and other downtown shopping areas, may be established.

The correspondence between issues, direction of measures, and short-term actions are shown below.

Table 5.2: Issues, Direction of Measures, and Short-term Actions in the Legal Systems and Business Support Pillar

Issues	Direction of Measures	Short-term Actions
4. Need to clarify and ease the complex legal procedures <i>→Information on laws and regulations are not offered in a single directory.</i> <i>→Legal procedures for projects in new disciplines are unclear.</i>	Improving the Business Environment ~The government supporting private smart city businesses~	<ul style="list-style-type: none"> Improvement of Business Operation Environment for Private Companies

Issues	Direction of Measures	Short-term Actions
<p>4. Need for active promotion of private smart city business</p> <p>→The public sector has not been able to proactively attract private businesses that provide urban services that cannot be covered by public projects.</p>	<p>Improving Incubation Functions ~Invite and foster new businesses~</p>	<ul style="list-style-type: none"> • Incubation of Private Businesses for Public Services

Source: JICA Survey Team

It is necessary to take steps to strengthen the capacity in stages, such as building an organizational structure, improving the system, and verifying and monitoring through demonstration experiments, through the promotion of individual projects.

Table 5.3: Action Plan for Capacity Development

Step	Basic Policy	Measures to be Implemented
First Step	Promote project implementation in the present organizational mechanism	<ul style="list-style-type: none"> • Assignment of Smart City Promotion Division from a present department/ division of the provincial government and establish one-stop service for project approval • Project information sharing and approval support for large-scale projects in the existing Smart City Committee
Second Step	Establish the platform led by the Smart City Committee and to promote public revenues through smart technologies by private sectors and data platform	<ul style="list-style-type: none"> • Promotion of private investment through platform activities • Establishment of smart city subsidy system by central and provincial governments • Establishment of tourism development fund (private funds, crowdfunding, fundraising from tourists, etc.) • Legal system development for realizing a smart city
Third step	Establish the organization for smart city operation and area management to monetize the data platform	<ul style="list-style-type: none"> • Establishment of Special Purpose Companies (SPCs) and/or Special Purpose Vehicles (SPVs) by private sectors and community organizations • Collaboration between public sector and SPC/ SPV for the data platform

Source: JICA Survey Team

5.4 Data Management

The basic approach for data management is “Utilization of Valuable Data”. The two main directions of measures are “developing data platforms” and “promoting open data”.



In data management, it is important to build a system to collect and share data across sectors and to multiple stakeholders in order to induce innovation and to create new and improve urban services. To this end, it is necessary to build a platform for centrally managing the data extracted from various projects, a system for disclosing data while taking privacy into consideration, and beyond that, efforts to build a data platform.

The correspondence between issues, direction of measures, and short-term actions are shown below.

Table 5.4: Issues, Direction of Measures, and Short-term Actions in the Data Management Pillar

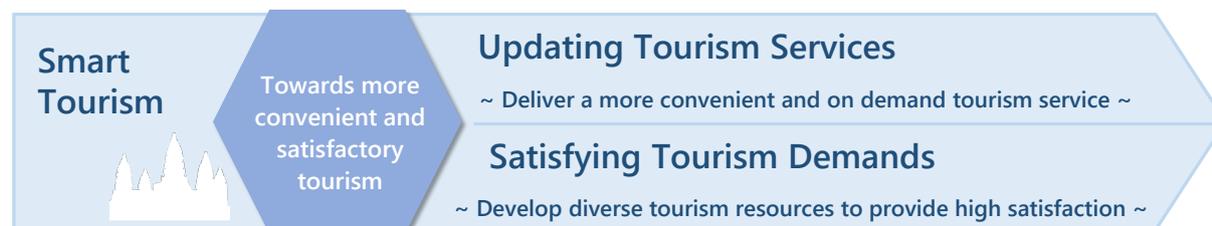
Issues	Direction of Measures	Short-term Actions
6. Need for improvement of hardware and ICT circumstances →Infrastructure for data storing and sharing is inefficient.	Developing data platforms ~Optimizing urban services in a unified operation system~	• Integrated Data Collection and Analysis (D-01)
7. Need for multi-sectoral data sharing and utilizing →Data storage format is inefficient. →Experience of government officers is lacking.		• Integrated Data Collection and Analysis (D-01)
8. Need for open data system, data security, and regulations →Decision making process for information disclosure is redundant.	Promoting Open Data ~Encouraging accessible data utilization by disclosing information~	• Data Dissemination to Relevant Stakeholders (D-02)

Source: JICA Survey Team

Chapter 6 Sectoral Approach: Basic Policies and Directions of Measures

6.1 Smart Tourism

The basic policy for smart tourism is “Towards more convenient and satisfactory tourism”. The two main directions of measures are “updating tourism services” and “satisfying tourism demands”.



Although Siem Reap is well known as a gateway town to the world heritage site of Angkor and has been visited by a huge number of visitors both international and national however, despite its wide variety of natural, cultural, human interaction, and shopping attractions, other than the heritage site, it is generally unknown to travelers.. This strong but limited image results to one time visit to the site. In order to overcome this fixed image, creating other/diversified attractiveness is needed at first. In order for Siem Reap to continue to welcome a large number of tourists in the future, it needs to become an attractive and comfortable tourist destination not only for group tourists but also for individual tourists. To do so, individuals need to be able to easily access the tourism resources that are best for them and the means of transportation to them. It is also essential that Siem Reap keeps attractiveness and comfortability for local people. To do so, a structure where not only tourism-related workers but also other sector workers benefit from the tourism sector development is expected. To improve the convenience of tourists, the integrated platform (E-tourism platform) will be used to consistently obtain information and make decisions for tourists involved in a series of tourism activities, from promotion to city transportation and local tourism experiences.

The correspondence between issues, direction of measures, and short-term actions are shown below.

Table 6.1: Issues, Direction of Measures, and Short-term Actions in the Smart Tourism Pillar

Issues	Direction of Measures	Short-term Actions
10. Need to improve the convenience of tourist behavior <i>→Mobility services are not provided on demand. →Payment is often only through cash.</i>	Updating Tourism Services ~Deliver a more convenient and on demand tourism service~	<ul style="list-style-type: none"> • Centralized Reservation and Payment System (T-02) • Shared Mobility Development (T-03) • MaaS Introduction (T-04) • Contactless Payment Development with QR Codes (T-05)
9. Need to strengthen promotion as a tourist city 11. Improving the attractiveness of local experiences at tourist attractions <i>→Tourism services are unable to target according to individual preferences. →Digital technology is not fully utilized to add on value to onsite tourism</i>	Satisfying Tourists' Demands ~Deliver diverse tourism resources to provide high satisfaction~	<ul style="list-style-type: none"> • Tourism Promotion Platform Development (T-01) • Enhancement of Local Tourism Experience with Virtual Contents (T-06)

Source: JICA Survey Team

6.2 Smart Mobility

The basic approach for smart mobility is “Towards more sustainable, safe and convenient mobility systems”. The two main directions of measures are “creating safe and smooth traffic” and “efficient management and environment consideration”.



In smart mobility, it is important to improve in the three aspects of convenience, safety, and sustainability, in order to provide a high-level mobility system for citizens and tourists. This requires improvements in mobility such as transportation systems, road maintenance, and vehicles, including parking management systems and the introduction of electric vehicles.

The correspondence between issues, direction of measures, and short-term actions are shown below.

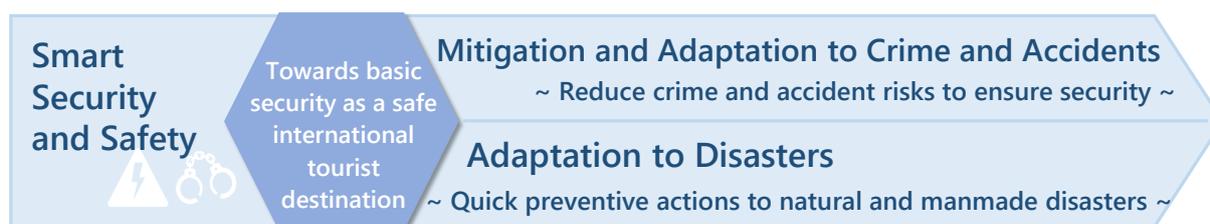
Table 6.2: Issues, Direction of Measures, and Short-term Actions in the Smart Mobility Pillar

Issues	Direction of Measures	Short-term Actions
12. Need for comfort against traffic congestion and on-street parking <i>→Traffic congestion and accidents occur due to poor design of intersections and traffic signals. →The road is not convenient for pedestrians due to car parking on roads.</i>	Creating safe and Smooth Traffic ~Create road space that is safe and convenient for people~	<ul style="list-style-type: none"> • Official Parking System Introduction (M-01) • Street Lighting Improvement (M-03) • Traffic Signal System Improvement (M-04) • Traffic Safety Management Improvement (M-05)
13. Need for optimized road maintenance <i>→Road infrastructure management is not optimized.</i>	Efficient Management and Environment Consideration ~Preventive maintenance of roads and the environment~	<ul style="list-style-type: none"> • Road Condition Monitoring (M-02)
14. Need for clean air and environmentally friendly mobility <i>→The gas emission from vehicles is damaging the air environment.</i>		<ul style="list-style-type: none"> • Promotion of Introduction of EV's (M-06)

Source: JICA Survey Team

6.3 Smart Security and Safety

The basic approach for smart security and safety is “Towards basic security as a safe international tourist destination”. The two main directions of measures are “mitigating and adapting to crime and accidents” and “adapting to disasters”.



Siem Reap is satisfying basic security needs so as that its security is rated relatively high by foreign nations such as the United States and Japan. However, as an international tourism city inviting tourists from around the globe, its security standards are not enough, and as a result, tourists are forced to exercise precautions in order to defend themselves and their belongings. Siem Reap is required to enhance basic security as a safe international tourism city, so that tourists can feel safe while they are visiting the city.

The correspondence between issues, direction of measures, and short-term actions are shown below. These projects can be broadly divided into three categories: crime prevention, disaster prevention, and information, and will contribute to improving the satisfaction of both citizens and tourists.

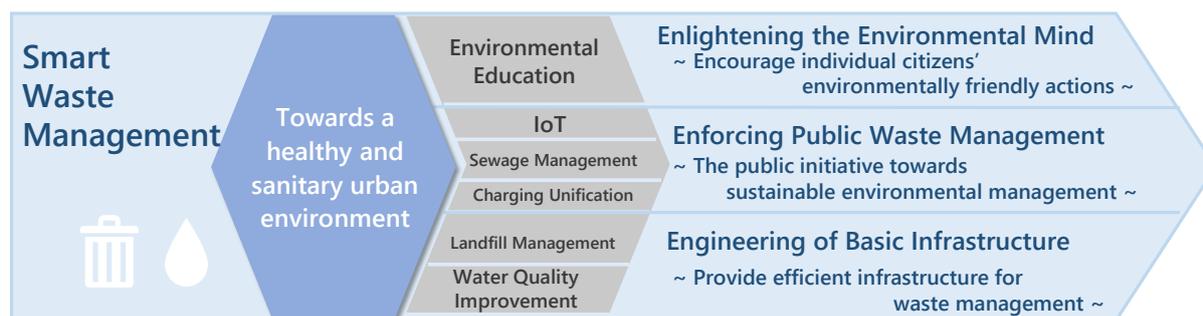
Table 6.3: Issues, Direction of Measures, and Short-term Actions in the Smart Security and Safety Pillar

Issues	Direction of Measures	Short-term Actions
15. Need for more safety against risks of traffic accidents and crimes <i>→Quick detection of crime and accidents is needed.</i>	Mitigating and Adapting to Crime and Accidents ~Reduce crime and accident risks to ensure security~	<ul style="list-style-type: none"> • CCTV System Introduction (S-01) • Public Relations Improvement for Safety (S-04)
16. Need for more safety against disasters (fire, flood, etc.) <i>→Quick fire detection for initial firefighting is lacking.</i> <i>→Warning for flooding is not efficiently transmitted to citizens and tourists.</i>	Adapting to Disasters ~Quick preventive actions to natural and manmade disasters~	<ul style="list-style-type: none"> • Flood Warning System Development (S-02) • Fire Alarm System Installation (S-03)

Source: JICA Survey Team

6.4 Smart Waste Management

The basic approach for smart waste management is “Towards a healthy and sanitary urban environment”. The three main directions of measures are “enlightening the environmental mind”, “enforcing public waste management”, and “engineering of basic infrastructure”.



In smart waste management, the public sector needs to take the initiative to control the necessary projects and develop the infrastructure, while citizens and tourists also need to take appropriate environmental actions in order to achieve an environmentally sustainable future. Especially, the enlightenment is an important solution to be disseminated to the citizens. It aims to determine the citizens’ and students’ attitudes toward waste management through campaigns by the broadcast media and public consultation, to examine the extent to which the broadcast media or school contribute towards campaigns on waste management, to find out how the citizens and school students in Siem Reap perceive the important roles in waste management, and to respond to environmental attitude through behavior change communication.

The correspondence between issues, direction of measures, and short-term actions are shown below.

Table 6.4: Issues, Direction of Measures, and Short-term Actions in the Smart Waste Management Pillar

Issues	Direction of Measures	Short-term Actions
17. Need for enlightenment towards environmentally friendly actions <i>→Citizens' and tourists' behavior towards garbage disposal and wastewater is damaging the environment.</i>	Enlightening the Environmental Mind ~Encourage individual citizens' environmentally friendly actions~	<ul style="list-style-type: none"> • Solid Waste Management System Improvement (W-01)
18. Need for enforcement of the public initiative <i>→The capacity of the public sector for waste management operation is lacking.</i> <i>→The toll collection system is not efficiently established.</i>	Enforcing Public Waste Management ~The public initiative towards sustainable environmental management~	<ul style="list-style-type: none"> • IoT Installation for Garbage Collection (W-02) • Wastewater Facility System Improvement (W-05) • Public Utilities Charging Unification (W-06)
19. Need for engineering of infrastructure <i>→The environment of the landfill is unsanitary.</i> <i>→The capacity of the wastewater treatment plant is not enough for future wastewater.</i>	Engineering of Basic Infrastructure ~Provide efficient infrastructure for waste management~	<ul style="list-style-type: none"> • Landfill Management (W-03) • Improving River Quality and River Use (W-04)

Source: JICA Survey Team

SIEM REAP SMART

Siem Reap Smart City Roadmap

Volume 2: Action Plan

Chapter 7 Implementation Measures

7.1 Enhancement and Operation of the Smart City Committee (SCC)

To implement the Smart City Roadmap, the missions and capacities of the existing Smart City Committee (SCC)⁴ shall be enhanced. The following actions will be taken:

- SCC will enhance its mission and tasks to implement the Smart City Road Map.
- To achieve the goals of tourism promotion and safety improvement, DoT and Provincial Police Headquarters will participate in the SCC.
- To manage and implement the projects in the Angkor Heritage Area, the APSARA National Authority and Angkor Enterprise will participate in the SCC. It will be further considered to establish the Working Group focusing on the heritage area, for which preservation issues are important as well as smart city development.
- The Siem Reap Provincial Administration will establish the “Smart City Promotion Division” as the main secretariat of SCC to be the front of public-private-academic collaboration platform.

The SCC will take a leading part to coordinate with the private sector, universities and institutions, and citizens to realize a smart city. To implement the pilot projects, a task force will be established with technical and financial supports from the line ministries. So, the smart city implementation mechanism including coordination among stakeholders and capacity development will be enhanced.

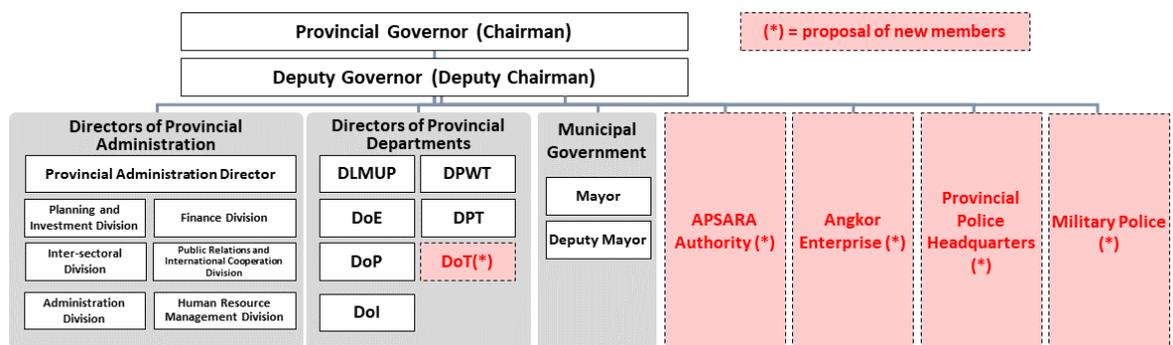


Figure 7.1: Proposal on the Enhancement of the Smart City Committee

7.2 New Establishment of the Smart City Promotion Division

The establishment of a “Smart City Promotion Division” is proposed, which will be the coordination division for private investors, and a coordination body of relevant governmental organizations. The major roles of the division are proposed as follows:

7.2.1 Expected Functions

- Assessment of projects based on the criteria for smart projects (e.g., compliance with roadmaps, SDGs, partnership of public, private and academic sector, technical and financial support, necessity of PoC, etc.)
- Consultation with private sectors
- Consolidation of necessary administrative procedure
- Selection of PoC (pilot projects) and support implementation
- Data sharing with private companies (excluding private information)

⁴ The SCC was formed in 2019 to coordinate the smart city initiative, chaired by the provincial governor with 14 members.

- Coordination with private companies to utilize data acquired by private companies for public purposes
- Business matching of private sectors (domestic, international)
- Coordination and applying for budgets for smart city related activities

7.2.2 Proposed Operation

The Smart City Promotion Division will be a division under the Siem Reap Provincial Administration. However, if this organizational structure change takes time through negotiation and inspection from MoI, the other divisions (such as the Planning and Investment Division) may cover its role in the initial stages of the implementation of the Smart City Roadmap.

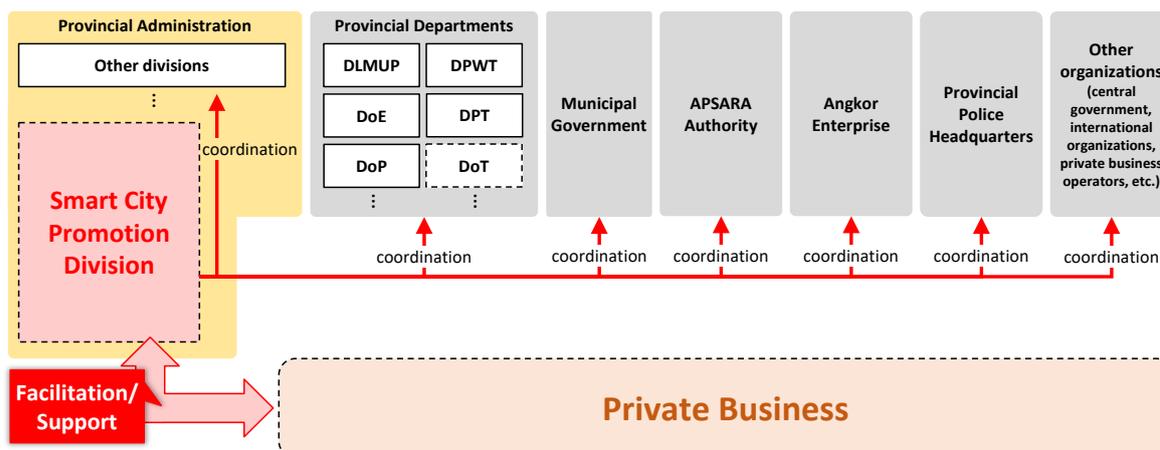


Figure 7.2: The relationship with the Smart City Promotion Division and Relevant Organizations

7.3 Industry-Academia-Government-Community Platform (Smart City Consortium)

The industry-academia-government-community platform (hereinafter refer to as “Smart City Consortium”) will be established to implement the Smart City Roadmap in Siem Reap Province by bringing together companies, universities/research institutes, Siem Reap Province/city government (Smart City Committee), community organizations, etc.

7.3.1 Expected Functions

- Promotion/priority support for smart city-related businesses: Provide financial and technical support/cooperation depending on each role, such as utilization of subsidies and activity funds by the central government and development partners, efficiency and simplification of business approval procedures by the central government, technology and funding by businesses, and technology and know-how by universities and research institutes.
- Information sharing/matching support: Supports companies, universities/research institutes, and government agencies to introduce organizations that can provide solutions and to expand successful model projects to other regions.
- Dissemination promotion activities in Japan and overseas: Introduce the efforts of pilot projects, disseminate information such as keynote speeches by experts, and share information by e-mail and online seminars for Smart City Consortium members.
- Report: Report their activities regularly to Smart city committee of Siem Reap

7.3.2 Operation

The Smart City Consortium will be built within the framework of the existing organizational structure in the short term. The Technical Working Group of Siem Reap Smart City, which is composed of government agencies, takes the lead, and the Smart City Promotion Division or temporary organizational

body for the preparation of the division manages various meetings as the secretariat by recruiting members of businesses, universities, research institutes, etc., holding subcommittees, and promoting participation in existing international conferences such as ASCN meetings, Conference of Japan-Cambodia Urban Development Platform, etc.

- Individual meeting: Prior to initiating the activities of the Smart City Consortium, a forum will be set up for discussion among the parties involved on the content of the activities. (The following plenary sessions and subcommittee settings will also be agreed upon at individual meetings.
- General meeting: It will be a place for understanding and consensus building among representatives of industry, academia, government, and the private sector. Decision-making shall be made by each institution and based on their respective procedures. The plenary meeting is held about once a year.
- Subcommittee meeting: To solve common problems, discuss solutions by theme and sector such as mobility, tourism, environment, security, and data management, and promote information sharing and joint projects. The subcommittee is held about once every three months, with the participation of government agencies that have jurisdiction over the sector, private businesses participating in the project, universities and research institutes, etc. Conduct technical discussions for approval of new businesses.

In the medium to long term, Special Purpose Companies (SPCs) and Special Purpose Vehicles (SPVs) will be established with the participation of multiple private businesses and citizen groups and will be responsible for the operation of data platform and area management for improving the urban environment. Part of the profits of various businesses and funds from companies and funds can be used as operation and management expenses.

7.4 Monitoring and Evaluation System

The International Organization for Standardization's ISO 37151, 37153 and other Framework have been developed as indicators for evaluating cities from a smart city perspective. These are considered to be universal indicators that can be applied to any city. However, the Smart City Roadmap for Siem Reap is currently specific to some sectors, including the tourism sector. Therefore, it is preferable to monitor and evaluate the progress of this roadmap independently, while referring to these existing indicators.

The following Key Goal Indicators (KGI) can be considered for monitoring the implementation of the roadmap.

Table 7.1: Draft Key Goal Indicators

Sector	Basic Policy	Key Goal Indicators
Administrative organizations	Open collaboration	Number of discussions related to Smart City Committee
Legal systems and business support	Promotion of smart business	New business permission related to smart city new project
Data management	Utilization of valuable data	Amount of utilized and disclosed data
Smart tourism	More convenient and satisfactory tourism	Number of tourists, number of repeaters, rate of tourist satisfaction
Smart mobility	More sustainable, safe, and convenient mobility systems	Number of traffic accidents, number of traffic jams, rate of EVs
Smart security	Basic security as a safe international tourist destination	Number of crimes, number of fatalities caused by fire, number of fatalities caused by natural disasters
Smart waste management	Healthy and sanitary urban environment	Turbidity of Siem Reap River, amount of solid waste

The KGIs shall be monitored and evaluated approximately every five years and shall be used as a reference when reviewing the roadmap. KIGs will also serve as reference information for the formulation of the next short-term actions.

While the KGIs are indicators to measure the degree of achievement of the basic policy, Key Performance Indicators (KPIs) are to measure the degree of achievement of the main actions of the priority projects listed in Chapter 8. The progress of the priority project will be monitored regularly.

7.5 Public relations and branding measures

7.5.1 Objective

For the promotion of smart city, awareness of smart city initiatives among a wide range of stakeholders and incorporation of diverse opinions are important. There is a need to harmonize the Smart City Roadmap with the movements of central government ministries and agencies and development partners. In addition, the method of publicizing the smart city initiatives should include a branding perspective that can improve the image of Siem Reap through the use of smart city and should not be limited to simply providing information. Strategic approaches to external communication and interaction methods will be important. The definition of "public relations" here is to promote understanding and empathy and build relationships with citizens, private companies, and government agencies through the smart city, while "branding" aims to improve Siem Reap's regional image and enhance the city's value through the smart city initiatives. The objectives of the PR and branding strategy shall be set as follows.

- I. Roadmap dissemination:
 - Publicize the importance of the Smart City Roadmap and increase the feasibility of smart city implementation (build momentum)
- II. Knowledge sharing:
 - To increase the presence of Siem Reap as a smart city and to attract knowledge that contributes to the Siem Reap smart city initiative.
- III. Attraction of companies:
 - To attract private companies to Siem Reap in order to improve the quality of products and services.
- IV. Enhancement of the regional image:
 - To enhance the regional image of Siem Reap for citizens and tourists by utilizing the smart city.

7.5.2 Implementation Structure

The Smart City Division and the International Exchange and PR Division are expected to play a key role in public relations activities related to smart cities. On the other hand, since it will take time to establish the Smart City Division, the International Exchange and PR Division, the Intersectoral Division, and the Investment Planning Division will cooperate in implementing measures until the Smart City Division is established.

7.5.3 Draft Actions

- Publicize through SNS and listen to opinions
- Conduct briefing sessions and seminars
- Ongoing discussions for consistency regarding Cambodia Smart City development
- Participate in international conferences related to smart cities
- Establish own website
- Create PR video and publicize it (YouTube)
- Create and distribute posters
- Create and distribute pamphlets
- Utilize public broadcasting (TV and radio)
- Conducting a smart technology experience fair for citizens in Siem Reap
- Collaboration and exchange with other cities (domestic: Phnom Penh, Battambang, overseas: smart cities in Japan)

7.6 The Development of the Data Platform and Promotion of Open Data

7.6.1 Overview

In order to achieve data-driven urban management, the data management center (on-premises or in the cloud) shall be constructed in stages. Besides this, data integration, external system linkage with systems related to mobility, waste, energy, security, etc. and data disclosure shall be promoted. As a result, the following benefits can be expected:

- Administrative efficiency
- Consideration for the environment
- Information accessibility and service improvement for residents
- Revitalization of corporate and start-ups activities
- Improving services for tourists and revitalizing the tourism industry

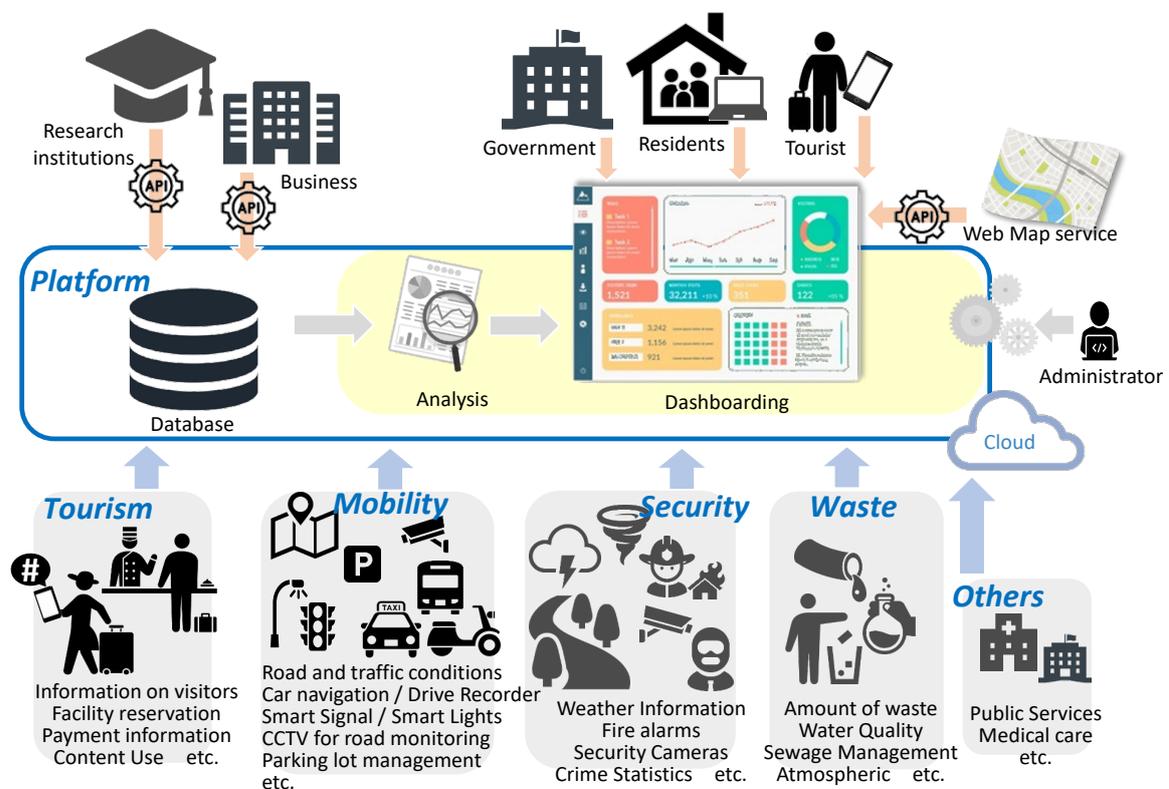


Figure 7.3: The Image of Data Platform for Smart City Management

The obsolescence of systems and applications is an issue not only in the data management, but in general. It will be necessary to continue to study the sustainability of the entire system considering programs to promote open innovation and the cooperation and utilization of the private sector for some functions.

7.6.2 Basic Policy for the Establishment of the Data Platform

The following shows the basic policy for the establishment of the data platform.

(1) Design Policy

The following four items will be suggested in consideration of the design policy of the data platform.

- Cross-organizational and cross-industry: A wealth of data can be collected through the participation of a variety of organizations and companies.

- Cross-sectional data utilization
 - New services and businesses can be developed by utilizing various types of data.
- Combination of security and openness
 - Realization of a secure and robust ICT platform. Data that requires confidentiality can be made available only to some related organizations, while data that can be made public can be widely used.
- Inclusive
 - Data that can be made publicly available can be widely used.

(2) Technical Requirements

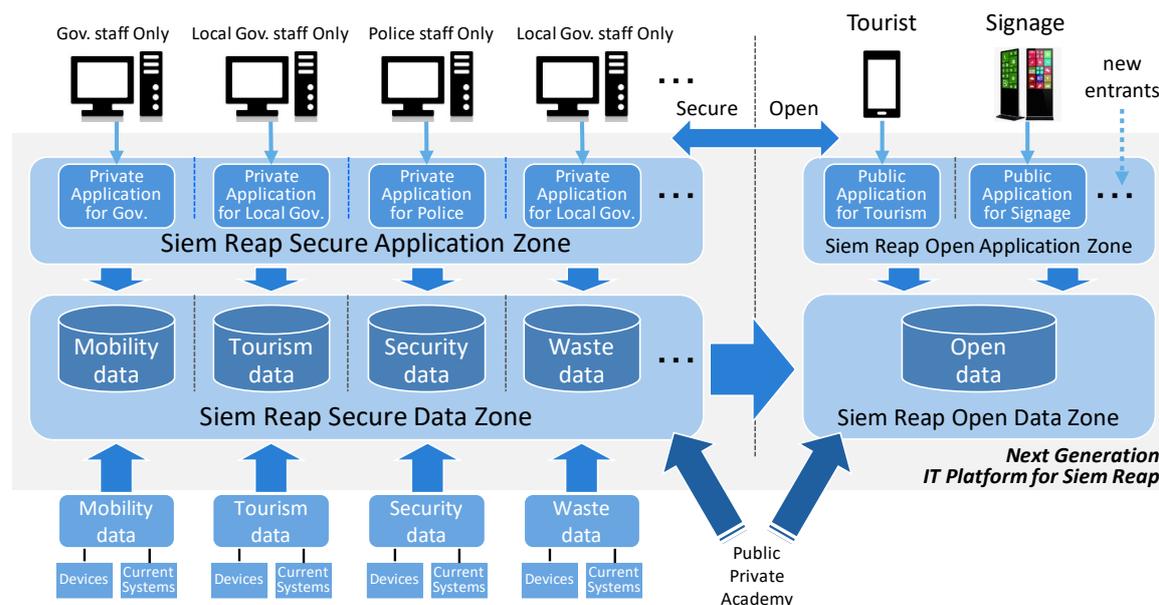
The five layers of physical IT platform requirements that are necessary to develop and build the above-mentioned data platform, as Siem Reap Smart City Platform, design concept are as follows:

Siem Reap Smart City Platform	Data Management Platform	Application Platform	Application environment for each business to deploy various services
		Data Management Platform	An environment that securely, openly stores, analyzes, and provides various data
	IT Facility Platform	IT Infrastructure	Highly reliable, high security, high performance IT infrastructure environment
		Network Infrastructure	High reliability, high speed, low latency network environment
		Data Center	Environmentally friendly data center environment with high reliability, high spec data and equipment protection

Figure 7.4: The 5 Technical Requirements for the Data Platform (Siem Reap Smart City Platform)

7.6.3 Conceptual Diagram

With the design policies, technical requirements, and security consideration described above, the data platform components and deployment design shall be described below. It shall run on cloud system so that the system portability is also secured.



Source: JICA Survey Team

Figure 7.5: The Data Platform Conceptual Diagram

7.6.4 Data Security

In order to promote the use of open data, data security must be ensured so that various stakeholders can provide and use the data with confidence. Security measures need to be comprehensively implemented in the following elements.

- Governance aspect: Determination of the direction of the entire smart city initiatives and measures, formulation of rules and basic policies, and organizational structure.
 - Formulation of security policies: Formulate information security basic policies, security measures standards, and data handling standards (including personal privacy protection).
 - Dissemination of the policy to multi-stakeholders: To ensure that the formulated policy is applied to various stakeholders, it should be appropriately reflected and incorporated in procurement specifications, contracts, and terms and conditions.
 - Ongoing efforts to maintain governance: In order to continuously maintain and improve the security of smart cities, the Plan-Do-Check-Action (PDCA) cycle shall be implemented, security policies and measures shall be continuously reviewed, and investments in security shall be continued as appropriate.
- Data platform aspect: From the perspective of security of the platform itself, implement security measures to prevent external attacks and incidents from occurring.
 - Measures to prevent external attacks, etc.: Implement and operate access control, appropriate authority settings, authentication functions, security monitoring, etc. for the platform.
 - Measures to prevent incidents from occurring: Measures to prevent attacks from entering the platform during the planning, design, development, and operation processes.
 - Measures to be taken in case of an incident: In order to minimize the damage in case of an incident, measures such as encryption of external communication and data, backups, and logs should also be implemented.
- Asset aspect: Effectively monitor and manage the security of devices such as IoT devices, networks for distributing data to data platforms, and relay devices, so that appropriate security measures can be implemented.
 - Monitoring and management of assets: While monitoring and managing assets, new vulnerabilities should be addressed on an ongoing basis.
 - Measures for the assets themselves: Implement communication and data encryption, authentication functions, and physical security measures, especially for IoT devices.

- Individual services aspect: Implement security measures for individual services such as priority projects of the roadmap.
 - Risk assessment for individual services: Identify risks based on the security policy formulated in advance and formulate a policy to deal with them.
 - Measures to prevent external attacks, etc.: Implement and operate service access control, appropriate authority settings, authentication functions, security monitoring, etc.
 - Measures to prevent incidents from occurring: Measures to prevent attacks from being introduced in the planning, design, development, and operation processes of services.
 - Measures to be taken in case of an incident: In order to minimize damage in case of an incident, measures such as encryption of external communications and data, backups, and logs should also be taken.

7.7 Improving the Business Environment

As institutional procedures to promote this roadmap, it is necessary to implement one-stop service procedures within the provincial administration, procedures for implementing other projects (pilot projects, full-scale projects), and deregulation measures.

Especially in the case of smart technology, there are businesses that cross multiple sectors (tourism and transportation, etc.), unprecedented new businesses such as MaaS, and businesses that use soft infrastructure (data) as products, in the entire country of Cambodia. In addition to improving the system, it is important to speed up the project implementation procedures at the provincial level. Specifically, system improvement and simplification of procedures are required in the following points:

- Data management: Legal system for personal information protection, licensing for commercial use of public data, ensuring security of data management, etc. It is under the jurisdiction of the DPT, provincial police, and provincial government.
- Public space use permission: Procedures for permission to use demonstration experiments on roads, handling of new mobility services, Road Traffic Law, etc. It is under the jurisdiction of MPWT (for national roads), DPWT, Traffic Police, and Provincial administration.

7.8 Improving Incubation Functions

In the absence of sufficient financial and technical capacity in the public sector, active attraction of private sector projects by the public sector is essential to promote this roadmap. In Siem Reap City, it is necessary for the provincial administration (Smart City Promotion Division) to take the lead in promoting this roadmap and actively attracting private sector projects to solve urban issues.

The collaborative events with private sector and/or academia, such as business contest, may be trigger emergent ideas from the private sector, which would be difficult for the public sector to come up with on its own, and that it will attract projects that have the prospect of securing sustainable profitability from the perspective of the private sector.

This will require strategic process management of open innovation based on the leadership of the public sector, as well as facilitation to draw out innovative financing ideas from the private sector that do not rely on public funds, and to foster understanding and consensus among the parties involved from the planning stage. Another option would be to work with companies that are specialized in creating incubation space.

In addition, in order to attract private-sector smart city-related projects and promote the roadmap in a sustainable manner to solve urban issues, the provincial administration needs to strategically select private projects to be attracted based on the following strategic evaluation criteria.

- Solution: Will the project contribute to solving urban problems and benefit residents and tourists?
- Sustainability: Can the project be sustained as a business, not just a one-time pitch event?
- Feasibility: Do both the public and private sectors have the resources to actually implement the project?

- Strategy: Is it a sector that should be strategically attracting the private sector's vitality to solve the problems according to the roadmap?

7.9 Area management

In addition, in order to effectively implement priority projects, it will be effective to limit the areas for concentrated investment, promote the projects related to smart city to citizens and tourists, and visualize the effects of the projects. For this reason, the city center, where urban issues are concentrated, will be set as the target area, and the policy will be to introduce various projects as a package on a priority basis.



Figure 7.6: Image of Introduction of Project Package to City Center Area

Chapter 8 Priority Projects Profile (formulated in 2021)

Priority projects with project outline targeting 2035 and short-term actions targeting 2025 are listed below. The profiles were summarized in 2021. The current condition is written in Annex.

8.1 Data Management

8.1.1 Project D-01: Integrated Data Collection and Analysis

Project D-01		Integrated Data Collection and Analysis	
Outline of the Project (Long-term goals targeting 2035)			
Existing Problem	6. Need for improvement of hardware and ICT circumstances 7. Need for multi-sectoral data sharing and utilization		
Objective	To establish an integrated data collection and analysis system of the urban environment		
Project Goal	The urban environment is monitored and analyzed appropriately for decision making by both public and private sectors.		
Target Area	All		
Issues to be Solved	<ul style="list-style-type: none"> • Vertical division among responsible departments of each sector • Paper-based management of existing statistical data • Lack of facilities for data management (including data centers) 		
Indicators (KPI)	<ul style="list-style-type: none"> • The amount/variety of data input 		
Short-term Actions (Priority projects targeting 2025)			
Implementation Body	Main	Provincial Administration, DPT	
	Sub	Private Business (system developer), Provincial Department in charge of each sector, Provincial Police	
	Relevant Organizations	-	
Main Action [Key Player]	<ol style="list-style-type: none"> 1. Coordination of relevant agencies for development of cross-sectoral data platform [Provincial Administration] 2. Planning and development of data platform (cloud service contract or installation of new on-premises system) [Provincial Administration, DPT, Private Business] 3. Input of existing statistical data into the data platform [Provincial Administration, Provincial Departments in charge of each sector, Provincial Police] 4. Input of data from other projects into the integrated data platform [Provincial Administration, Provincial Departments in charge of each sector, Provincial Police] 5. Maintenance and inspection of the entire system [Private Business, DPT] 		
Fund Source Business Model	If the data platform is procured through a cloud service contract, the procurement cost will be relatively small, so the initial investment is financed by the Provincial Administration. In case of the on-premises system, the cost may be supported from development partners. Operation and maintenance costs will be also funded by the Provincial Administration.		
	Initial Cost	For cloud: Provincial Administration (development partners funding support also assumed) For on-premises: development partners' support (Cost for reference: USD 300,000 (software development), USD 400,000 (environment setup), USD 50,000 (data input))	
	O&M Cost	Provincial Administration	

8.1.2 Project D-02: Data Dissemination to Relevant Stakeholders

Project D-02		Data Dissemination to Relevant Stakeholders	
Outline of the Project (Long-term goals targeting 2035)			
Existing Problem	8. Need for open data system, data security, and regulations		
Objective	To establish data disclosure system for relevant stakeholders to utilize and benefit themselves		
Project Goal	Data obtained through the smart city concept is disclosed to relevant stakeholders with easy access and consideration of privacy etc.		
Target Area	All		
Issues to be Solved	<ul style="list-style-type: none"> Data publication and utilization process for each stakeholder Detailed data security management procedure 		
Indicators (KPI)	<ul style="list-style-type: none"> Amount of data to be published, number of accesses 		
Short-term Actions (Priority projects targeting 2025)			
Implementation Body	Main	Provincial Administration, DPT	
	Sub	Private Business (platform provider), Provincial departments in charge of each sector, Provincial Police	
	Relevant Organizations	Private company (data beneficiary)	
Main Action [Key Player]	<ol style="list-style-type: none"> Consideration of guidance for data handling [Provincial Administration, DPT] Data processing for privacy consideration for data release [DPT] Release each information stored in Project D-01 to the public through API with consideration for privacy protection [Provincial Administration, DPT] 		
Fund Source Business Model	Initial investment is not expected. (It will be implemented in Project D-01.) Operation and maintenance costs will also be integrated with Project D-01, but business activities will become more active based on the disclosed information, and a certain amount of revenue will be received by the Provincial Administration from the tax revenue. It will cover the operation and maintenance costs of Project D-01.		
	Initial Cost	-	
	O&M Cost	Provincial Administration	

8.2 Smart Tourism

8.2.1 Project T-01: Tourism Promotion Platform Development

Project T-01		Tourism Promotion Platform Development	
Outline of the Project (Long-term goals targeting 2035)			
Existing Problem	9. Need to strengthen promotion as a tourist city		
Objective	To attract a large number of tourists to Siem Reap in a sustainable manner		
Project Goal	To promote a variety of tourism services on the same platform		
Target Area	All		
Managed data	<ul style="list-style-type: none"> • Tourist demographics • Tourist interests • Tourist behavior • Tourist feedback 		
Issues to be Solved	<ul style="list-style-type: none"> • Burden of platform development cost • Measures to ensure the number of users • Mechanism to enable continuous updating 		
Indicators (KPI)	Number of users		
Short-term Actions (Priority projects targeting 2025)			
Implementation Body	Main	DoT, private sector operators (system developers)	
	Sub	Private sector operators (tourism service providers), DPT	
	Relevant Organizations	-	
Main Actions [Key Player]	<ol style="list-style-type: none"> 1. Understanding the needs of visitors to Siem Reap (tourism, MICE, etc.) and planning related to promotion, etc. [DoT] 2. Development of a platform to publish promotional contents [Private sector (system developer)] 3. Development of promotional contents and posting them on the platform (VR, etc.) [Private sector (tourism service providers)] 4. Operation of the promotion platform [private sector (system developer)] 5. Accumulate and publish data on the data platform [DPT]. 		
Fund Source Business Model	Since this is a highly public project that contributes to the promotion of tourism in Siem Reap, and the investment amount is relatively small, the initial investment is expected to be made through DoT's own funds. It is assumed that the DoT will collect publication fees from tourism businesses that publish contents, which will be used for the operation and maintenance costs.		
	Initial Cost	DoT funding (development partners funding support is also assumed)	
	O&M Cost	Operation and maintenance cost Collection of publication fees from private businesses (tourism service providers)	

8.2.2 Project T-02: Centralized Reservation and Payment System

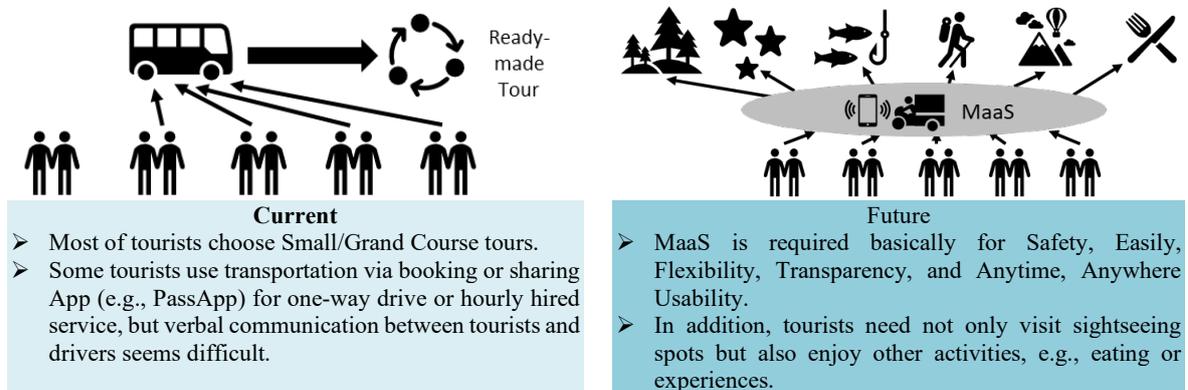
Project T-02		Centralized Reservation and Payment System	
Outline of the Project (Long-term goals targeting 2035)			
Existing Problem	9. Need to strengthen promotion as a tourist city 10. Need to improve the convenience of tourist behavior		
Objective	To make it easy for individual tourists to create their own personalized sightseeing plans		
Project Goal	To operate a platform that allows one-stop reservation and payment for various tourism contents		
Target Area	All		
Managed data	<ul style="list-style-type: none"> Tourist spots to be reserved by each individual 		
Issues to be Solved	<ul style="list-style-type: none"> Involvement of each tourism operator Adjustment of interests with existing travel agencies 		
Indicators (KPI)	Number of users (number of reservations)		
Short-term Actions (Priority projects targeting 2025)			
Implementation Body	Main	DoT, private sector operators (system developers)	
	Sub	Private sector operators (each tourism content provider), DPT	
	Relevant Organizations	-	
Main Actions [Key Player]	<ol style="list-style-type: none"> Planning and study of one-stop reservation and settlement for tourism services [DoT] Creation of a one-stop platform for reservation and settlement of tourism services [Private Sector (System Developer)] Attracting the listing of various tourism services [DoT]. Operation of reservation and settlement platform [Private sector (system developer)] Accumulate and publish data in the data platform [DPT]. 		
Fund Source Business Model	It is assumed that the DoT will collect listing fees from tourism businesses that list their services, which will be used for the operation and maintenance costs.		
	Initial Cost	DoT funding (development partners funding support is also assumed)	
	O&M Cost	Operation and maintenance cost Collection of publication fees from private businesses (tourism service providers)	

8.2.3 Project T-03: Shared Mobility Development

Project T-03		Shared Mobility Development	
Outline of the Project (Long-term goals targeting 2035)			
Existing Problem	10. Need to improve convenience of tourist behavior		
Objective	Improving the convenience of travel for tourists		
Project Goal	To commercialize small-shared mobility and provide it to tourists		
Target Area	All		
Managed data	<ul style="list-style-type: none"> Usage status (location information, etc.) 		
Issues to be Solved	<ul style="list-style-type: none"> Adjustment of interests with existing mobility 		
Indicators (KPI)	Number of users		
Short-term Actions (Priority projects targeting 2025)			
Implementation Body	Main	Provincial Administration, private sector operators (project operators)	
	Sub	DoT, DPT	
	Relevant Organizations	-	
Main Actions [Key Player]	<ol style="list-style-type: none"> Study of feasible forms of mobility (from regulatory and demand perspectives) [Provincial Administration] Development of hardware and software infrastructure for the introduction of shared mobility [Provincial Administration, private sector operators (business operators)] Operation of pay-as-you-go shared mobility [Private sector operators (business operators)] Monitoring of operations [Provincial Administration] Data accumulation and disclosure in data platform [DPT] 		
Fund Source Business Model	<p>Since this is a highly public project that will contribute to the promotion of tourism in Siem Reap, and the amount of investment is relatively small, the initial investment is expected to be made with the Provincial Administration's own funds.</p> <p>It is assumed that a user fee will be collected from tourists using the service to cover the operation and maintenance costs.</p>		
	Initial Cost	Provincial Administration funds (development partners funding support is also assumed) (Cost for reference: USD 2,500 (market price of shared e-bikes))	
	O&M Cost	Operation and maintenance costs Usage fees from tourists using the service	

8.2.4 Project T-04: MaaS Introduction

Project T-04	MaaS Introduction	
Outline of the Project (Long-term goals targeting 2035)		
Existing Problem	10. Need to improve convenience of tourist behavior	
Objective	Improving the convenience of tourists' transportation	
Project Goal	MaaS will allow tourists to choose from multiple means of transportation and make reservations and payments on a single platform.	
Target Area	All	
Managed data	<ul style="list-style-type: none"> Usage status (personal attributes, number of reservations, location information, etc.) 	
Issues to be Solved	<ul style="list-style-type: none"> Adjustment of interests with existing mobility 	
Indicators (KPI)	Number of users	
Short-term Actions (Priority projects targeting 2025)		
Implementation Body	Main	Provincial Administration, private sector operators (system developers)
	Sub	Private sector operators (various transport mode operators, travel agencies), DPT
	Relevant Organizations	-
Main Actions [Key Player]	<ol style="list-style-type: none"> 1. Planning and study of tourism MaaS development [Provincial Administration] 2. Coordination with stakeholders [Provincial Administration] 3. Tourism MaaS system development [Private sector (system developer)] 4. Arrangement of transportation modes to be registered [Private sector (each transportation mode operator)] 5. Promotion to users [Provincial Administration, private operators (system developers)] 6. Operation of the system [Private operator (system developer)] 7. Data accumulation and disclosure on the data platform [DPT] 	
Fund Source Business Model	The private sector, which will be the main implementer of the system, is expected to contribute its own funds for initial investment and operation and maintenance costs.	
	Initial Cost	Private sector operator's own funds (Cost for reference: USD 100,000 (application development cost))
	O&M Cost	Private sector operator's own funds (collection of usage fees from service users)



Source: JICA Survey Team

Figure 8.1: Image of MaaS Introduction

8.2.5 Project T-05: Contactless Payment Development with QR Codes

Project T-05		Contactless Payment Development with QR Codes	
Outline of the Project (Long-term goals targeting 2035)			
Existing Problem	10. Need to improve convenience of tourist behavior		
Objective	To make local payment procedures smoother and purchasing behavior more stress-free.		
Project Goal	To introduce a contactless local electronic payment system and promote electronic payment in the city.		
Target Area	All		
Managed data	<ul style="list-style-type: none"> Information on purchasing 		
Issues to be Solved	<ul style="list-style-type: none"> - 		
Indicators (KPI)	Number of uses		
Short-term Actions (Priority projects targeting 2025)			
Implementation Body	Main	Provincial Administration, private sector operators (system developers)	
	Sub	Private sector operators (each store operator)	
	Relevant Organizations	-	
Main Actions [Key Player]	<ol style="list-style-type: none"> 1. Planning and study of a contactless payment system [Provincial Administration] 2. System development [Private sector (system developer)] 3. Explain the system to local stores [Provincial Administration] 4. Operation the system [Private sector operators (system developer)] 		
Fund Source Business Model	It is assumed that the private sector (system developer) will cover the initial investment costs with its own funds and the fees generated at the time of settlement will be used for the operation and maintenance costs.		
	Initial Cost	Private sector operator's own funds	
	O&M Cost	Private sector	

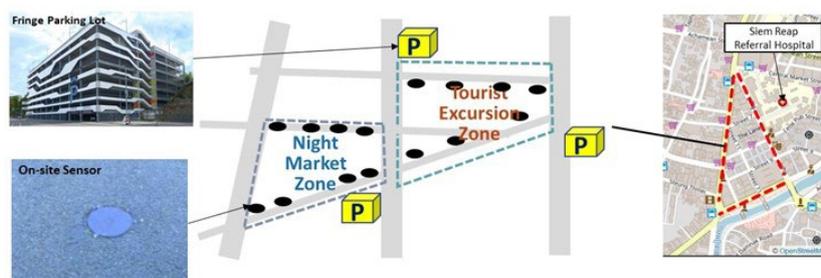
8.2.6 Project T-06: Enhancement of Local Tourism Experience using AR

Project T-06		Enhancement of Local Tourism Experience using AR	
Outline of the Project (Long-term goals targeting 2035)			
Existing Problem	11. Need to improve the attractiveness of local experiences at tourist attractions		
Objective	To improve tourists' understanding and satisfaction of tourist attraction at tourist attractions		
Project Goal	AR contents that make the local experience more attractive should be provided at each tourism spot.		
Target Area	All		
Managed data	<ul style="list-style-type: none"> • 3D models • Location data • User data 		
Issues to be Solved	<ul style="list-style-type: none"> • Coordination of interests with existing tourist guides, etc. 		
Indicators (KPI)	Number of views		
Short-term Actions (Priority projects targeting 2025)			
Implementation Body	Main	DoT, APSARA National Authority, private sector operators (operators of various tourist facilities)	
	Sub	Private sector operators (virtual content developer)	
	Relevant Organizations	-	
Main Actions [Key Player]	<ol style="list-style-type: none"> 1. Planning of virtual contents (including AR) [DoT, APSARA National Authority, private sector operators (each tourism facility operator)] 2. Development of hardware infrastructure (e.g., QR code signs) for access to virtual contents [DoT, APSARA National Authority, private sector (operators of tourist facilities)] 3. Establishing, disseminating, and developing rules for the use of virtual contents [DoT, APSARA National Authority] 		
Fund Source Business Model	The investment will be recovered by selling the virtual contents to local tourists.		
	Initial Cost	APSARA National Authority, private sector (each tourist facility operator) (Cost for reference: USD 1,500 (initial demonstration application development cost))	
	O&M Cost	Covered by public private partnership	

8.3 Smart Mobility

8.3.1 Project M-01: Official Parking System Introduction

Project M-01		Official Parking System Introduction	
Outline of the Project (Long-term goals targeting 2035)			
Existing Problem	12. Need for comfort against traffic congestion and on-street parking		
Objective	To coexist tourism and local life with smart technologies for attractive and easy tourism		
Project Goal	Installing official parking system around Pub Street and other streets which have a lot of on-street parking vehicles in Siem Reap City		
Target Area	City Area		
Managed data	<ul style="list-style-type: none"> Monitoring of on-street parking behavior Integration of the processes from parking reservation to payment by the parking system equipped with monitoring and online payment 		
Issues to be Solved	<ul style="list-style-type: none"> Instituting a law/system regarding billing system on street parking Selecting the operator of the parking system Considering the area and time for on-street parking Securing lands for off-street parking for parking demand that will not be able to be handled by street parking 		
Indicators (KPI)	No. of illegal on-street parking vehicles, Satisfaction of the drivers and pedestrians		
Short-term Actions (Priority projects targeting 2025)			
Implementation Body	Main	Provincial Administration DPWT,	
	Sub	Private Business (Parking lot operator)	
	Relevant Organizations	Provincial Police, Siem Reap City	
Main Actions [Key Player]	<ol style="list-style-type: none"> Formulation and enforcement of street parking fee system, formulation and operation of toll system (designation of special zones for roads around Pub Street, etc.) [Provincial Administration] Designation and marking of toll street parking lots [Road Manager (DPWT, Provincial Administration)] Contract form and operator selection of street parking operator [Provincial Administration] Installation of parking sensors on roads (designated special zones) around Pub Street [Parking lot operator] Street parking fee collection business and providing the fullness/emptiness information of the parking [Parking lot operator] 		
Fund Source Business Model	Surplus areas of road space will be utilized effectively and illegal parking that impedes road traffic and roadside use will be prevented. The fee-based system will be introduced for the purpose of utilizing on-street parking lots while covering management costs. The business model covers management costs including the introduction of various equipment, recovery of initial investment costs for system development, maintenance and repair of equipment, and human resources. Regarding setting the charges, it is necessary to consider the fees of parking lots operated by private companies in the surrounding area. It is also necessary to set the parking fee in consideration of the business feasibility considering the payback period.		
	Initial Cost	Covered by the parking lot operator (collection of funds with a part of parking fee income) (Cost for reference: USD 1,000,000 (for 140 lots in Sivatha street and 2 Thnou street))	
	O&M Cost	Parking fee income, Compensation from Tourism Development Fund (if needed)	



Source: JICA Survey Team

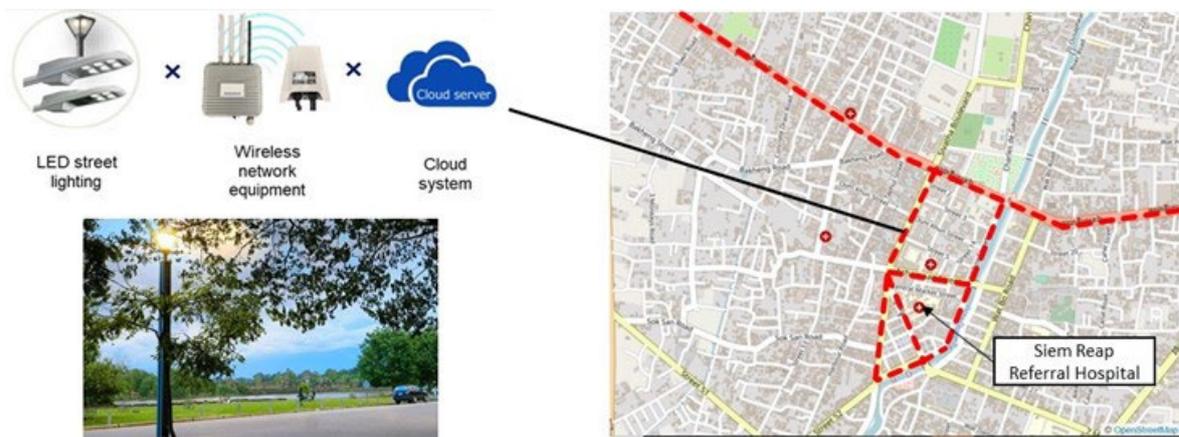
Figure 8.2: Image of Short-term Actions for Official Parking System Introduction

8.3.2 Project M-02: Road Condition Monitoring

Project M-02		Road Condition Monitoring	
Outline of the Project (Long-term goals targeting 2035)			
Existing Problem	13. Need for optimized road maintenance 15. Need for more safety against risks of traffic accidents and crimes		
Objective	Ensuring the quality of road conditions and structuring systematic and efficient road maintenance plan.		
Project Goal	Ensuring the required road quality at the minimum required cost by using Road Care mobile application developed by MPWT.		
Target Area	Main: City Area, Heritage Area / Sub: Tonle Sap Area		
Managed data	<ul style="list-style-type: none"> • Automatic road condition data collection • Automatic detection and classification of road conditions with Artificial Intelligence (AI) • Using for maintenance planning as actual records 		
Issues to be Solved	<ul style="list-style-type: none"> • Finding a collaborator for data acquisition • Increasing road coverage rate of data collection • Securing data processing cost 		
Indicators (KPI)	Number of reports by using Road care app		
Short-term Actions (Priority projects targeting 2025)			
Implementation Body	Main	Provincial Administration, DPWT, APSARA National Authority	
	Sub	Private Business (Application service provider)	
Main Actions [Key Player]	<ol style="list-style-type: none"> 1. Identify the target of the users. Determine who the application will target and who will benefit most. This could include drivers, transportation companies, government agencies, or other stakeholders. [Provincial Administration] 2. Promote the application. Use a variety of channels to promote the application and increase awareness among the target audience. This could include social media, website advertising, email campaigns, and other marketing strategies. [DPWT] 3. Provide training and support. Provide training and support to help users understand how to use the application effectively. [Provincial Administration] 4. Facilitate feedback. Encourage users to provide feedback on problems and improvements with the application. [Provincial Administration] 5. Monitor usage and results. Monitor application usage and outcomes to assess its effectiveness and identify areas for improvement. [DPWT] 6. Collaborate with relevant organizations. Collaborate with relevant organizations. [DPWT] 		
Fund Source Business Model	Initial Cost	Part of the annual road maintenance budget (initial setting cost, a small amount for machine learning of image processing tailored to the site) (Cost for reference: USD 200,000 estimation using existing platforms))	
	O&M Cost	Part of the annual road maintenance budget	

8.3.3 Project M-03: Street Lighting Improvement

Project M-03	Street Lighting Improvement	
Outline of the Project (Long-term goals targeting 2035)		
Existing Problem	15. Need for more safety against risks of traffic accidents and crimes	
Objective	Providing safe walking environment at night for pedestrians including international tourists	
Project Goal	Multi-functionalization of street lighting by integrated management with CCTV, environmental sensor, and parking sensor	
Target Area	Main: City Area / Sub: Heritage Area	
Managed data	<ul style="list-style-type: none"> Monitoring the data of meteorology, traffic condition, level of river, etc. 	
Issues to be Solved	<ul style="list-style-type: none"> Selecting the provider of telecommunication equipment and system Securing of communication capability 	
Indicators (KPI)	Number of street crimes, Satisfaction of residents and tourists about safety	
Short Term Actions (Priority Projects targeting 2025)		
Implementation Body	Main	Provincial Administration, DPWT
	Sub	DPT, Private Business (Street lighting provider, Sensor provider, and Telecommunications service provider)
	Relevant Organizations	Provincial Police, Provincial Administration
Main Actions [Key Player]	<ol style="list-style-type: none"> Determination of street lighting installation section and specifications on the road around Pub Street and on NR6 [DPWT] Installation of the sensors attached to the street lighting [Street lighting provider, Sensor provider] Connection with telecommunication equipment [Telecommunications service provider] Accumulation of various data on the data platform and opening the data to public [DPT] 	
Fund Source Business Model	Street lightings, which have a function of linking with communication devices equipped with various sensors, are a business that enables real-time monitoring by supplying power and communication. It uses LED lighting, which is also environmentally friendly and has a function to constantly acquire data. It is also a business model that meets such diverse monitoring needs. Since the power supply of each sensor can be shared, the whole budget will be reduced than if the sensors are installed by each.	
	Initial Cost	Road safety management budget of DPWT and Siem Reap City, National budget (38 Road Construction Project)
	O&M Cost	Part of the annual road maintenance budget

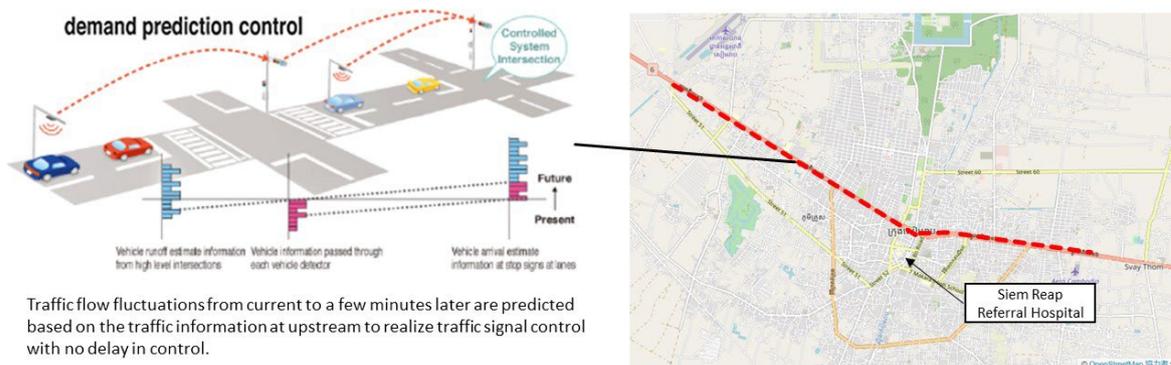


Source: MinebeaMitsumi

Figure 8.3: Image of Short-term Actions for Street Lighting Improvement

8.3.4 Project M-04: Traffic Signal System Improvement

Project M-04		Traffic Signal System Improvement	
Outline of the Project (Long-term goals targeting 2035)			
Existing Problem	12. Need for comfort against traffic congestion and on-street parking 6. Need for improvement of hardware and ICT circumstances		
Objective	Improvement traffic flow for supporting tourist destination value-up and economic growth.		
Project Goal	Optimized traffic flow according to traffic demands.		
Target Area	Main: City Area, Heritage Area / Sub: Tonle Sap Area		
Managed data	• Monitoring relationship between traffic flow, traffic demand, and traffic light's phases		
Issues to be Solved	• Installation of new traffic lights with function of traffic counting and automatic phase control through interactive communication		
Indicators (KPI)	Traffic congestion rate, traffic flow capacity		
Short-term Actions (Priority projects targeting 2025)			
Implementation Body	Main	DPWT	
	Sub	Siem Reap City, Private Business (Traffic signal and signal control system developer)	
	Relevant Organizations	Provincial Police	
Main Actions [Key Player]	<ol style="list-style-type: none"> 1. Determining the target traffic signals/zone to network traffic signals [DPWT] 2. Procurement of traffic signal linkage equipment, signal control, traffic control, etc. [DPWT] 3. Installation of traffic signal linkage equipment, signal control, traffic control, etc. [Traffic signal and signal control system developer] 4. Operation of traffic signal linkage equipment, signal control, traffic control, etc. [DPWT] 		
Fund Source Business Model	The amount of cost varies depending on the scale of both traffic signals and control systems. However, they are positioned as public investments due to the nature of the equipment and functions. Since it is difficult to secure profits from these traffic control systems themselves, the model is generally implemented as public investment.		
	Initial Cost	Funding for public investment (DPWT, Provincial Administration, Siem Reap City, APSARA National Authority) Official Development Assistance (Cost for reference: USD 15,000,000 (development Partners grant amount for) the development of traffic management system in Phnom Penh with 115 intersections with traffic signals))	
	O&M Cost	Funding for public investment (DPWT, Provincial Administration, Siem Reap City, APSARA National Authority)	



Source: Sumitomo Electric System Solutions and JICA Survey Team

Figure 8.4: Image of Short-term Actions for Traffic Signal System Improvement

8.3.5 Project M-05: Traffic Safety Management Improvement

Project M-05		Traffic Safety Management Improvement	
Outline of the Project (Long-term goals targeting 2035)			
Existing Problem	15. Need for more safety against risks of traffic accidents and crimes		
Objective	Improvement traffic safety management and driving for safe community and tourist destination.		
Project Goal	Safe community and safe and walkable tourist destination		
Target Area	Main: City Area, Heritage Area / Sub: Tonle Sap Area		
Data Management	<ul style="list-style-type: none"> Identifying and sharing traffic accident black spots Analyzing causes of traffic accidents Evaluation of individual driver's driving behavior and improvement support of drivers for safety driving 		
Issues to be Solved	<ul style="list-style-type: none"> Finding a collaborator for data acquisition (just set onboard smartphone or dashcam with 3D accelerate sensor), increasing road coverage rate, and securing data processing cost. 		
Indicators (KPI)	Number of traffic accidents or improvement black spots		
Short-term Actions (Priority projects targeting 2025)			
Implementation Body	Main	Provincial Police	
	Sub	Private Business (Service provider)	
	Relevant Organizations	DPWT, Siem Reap City, APSARA National Authority, DPT	
Main Actions [Key Player]	<ol style="list-style-type: none"> Formulation of items for specifying traffic incidents, data acquisition plans, and plans for reflection on countermeasure projects [DPWT, Provincial Administration] Securing and arranging cooperators for installation of the application and drive recorder [Provincial Administration] Installation of application service for collection of driving behavior [Service provider] Data collection, accumulation of status survey results, and data provision [Service provider] Accumulation of various data on the data platform and opening the data to public [DPT] Holding traffic safety training for drivers [Provincial Police] 		
Fund Source Business Model	A smartphone/dashcam equipped with an application will be installed in vehicles that are driven on daily basis so that traffic managers can identify potential traffic unsafe points and preventive measures. And it acquires information on traffic hazards by constantly collecting driving behavior data. Eventually, that information will be used to select areas for consideration of countermeasures and to disclose the information to citizens to encourage traffic safety actions. The business model is to purchase an in-vehicle device, data analysis, and display system from an application provider as an initial cost and pay the annual system usage fee by the administration. Regarding the vehicles for data collection from passenger transport business, they will be requested to cooperate at a certain rate.		
	Initial Cost	A part of the road safety management budget (Cost for reference: USD 500,000 (including application development and equipment cost))	
	O&M Cost	A part of the road safety management budget	



Source: Honda

Figure 8.5: Image of Short-term Actions for Safety Drive Improvement

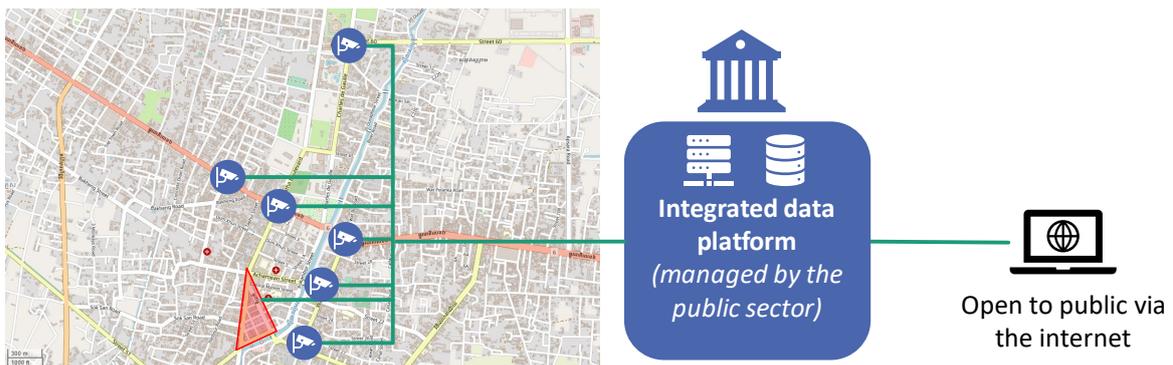
8.3.6 Project M-06: Promotion of Introduction of EVs

Project M-06		Promotion of Introduction of EVs	
Outline of the Project (Long-term goals targeting 2035)			
Existing Problem	14. Need for clean air and environmentally friendly mobility		
Objective	Improving environmental levels and promoting sustainable tourist destination.		
Project Goal	Replaced to electrified vehicles (EV) in Siem Reap		
Target Area	Main: Heritage Area / Sub: City Area, Tonle Sap Area		
Managed data	<ul style="list-style-type: none"> • Monitoring EVs operation • Monitoring driving recording data (route, trip length, velocity, etc.) and energy consumption data • Planning efficient charging spots with charging schedule 		
Issues to be Solved	<ul style="list-style-type: none"> • Stabilization of electric power supply for charging spots • Formulation of the policy for decarbonization and the overall strategy for introduction of various types of EVs (e-bus, e-bike, EV tuk-tuk, etc.) • Promotion of installation of charging spots with subsidy • Introduction of new pricing plan for EV tuk-tuk and EV taxi • Development of affordable EV tuk-tuk for driver and introduction of loan/subsidy for purchase • Ensuring Profitability of e-buses • Adjustment of stakeholder's opinion (TTA, Grab, PassApp, etc.) 		
Indicators (KPI)	Usage rate of EVs, Usage rate of traveler's travel kilometers		
Short-term Actions (Priority projects targeting 2025)			
Implementation Body	Main	Provincial Administration MPWT	
	Sub	APSARA National Authority, TTA, Private Business (Energy company, EV provider, financial institution)	
	Relevant Organizations	MOE, UNESCO	
Main Actions [Key Player]	<ol style="list-style-type: none"> 1. Formulation of policy for promotion of EV introduction [Provincial Administration] 2. Introduction of charging spots and EV for PoC [Provincial Administration] 3. Monitoring of EV tuk-tuk using subsidies, convenience evaluation, survey of willingness to pay by domestic and foreign tourists [Provincial Administration] 4. Introduction of EV as a business [EV provider] 		
Fund Source Business Model	It promotes the replacement of existing fossil fuel-based vehicles with EVs. If there is a gap between the prices of EVs and fuel vehicles, the subsidies from the Provincial Administration and incentives for car loans should be introduced. It encourages transportation companies to replace their vehicles with EVs. Initial maintenance of charging equipment and equipment for replacing storage batteries will be installed with public funds from the government, etc. However, subsequent maintenance cost will be covered by the charging fees collected from end-users who use EVs.		
	Initial Cost	Transport operator burden, Introduction subsidy, Provincial Administration	
	O&M Cost	User burden (passed on to the usage fee of passengers and logistics end user)	

8.4 Smart Security and Safety

8.4.1 Project S-01: CCTV System Introduction

Project S-01		CCTV System Introduction	
Outline of the Project (Long-term goals targeting 2035)			
Existing Problem	15. Need for more safety against risks of traffic accidents and crimes 6. Need for improvement of hardware and ICT circumstances 7. Need for multi-sectoral data sharing and utilizing 8. Need for open data system, data security, and regulations		
Objective	To utilize CCTV cameras effectively to reduce crime and visualize the street environment for all people.		
Project Goal	Ontime video images with necessary information of main areas of Siem Reap City are disclosed, leading to tourists' satisfaction and reduction of street crime.		
Target Area	City Area		
Managed data	<ul style="list-style-type: none"> Management, analysis, and disclosure of all public CCTVs under a unified system (with consideration of privacy issues) 		
Issues to be Solved	<ul style="list-style-type: none"> Integration and connection of CCTV systems introduced by different departments 		
Indicators (KPI)	No. of CCTV cameras in operation and open to public		
Short-term Actions (Priority projects targeting 2025)			
Implementation Body	Main	Provincial Administration	
	Sub	Provincial Police, DPT, Private Business (System Provider)	
	Relevant Organizations	DPWT	
Main Actions [Key Player]	<ol style="list-style-type: none"> CCTV installation [Provincial Administration] Data monitoring system development for existing CCTVs [Private Business] Development for an operation and monitoring structure and system for security maintenance [Provincial Police] System operation and maintenance [Private Business] Data processing system development for privacy protection [Private Business] Accumulation and disclosure of processed data to the data platform [DPT] 		
Fund Source Business Model	Since the initial cost is relatively small, funding from the Provincial Administration is assumed, although development partners' funding is also subject to be considered. Collecting the initial cost and O&M cost is assumed to be accomplished via the tourism promotion fund.		
	Initial Cost	Provincial Administration (development partners funding also subject to be considered) (Cost for reference: USD 3,000 (for 1 camera installation))	
	O&M Cost	Tourism promotion fund	



Source: JICA Survey Team

Figure 8.6: Image of Short-term Actions for CCTV Camera Introduction

8.4.2 Project S-02: Flood Warning System Development

Project S-02	Flood Warning System Development	
Outline of the Project (Long-term goals targeting 2035)		
Existing Problem	16. Need for more safety against disasters (fire, flood, etc.) 8. Need for open data system, data security, and regulations	
Objective	To enable disaster warning to be informed widely to citizens and international tourists.	
Project Goal	Disaster warning is widely informed to citizens and international tourists	
Target Area	City Area, Tonle Sap Area	
Managed data	Prompt data collection and distribution regarding natural disasters from various sources	
Issues to be Solved	<ul style="list-style-type: none"> Lack of data collection platform of natural disaster warnings Lack of efficient data source for natural disaster warnings 	
Indicators (KPI)	<ul style="list-style-type: none"> Number of warnings Number of people receiving the warnings 	
Short-term Actions (Priority projects targeting 2025)		
Implementation Body	Main	Provincial Administration
	Sub	Provincial Police
	Relevant Organizations	Implementation bodies of tourist apps
Main Actions [Key Player]	<ol style="list-style-type: none"> Formulation of sensor installation plan [Provincial Administration, Provincial Police, and civil association] Explanation to stakeholders (local residents, etc.) [Provincial Administration] Installation of sensors in the city center (Old market, Pub Street area, etc.) [Private Business (fire alarm manufacture)] Data visualization and dissemination [Provincial Administration] 	
Fund Source Business Model	Since the initial cost is relatively small, funding from the Provincial Administration is assumed, although development partners' funding scheme is also subject to be considered. Collecting the initial cost and O&M cost is assumed to be accomplished via the tourism promotion fund.	
	Initial Cost	Provincial Administration (development partners' funding also subject to be considered) (Cost for reference: USD 100,000 (system development cost))
	O&M Cost	Tourism promotion fund

8.4.3 Project S-03: Fire Alarm System Installation

Project S-03		Fire Alarm System Installation	
Outline of the Project (Long-term goals targeting 2035)			
Existing Problem	15. Need for more safety against disasters (fire, flood, etc.) 6. Need for improvement of hardware and ICT circumstances		
Objective	To notify those who may be affected of the fire. The community should be able to extinguish the fire in its initial stages.		
Project Goal	Immediate evacuation and initial firefighting are enabled by the early warning of fire		
Target Area	City Area		
Managed data	Prompt data collection and distribution regarding fire from various fire alarms		
Issues to be Solved	<ul style="list-style-type: none"> Lack of fire alarms in the city Lack of networks among multiple fire alarms 		
Indicators (KPI)	<ul style="list-style-type: none"> Number of fire alarms Number of fire alerts 		
Short-term Actions (Priority projects targeting 2025)			
Implementation Body	Main	Provincial Administration, Provincial Police	
	Sub	Individual real estate owners, Private Business (system provider)	
	Relevant Organizations	-	
Main Actions [Key Player]	<ol style="list-style-type: none"> Formulation of fire alarm installation plan [Provincial Administration, Provincial Police, and civil association] Explanation to stakeholders (local residents, etc.) [Provincial Administration] Installation of fire alarms in fire vulnerable areas in the city center (Old market, Pub Street area, etc.) [Private Business (fire alarm manufacture)] Training and educational activity on rapid evacuation and initial fire suppression using information from fire alarms [Provincial Administration, Provincial Police] 		
Fund Source Business Model	The initial investment is expected to be made with the provincial government's own funds because the investment amount is relatively small. If necessary, development partners' donor funds will be considered as part of TC scheme.		
	Initial Cost	Provincial Administration (development partners funding also subject to be considered) (Cost for reference: USD 3,000 (market price of a fire alarm system installation))	
	O&M Cost	Tourism development fund	

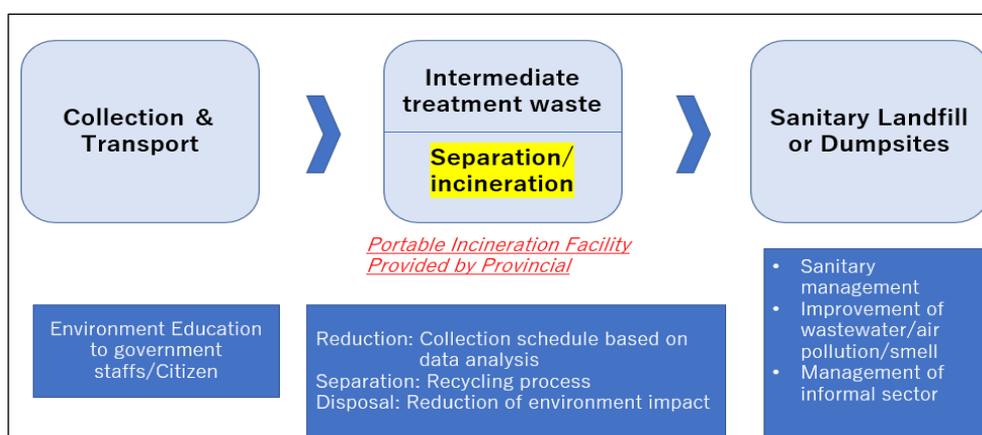
8.4.4 Project S-04: Public Relations Improvement for Safety

Project S-04		Public Relations Improvement for Safety
Outline of the Project (Long-term goals targeting 2035)		
Existing Problem	15. Need for more safety against risks of traffic accidents and crimes 16. Need for more safety against disasters (fire, flood, etc.) 8. Need for open data system, data security, and regulations	
Objective	To improve the public relations of the police and notify information on crime/traffic accidents.	
Project Goal	Daily information on crime and traffic accidents are shared to citizens	
Target Area	All	
Managed data	Prompt data collection and distribution regarding fire from various fire alarms	
Issues to be Solved	<ul style="list-style-type: none"> Lack of on-time information sharing system in the police Lack of information providing platform to citizens 	
Indicators (KPI)	<ul style="list-style-type: none"> Number of citizens accessing the information provided 	
Short-term Actions (Priority projects targeting 2025)		
Implementation Body	Main	Provincial Police
	Sub	Private Business (system provider)
	Relevant Organizations	-
Main Actions [Key Player]	<ol style="list-style-type: none"> Establishment of a system for centralized collection and management of daily crime and traffic accident-related information within the Provincial Police [Provincial Police] Development of tools and systems for disseminating crime and traffic accident-related information [Private Business (system providers)] Dissemination of the above information on crime and traffic accidents through the Provincial Police and Provincial Administration web pages and tourism applications [Provincial Police] 	
Fund Source Business Model	The investment amount is relatively small. The initial investment is expected to be made by the Provincial Police. If necessary, development partners funds will be considered. Since the operation and maintenance costs are also very small, the Provincial Police is expected to contribute their own funds.	
	Initial Cost	Provincial Police (development partners funding also subject to be considered)
	O&M Cost	Provincial Police

8.5 Smart Waste Management

8.5.1 Project W-01: Solid Waste Management System Improvement and Environmental Education

Project W-01		Solid Waste Management System and Environmental Education	
Outline of the Project (Long-term goals targeting 2035)			
Existing Problem	17. Need for enlightenment towards environmentally friendly actions 18. Need for enforcement of the public initiative		
Objective	To change citizen awareness.		
Project Goal	Reduction of garbage from markets, hotels, and houses, and classification of garbage		
Target Area	City Area		
Managed data	Measurement of garbage volume in each household and Angkor Wat area for effective collection system		
Issues to be Solved	<ul style="list-style-type: none"> • Coordination with existing concessionaire company • Business model for recycling • Support to low-income households 		
Indicators (KPI)	<ul style="list-style-type: none"> • Garbage volume • Percentage of recycle • Number of campaigns 		
Short-term Actions (Priority projects targeting 2025)			
Implementation Body	Main	Provincial Administration, DoE, Department of Economic and Finance, Municipality/District Hall Administration	
	Sub	Model commune and service-providing company	
	Relevant Organizations	MoI, MoE, Ministry of Economic and Finance, Citizen, and recycle business	
Main Actions [Key Player]	<ol style="list-style-type: none"> 1. To select and discuss solid waste management systems (collection/disposal/fee collection) [Provincial Administration, DoE, Department of Economic and Finance, Municipality/District Hall Administration, Model Commune] 2. Planning of implementation method and management system, explanation and consensus to citizen [Provincial Administration, DoE, Department of Economic and Finance, Municipality/District Hall Administration, Model Commune] 3. Implementation of solid waste management system (collection/disposal/fee collection) [Model Commune] 4. Introduction of the method of the environmental education by using technologies [Provincial Administration] 5. Introduction of environmental education and guidance to household to reduce waste and recycling [Model Commune] 		
Fund Source Business Model	Obtain support from development partners The equipment and facilities will be utilized in the grassroots program, and maintenance and operating funds will be covered by fee collection or Provincial Administration budget.		
	Initial Cost	Provincial Administration (development partners funding also subject to be considered) (Cost for reference: USD 500,000)	
	O&M Cost	Fee collection from users	



Source: JICA Survey Team

Figure 8.7: Solid Waste Management System

8.5.2 Project W-02: IoT Installation for Garbage Collection

Project W-02		IoT Installation for Garbage Collection	
Outline of the Project (Long-term goals targeting 2035)			
Existing Problem	18. Need for enforcement of the public initiative		
Objective	To collect 100% of the waste on households and public areas.		
Project Goal	Installation of sensor garbage box in group areas and public areas to collect waste and also implementing the garbage separation.		
Target Area	City Area, Heritage Area		
Managed data	<ul style="list-style-type: none"> Measurement of garbage volume roads and parks along Siem Reap River. Visualization of garbage truck routes. 		
Issues to be Solved	<ul style="list-style-type: none"> Citizen and tourist awareness (Environmental education) Coordination between private collection companies and the Provincial Administration 		
Indicators (KPI)	<ul style="list-style-type: none"> Cleanliness of public area Reduction of illegal dumping Collection truck route 		
Short-term Actions (Priority projects targeting 2025)			
Implementation Body	Main	City Government, APSARA National Authority	
	Sub	Concessionaire (e.g., GAEA) Provincial Administration, DoE, Selected communes	
	Relevant Organizations	MoI, MoE	
Main Action [Key Player]	<ol style="list-style-type: none"> Installation of the sensor for garbage track Preparation of waste management plan [City Government, APSARA National Authority] Explanation of implementation method and waste management plan to communes to make consensus. [City Government, Communes, Concessionaire] Sensor will be installed in the garbage box to clarify the volume. [City Government, Concessionaire] Accumulation the related data (amount of garbage and) [City Government,] Utilizing the IoT system for efficient garbage collection 		
Fund Source Business Model	Large-scale budget is not required for waste disposal (separation, etc.) and appropriate management in this proposal, it can be realized by changing the awareness of the parties concerned and implementing it. The sensor will be budgeted by the Provincial Administration and maintenance and operating funds will be covered by fee collection. Government shall make an effort to explain its purpose it for Concessionaire and APSARA National Authority to obtain financial support. It is also necessary to make adjustments to get support from development partners.		
	Initial Cost	Provincial Administration (Cost for reference: USD 200 (installing sensors to garbage trucks per truck), USD 100,000 (software development cost))	
	O&M Cost	Fee collection from users	

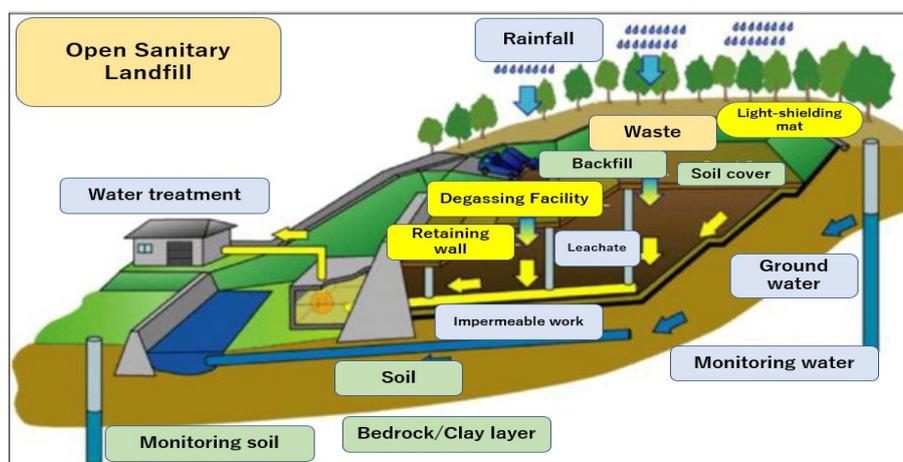


Source: JICA Survey Team

Figure 8.8: Image of Garbage Collection IoT Installation Project

8.5.3 Project W-03: Landfill Management

Project W-03		Landfill Management	
Outline of the Project (Long-term goals targeting 2035)			
Existing Problem	19. Need for engineering of infrastructure		
Objective	To develop a landfill with sanitary environmental management		
Project Goal	Establishment of sanitary landfills instead of existing dumping sites		
Target Area	City Area		
Managed data	<ul style="list-style-type: none"> Assessment of various items related to solid waste management such as ratio of waste separation/recycling Environmental standard value Fee collection 		
Issues to be Solved	<ul style="list-style-type: none"> Location of landfill Environmental standard value to be cleared 		
Indicators (KPI)	Garbage volume, conversion ratio of recycle and environmental standard value		
Short-term Actions (Priority projects targeting 2025)			
Implementation Body	Main	Provincial Administration	
	Sub	DoE, MoE, CDC	
	Relevant Organizations	MoI, Concessionaire (GAEA), Development Partners, Private Business	
Main Action [Key Player]	<ol style="list-style-type: none"> Discussing for the management of the landfill [Provincial Administration, Concessionaire, APSARA National Authority] Preparation of implementation plan and request form for sanitary landfill [Provincial Administration, Concessionaire, APSARA National Authority] Design and construction of the sanitary landfill that comply with the environmental standards [Provincial Administration, Development Partners] Plan for appropriate operation and management of sanitary landfill [Private Business] 		
Fund Source Business Model	A facility that combines landfills and related ancillary facilities can appropriately store waste and make it stable biologically, physically, and chemically based on environmental standards that do not hinder the preservation of the living environment. Facility will be constructed and operated by provincial (Development Partners) or private company. Emphasis will be placed on the acceptance of non-general waste such as construction by-products, factory / agricultural waste, etc., so that the operator can collected the processing costs from the person who generated the waste. The Provincial Administration will set out preferential policies for recycling and promote recycling projects as soon as possible.		
	Initial Cost	Public budget (Provincial Administration, Development Partners) (Cost for reference: USD 20,000,000 (example of an 8-ha construction by ADB))	
	O&M Cost	Public budget (Annual budget from Provincial Administration or concession or private fund)	



Source: JICA Survey Team

Figure 8.9: Sanitary Landfill

8.5.4 Project W-04: Improving River Quality and River Use

Project W-04	Improving River Quality and river use	
Outline of the Project (Long-term goals targeting 2035)		
Existing Problem	18. Need for enforcement of the public initiative	
Objective	To improve the public water quality based on environment standard	
Project Goal	Establishment of monitoring system	
Target Area	City Area	
Managed data	Assessment of Chemical Oxygen Demand (hereinafter referred to as COD), Biochemical Oxygen Demand (hereinafter referred to as BOD) and odor value	
Issues to be Solved	<ul style="list-style-type: none"> Untreated miscellaneous wastewater flows into the public water area 	
Indicators (KPI)	<ul style="list-style-type: none"> COD and BOD figure 	
Short-term Actions (Priority projects targeting 2025)		
Implementation Body	Main	Private Business, Provincial Administration
	Sub	DPWT
	Relevant Organizations	DoT, DPT
Main Action [Key Player]	<ol style="list-style-type: none"> Monitoring for water quality and odor of Siem Reap River using sensor. [DPWT] Development of water quality improvement plan and spatial planning along Siem Reap River [Provincial Administration, DPWT, Private Business] Implementation of Siem Reap River water quality improvement [DPWT, Private Business] Implementation of spatial planning [Provincial Administration, DoT, Private Business] Data storage and publication on data platforms [DPT] 	
Fund Source Business Model	Water quality monitoring is important as a tourist city in the maintenance plan after restoration work for Siem Reap River that is currently being implemented. In order to make the riverfront one of the places to attract tourists from the viewpoint of landscape and revetment maintenance, the Provincial Administration shall strive to conserve water quality by artificially creating a flow in Siem Reap River. The facilities will be discussed about national budget from MOT and Provincial Administration or utilization of Development Partners' fund. If it is possible, Provincial Administration shall create the tourism development fund for maintenance.	
	Initial Cost	Public budget (Provincial Administration, MOT, Development Partners (Cost for reference: USD 2,000/km (bank construction), USD 100,000/km (installation of water purification system), USD 50/m ³ (water purification material), USD 100,000 (software development cost))
	O&M Cost	Public budget (Provincial Administration, earmarked fund)



Source: MLMUPC



Source: Photock

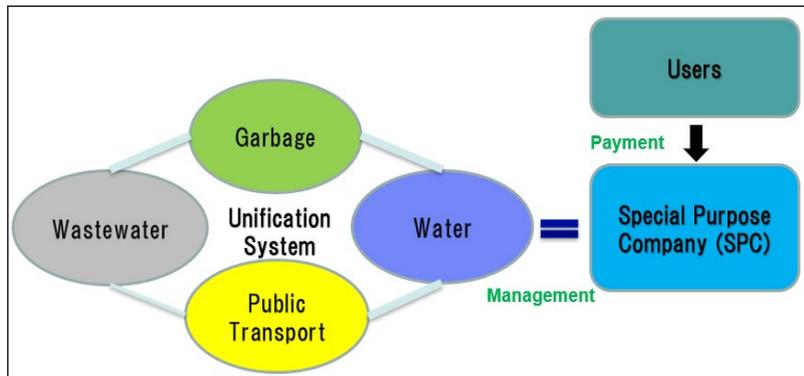
Figure 8.10: Images of River Use

8.5.5 Project W-05: Wastewater Facility System Improvement

Project W-05		Wastewater Facility System Improvement	
Outline of the Project (Long-term goals targeting 2035)			
Existing Problem	19. Need for engineering of infrastructure		
Objective	The sewage line and treatment facility will be enhanced, and a maintenance system will be established.		
Project Goal	To develop the maintenance system for wastewater sector to achieve the long-life plan and crisis management. (Creating a database for pipeline information)		
Target Area	City Area		
Managed data	<ul style="list-style-type: none"> Updating wastewater lines inventory book Upstream and downstream tracking information 		
Issues to be Solved	<ul style="list-style-type: none"> How to update the inventory book Willing to pay wastewater fee 		
Indicators (KPI)	<ul style="list-style-type: none"> Ration of payment from household and company Annual maintenance plan 		
Short-term Actions (Priority projects targeting 2025)			
Implementation Body	Main	Provincial Administration, MPWT	
	Sub	DPWT	
	Relevant Organizations	Development Partners	
Main Action [Key Player]	<ol style="list-style-type: none"> Development of the maintenance management system for drainage pipes [DPWT, Provincial Administration] Accumulation of data on existing drainage pipes and monitoring of drainage capacity [DPWT] Planning and financing for new sewage treatment plant [Provincial Administration, MPWT] Construction of new sewage treatment plant 		
Fund Source Business Model	Lack of capacity for sewage treatment has already been clarified in the data, and expansion and new construction are urgent issues. To build a facility larger than the current size, it is necessary to request funds from development partners. However, when considering financial assistance for construction, donors will require MPWT to have a maintenance and treatment plant operation system in place, and management training and fee collection system will be essential.		
	Initial Cost	Public budget (development partners) (Cost for reference: USD 48,000,000 (WWTP of the same capacity of the existing one), USD 13,000,000 (sewage pipes of the same capacity of the existing one))	
	O&M Cost	Public budget (DPWT)	

8.5.6 Project W-06: Public Utilities Charging Unification

Project W-06		Public Utilities Charging Unification	
Outline of the Project (Long-term goals targeting 2035)			
Existing Problem	17. Need for enlightenment towards environmentally friendly actions 18. Need for enforcement of the public initiative		
Objective	To establish a centralized collection system of utility charges to improve the convenience of citizens and to improve administrative efficiency.		
Project Goal	To develop the unification system for public utilities service charge		
Target Area	City Area (main), Tonle Sap Area (sub)		
Managed data	<ul style="list-style-type: none"> Ratio of fee collection Balance statement 		
Issues to be Solved	<ul style="list-style-type: none"> Collection of fees commensurate with the maintenance budget Citizen’s willingness to pay against public utilities charge 		
Indicators (KPI)	<ul style="list-style-type: none"> Balance sheet and statement Ratio of payment 		
Short Term Actions (Priority Projects targeting 2025)			
Implementation Body	Main	Provincial Administration, Special Purpose Company (SPC)	
	Sub	-	
	Relevant Organizations	MPWT, DPT	
Main Action [Key Player]	<ol style="list-style-type: none"> Formulating the subcommittee for waste management Data collection and evaluation of current situation and consideration of new system [City Hall, Provincial Administration, Water Supply Authority, Waste collector, MPWT] Composition of SPC [Water Supply Authority, Waste Collector] Collection / monitoring system development [SPC/City Hall] Utility charge collection, status monitoring [SPC/City Hall] Data storage and disclosure to data platforms [[SPC/City Hall] 		
Fund Source Business Model	Development and operation of a toll system that integrates water and sewage, utility charges for waste, etc. Initial investment (software development) and operating funds will be provided by private companies or SPC (composed of the Provincial Administration and public authorities and private company). In the future, the expansion into electric power and public transportation will be explored.		
	Initial Cost	SPC	
	O&M Cost	SPC, City Hall	



Source: JICA Survey Team

Figure 8.11: Utility Charge Unification System

ANNEX 1: Methods for Updating the Roadmap

● Background

The Siem Reap Smart City Roadmap was drafted based on the results of the "Data Collection Survey on Urban Improvement in Siem Reap City in the Kingdom of Cambodia (2020-2021, supported by JICA)", the outline was approved by the Provincial Governor at the survey's Joint Coordinating Committee (JCC) in December 2021. In May 2022, a Smart City Project⁵ was launched and its team was formulated in collaboration with Siem Reap officials and JICA, and a work plan to finalize the roadmap was proposed by the Smart City Project and approved by the Provincial Governor.

● Purpose

The purpose of the update is to improve the roadmap into a more usable format for the Siem Reap. The need for this update is due to several factors, including that the socioeconomic situation has been significantly transformed by the COVID-19 pandemic. There were major events in 2021, including the 38 road improvement projects and the rise of QR code decision making. In addition, important planning documents were formulated that were not available at the time of development of the roadmap. Therefore, these factors have to be incorporated to the roadmap.

● Timeline

May 2022 to - February 2023

● Methods

The update process was carried out as following.

- Identification of the need for updating: the need to update the Siem Reap Smart City Roadmap was reviewed by the project team and proposed at the first JCC meeting.
- Meetings among stakeholders: Discussions on the content of the roadmap were held between the project team, relevant ministries and stakeholders.
- Review and revision of the updated document: The drafted document was reviewed and revised by the technical working group (TWG), JCC, and Siem Reap Smart City Committee.
- Approval and Adoption: The document was approved by the Smart City Committee and the Smart City Project JCC.

● Discussion

Discussions were held in several individual consultations, monthly Smart City Project Technical Working Group (TWG) meetings, and regular Joint Coordination Committee meetings. The main meetings were held as below.

- JCC 1: 24 May, kick off for the Siem Reap Smart City Project
- TWG 1: 28 June, Planning on the roadmap
- TWG 2: 21 July, Pilot project planning
- TWG 3: 23 Aug, Roadmap updating and Pilot project progress
- Seminar: 12 Oct, Opinion exchange on the roadmap
- TWG 4: 21 Oct, Roadmap updating and Pilot project confirmation
- JCC 1 and Siem Reap Smart City Committee: 31 Oct. 2022, Reporting the Project Progress

⁵ Smart City Project: The project aims to solve individual issues using smart technology in the urban area, and at the same time, build a system on the administrative side and relationships with private companies for related authorities to accumulate experience, and realize a smart city.

- Members who contributed to the update

Members of Joint Coordinating Committee (JCC)	
H.E Tea Seiha	Governor of Siem Reap Province
H.E Ly Samrith	Deputy Governor of Siem Reap Province
H.E. Mr. Yun Linne	Deputy Governor of Siem Reap Province
Mr. Sok Thol	Deputy Governor of Siem Reap Province
Mr. Ly Vannak	Siem Reap Provincial Administration Director
Siem Reap municipality Mayor	
Department of Land Management Urban Planning and Construction Director	
Department of Public Work and Transport Director	
Department of Planning Director	
Department of Tourism Director	
Department of Environment Director	
Department of Post and Telecommunication Director	
Department of Culture and Fine Arts Director	
Deputy Director of Provincial Administration	
Deputy director of technical support and inter-sector Department of Apsara Authority	
Siem Reap Municipality Deputy Mayor	
Deputy Commissioner for Security Planning of Provincial Police Commissioner	
Deputy Commander of Military Police	
Director of Human Resource Management Division	
Finance Division Director	
Mr. Tip Piseth	Planning and Investment Division Director
Inter-Sectoral Division Director	
Public Relations and International Cooperation Division Director	
Chief of Investment Office	
IT Support Department of Angkor Enterprise	
Other members from Siem Reap Provincial Administration	
Chief of Investment Office	
Chief of Planning Office	
Chief of Economic and Social Affairs Office	
Chief of Information and Statistic Office	
Deputy Chief of the International Relations and Cooperation Office	
Deputy Chief of Investment Office	
Officer at the Finance Office	
Contracted Officer of Investment Office	
JICA and JICA Expert Team	
Deputy General Director, Urban and Regional Development Group Infrastructure Management Department, JICA	
Director, Urban and Regional Development Group Infrastructure Management Department, JICA	
Officer in charge of the Project, JICA	
Assistant Expert in charge of the Project, JICA	
Representative, JICA Cambodia Office	
Project Formulation Advisor, JICA Cambodia Office	
Program Officer, JICA Cambodia Office	
JICA Expert: Chief Advisor/Project Manager	
JICA Expert: Smart City/Project Coordinator	
JICA Consultant Team Leader / Smart Technology and PPP Expert	
JICA Consultant Team Deputy Leader / Finance and Project Planning Expert	
JICA Consultant Team Member/ Pilot Project Planning and Implementation / Branding	
JICA Consultant Team Member/ Data Management Expert	
JICA Consultant Team Member/ Solid Waste Collection Expert	
Mr. Thach Soksoviceha	Coordinator, translator and interpreter
Mr. Kang Chhivly	Coordinator, translator and interpreter
Mr. Tak Tey	Coordinator

ANNEX 2: Budget Plan

The Budget Plan is shown below. This is a rough estimate of how much initial cost and annual cost will be required for carrying out each of the implementation measures and priority projects and is for reference only. With some exceptions, budgetary measures are not currently being pursued, and will need to be reviewed as appropriate.

No.	Priority Projects	Initial Cost (USD)	Operating budget plan (USD/per year)	Organization in charge for operating
D-01	Integrated Data Collection and Analysis	1,000,000 (Data center) 300,000 (software development), 400,000 (environment setup) 50,000 (data input)	250,000 (maintenance)	SRPA
D-02	Data Dissemination to Relevant Stakeholders	Borne by D-01	Borne by D-01	SRPA
T-01	Tourism Promotion Platform Development	Depends on the business	Depends on the business	Private sector
T-02	Centralized Reservation and Payment System	Depends on the business	Depends on the business	Private sector
T-03	Shared Mobility Development	Depends on the business	Depends on the business	Private sector
T-04	Maas Introduction	Depends on the business	Depends on the business	Private sector
T-05	Contactless Payment Development with QR Codes	Depends on the business	Depends on the business	Private sector
T-06	Local Tourism Experience Enhancement using AR	Depends on the business	Depends on the business	Private sector
M-01	Official Parking System Introduction	1,000,000	Covered by parking fees. (Subject to change depending on the direction in charging for parking fees)	DPWT/Private sector
M-02	Road Condition Monitoring	200,000	Utilizes the regular maintenance cost	DPWT
M-03	Street Lighting Improvement	(38 road construction project covered)		SRPA
M-04	Traffic Signal System Improvement	15,000,000	2,500: The maintenance cost of the Phnom Penh traffic control and maintenance system is approximately USD 119,000/year with 100 intersections	DPWT
M-05	Traffic Safety Management Improvement	500,000	10,000	DPWT

No.	Priority Projects	Initial Cost (USD)	Operating budget plan (USD/per year)	Organization in charge for operating
M-06	EV Promotion		Being surveyed	Private Sector
S-01	CCTV System Introduction	Hardware: 38 road construction projects covered	36,000 (CCTV networking)	SRPA
S-02	Flood Warning System Development	100,000	15,000	SRPA
S-03	Fire Alarm System Installation	300,000	4,000	Provincial Police
S-04	Public Relations Improvement for Safety	30,000	Covered in the daily operation	Provincial Police
W-01	Solid Waste Management System and Environmental Education	500,000	Covered in the daily operation	DoE
W-02	IoT Installation for Garbage Collection	(MoE installed the system of garbage monitoring system)		
W-03	Landfill Management	20,000,000	Being surveyed	DoE, MoE, SRPA
W-04	Improving River Quality and River Use	1,000,000	300,000/year	SRPA, Private sector
W-05	Wastewater Facility System Improvement		Not specified	MPWT, SPRA, APSARA Authority
W-06	Public Utilities Charging Unification	300,000	150,000/year	Special Purpose Company

ANNEX 3: Progress of the Action Plan

The progress of implementation measures and priority projects from 2021, when the roadmap was developed, to 2023 is shown below.

1. Enhancement and Operation of the Smart City Committee

The Smart city committee has been enhanced as outlined in the roadmap in June 2022. The current Smart City Committee is comprised of the following members.

- **Chair:**

- Governor, Siem Reap Province

- **Members**

- Deputy Governor, Siem Reap Province
- Administration Director, Provincial Administration
- Director, Department of Public Works and Transport
- Director, Department of environment
- Director, Department of Post and Telecommunication
- Director, Department of Land Management, Urban Planning, Construction and Cadastral
- Director, Department of Tourism
- Director, Department of Planning
- Director, Department of Culture and Fine Arts
- Department's Vice Director, Apsara authority
- Information Technology Supporter, Angkor Enterprise
- Vice Commissioner, Provincial Police Commissioner
- Vice Commander, Military Police
- Mayor, SR Municipality Hall
- Vice Mayor, SR Municipality Hall
- Director, Division of Planning and Investment
- Director, Division of Public Relations and International Cooperation
- Director, Division of Human Recuse Management
- Director, SR Finance Division
- Director, Division of Inter-Sector
- Chief of Economic and social affairs office, Division of Inter-Sector
- Chief of Planning Office, Division of Planning and Investment
- Chief of Information Office, Division of Administration
- Chief of Investment Office, Division of Planning and Investment
- Vice Chief of Investment Office, Division of Planning and Investment
- Vice Chief of International Relation Office, Division of Public Relations and International Cooperation
- Officer, Finance Division

The SCC is expected to proceed with the following

- Establish of task forces for specific work: The formation of task forces should be considered in the implementation of pilot projects, etc.
- Budgetary measures: In order to make the Smart City Committee a regular meeting, budgetary measures should be considered.

2. New Establishment of the Smart City Promotion Division

The Siem Reap Provincial Administration is in the process of coordinating with the central ministries. The goal is to establish a new department and consider budget allocations to make the Siem Reap Smart City Sustainable.

3. Industry-Academia-Government-Community Platform (Smart City Consortium)

In order to realize the Smart City Consortium, the following meetings have been held related to this matter.

- October 12, 2022: Briefing on Siem Reap Smart City Roadmap (Participants: representatives of the public, private sector, universities, development partners)
- November 22, 2023: Academia - Provincial Government Workshop: participants: 3 universities

4. Monitoring and Evaluation System

A monitoring and evaluation system for smart cities will be summarized in a separate report, which is currently being studied by a project team with the aim of being established by 2024.

5. Public relations and branding measures

Public relations activities are carried out as follows

- Operating of social networking service: Facebook is being operation as a trial
- Implementation of roadmap briefing sessions: Roadmap briefing was held on October 12
- Participation in international conferences: A booth was exhibited at the Japan-ASEAN Smart City High Level Meeting



- Collaboration with other cities: Discussions are underway at the staff level with Japanese cities implementing smart cities.

6. The Development of the Data Platform and Promotion of Open Data

A structure for having a data platform is being considered within the Smart City Project. It is necessary to collaborate with specialists in various fields, including consideration of establishing a smart city consortium.

7. Improving the Business Environment

The Investment Law has been revised. This will be carried out in conjunction with the Smart City Promotion Division's actions mentioned above. Similarly, it is necessary to establish a system to incorporate the initiatives of the central government into Siem Reap, while confirming the initiatives of the central government.

8. Improving Incubation Functions

In February 2021, a smart city business competition was announced and implemented by the provincial administration and JICA. Starting in May 2022, the current smart city project is underway to provide capacity development to the public sector, including on-the-job training.

9. Area management

The area management initiative is being implemented with waste management as its cue. A sub-committee on waste management is in the process of being prepared. A priority Sangkat will be developed, and pilot project areas will be identified.

(Priority Project)

10. D-01 Integrated Data Collection and Analysis

Action in progress/completed	1. Coordination of relevant agencies for development of cross-sectoral data platform [Provincial Administration]
Action to be completed	2. Planning and development of data platform (cloud service contract or installation of new on-premises system) [Provincial Administration, DPT, Private Business] 3. Input of existing statistical data into the data platform [Provincial Administration, Provincial Departments in charge of each sector, Provincial Police] 4. Input of data from other projects into the integrated data platform [Provincial Administration, Provincial Departments in charge of each sector, Provincial Police] 5. Maintenance and inspection of the entire system [Private Business, DPT]

Currently, the Smart City Project is gathering information on the state of data and building relationships with experts in a variety of fields. As stated in the implementation measures above, the direction of the data handling will be discussed with the various stakeholders involved.

11. D-02 Data Dissemination to Relevant Stakeholders

Action to be completed	1. Consideration of rules and regulations for data handling [Provincial Administration, DPT] 2. Data processing for privacy consideration for data release [DPT] 3. Release each information stored in Project D-01 to the public through API with consideration for privacy protection [Provincial Administration, DPT]
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This project is currently in the study phase, as it is the next phase of D-1. Meanwhile, pilot projects and other activities are being used to organize rules for data handling and to improve capacity for information disclosure.

12. T-01 Tourism Promotion Platform Development

Action in progress/completed	1. Understanding the needs of visitors to Siem Reap (tourism, MICE, etc.) and planning related to promotion, etc. [DoT] 2. Development of a platform to publish promotional contents [Private sector (system developer)] 3. Development of promotional contents and posting them on the platform (VR, etc.) [Private sector (tourism service providers)]
	4. Operation of the promotion platform [private sector (system developer)] 5. Accumulate and publish data on the data platform [DPT].

Starting in 2022, the Siem Reap Tourism Club (STC) will participate in the Siem Reap Smart City Project as an advisor. Although this is a private sector-based initiative, the development of a tourism platform is in the process of being prepared.

13. T-02 Centralized Reservation and Payment System

Action in progress/completed	1. Planning and study of one-stop reservation and settlement for tourism services [Private Sector]
Action to be completed	2. Creation of a one-stop platform for reservation and settlement of tourism services [Private Sector (System Developer)] 3. Attracting the listing of various tourism services [DoT]. 4. Operation of reservation and settlement platform [Private sector (system developer)] 5. Accumulate and publish data in the data platform [DPT]

Same as above, implementation is expected to be done in collaboration with the private sector. A private entity is developing the project.

14. T-03 Shared Mobility Development

Action in progress/completed	<ol style="list-style-type: none"> 1. Study of feasible forms of mobility (from regulatory and demand perspectives) [Provincial Administration] 2. Development of hardware and software infrastructure for the introduction of shared mobility [Provincial Administration, private sector operators (business operators)] 3. Operation of pay-as-you-go shared mobility [Private sector operators (business operators)]
Action to be completed	<ol style="list-style-type: none"> 4. Monitoring of operations [Provincial Administration] 5. Data accumulation and disclosure in data platform [DPT]

In 2021, a shared mobility hub has been developed and operated in Siem Reap city by a private company.

On the other hand, the challenge will be data acquisition and monitoring by provincial administrations. How and by whom the data will be acquired will be a matter for further consideration.

15. T-04 Maas Introduction

Action in progress/completed	<ol style="list-style-type: none"> 1. Planning and study of tourism MaaS development [Provincial Administration] 2. Coordination with stakeholders [Provincial Administration] 3. BTourism MaaS system development [Private sector (system developer)]
Action to be completed	<ol style="list-style-type: none"> 4. Arrangement of transportation modes to be registered [Private sector (each transportation mode operator)] Promotion to users [Provincial Administration, private operators (system developers)] 5. Operation of the system [Private operator (system developer)] 6. Data accumulation and disclosure on the data platform [DPT]

Tourism Maas is also being implemented in collaboration with the private sector and provincial administration and is currently in the trial stage.

The implementation of sustainable business practices and the acquisition of data will need to be considered in the future.

16. T-05 Contactless Payment Development with QR Codes

Action in progress/completed	<ol style="list-style-type: none"> 1. Planning and study of a contactless payment system [Provincial Administration] 2. System development [Private sector (system developer)] 3. Explain the system to local stores [Provincial Administration] 4. Operation the system [Private sector operators (system developer)]
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The COVID-19 pandemic has led to the spread of KHQR code payments throughout Cambodia. KHQR is a universal Quick Response (QR) code system created for retail payments in Cambodia that requires only a QR code to accept payments from any mobile app. As of the time of service launch (2022), 37 banks and financial institutions are participating in the KHQR code payment service, of which 29 banks and financial institutions have successfully operated in approximately 230,000 stores nationwide.

The challenge is that existing QR payments are not compatible with traveler payments (limited to Cambodia's partner banking system). Some QR devices are linked to credit card payments, and their widespread use is required.

17. T-06 Local Tourism Experience Enhancement using AR

Action in progress/completed	<ol style="list-style-type: none"> 1. Planning of virtual contents (including AR) [DoT, APSARA National Authority, private sector operators (each tourism facility operator)]
Action to be completed	<ol style="list-style-type: none"> 2. Development of hardware infrastructure (e.g., QR code signs) for access to virtual contents [DoT, APSARA National Authority, private sector (operators of tourist facilities)] 3. Establishing, disseminating, and developing rules for the use of virtual contents [DoT, APSARA National Authority]

With the support of Japan's Ministry of Land, Infrastructure, Transport and Tourism, AR is being studied, and a survey is underway to plan and develop virtual content. The survey will be compiled in March 2023.

18. M-01 Official Parking System Introduction

Action to be completed	<ol style="list-style-type: none"> 1. Formulation and enforcement of street parking fee system, formulation and operation of toll system (designation of special zones for roads around Pub Street, etc.) [Provincial Administration] 2. Designation and marking of toll street parking lots [Road Manager (DPWT, Provincial Administration)] 3. Contract form and operator selection of street parking operator [Provincial Administration] 4. Installation of parking sensors on roads (designated special zones) around Pub Street [Parking lot operator] 5. Street parking fee collection business and providing the fullness/emptiness information of the parking [Parking lot operator]
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A smart parking demonstration was conducted in Siem Reap city in December 2021. For implementation, reform of the fee system needs to be discussed and is planned.

19. M-02 Road Condition Monitoring

Action to be completed	<ol style="list-style-type: none"> 1. Identify the target of the users. Determine who the application will target and who will benefit most. This could include drivers, transportation companies, government agencies, or other stakeholders. [Provincial Administration] 2. Promote the application. Use a variety of channels to promote the application and increase awareness among the target audience. This could include social media, website advertising, email campaigns, and other marketing strategies. [DPWT] 3. Provide training and support. Provide training and support to help users understand how to use the application effectively. [Provincial Administration] 4. Facilitate feedback. Encourage users to provide feedback on problems and improvements with the application. [Provincial Administration] 5. Monitor usage and results. Monitor application usage and outcomes to assess its effectiveness and identify areas for improvement. [DPWT] 6. Collaborate with relevant organizations. Collaborate with relevant organizations. [DPWT]
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Feasibility study to introduce remote sensing technology using drones for infrastructure measurement was conducted in 2022. Management of road infrastructure will be studied from a multidisciplinary perspective.

The Road Care Mobile App developed by Ministry of Public Works and Transport is being the good practice for the initiative. The MPWT has received approximately 6,000 reports of potholes and other road damage through the Road Care Mobile App since its launch in December 2018. App users take photos of the damage, tag the location, and send them through the app. The ministry is working with municipalities to address most of the reports as quickly as possible (some are incorporated into long-term development plans). The app helps the ministry prioritize its work based on the issues that affect the most people.

However, its use in Siem Reap is limited, and it is expected that applications will be utilized.

20. M-03 Street Lighting Improvement

Action in progress/completed	<ol style="list-style-type: none"> 1. Determination of street lighting installation section and specifications on the road around Pub Street and on NR6 [DPWT] 2. Installation of the sensors attached to the street lighting [Street lighting provider, Sensor provider]
Action to be completed	<ol style="list-style-type: none"> 3. Connection with telecommunication equipment [Telecommunications service provider] 4. Accumulation of various data on the data platform and opening the data to public [DPT]

Improvements to street lighting were made through the 38 Road Construction Project, which installed as many as 5,300 smart streetlights. These streetlights are capable of switching electric lights based on brightness, which is expected to lead to more efficient use of electricity.

On the other hand, data storage and connections have not yet been made. Since the scalability of the equipment exists, implementation will be considered.

21. M-04 Traffic Signal System Improvement

Action to be completed	<ol style="list-style-type: none"> 1. Determining the target traffic signals/zone to network traffic signals [DPWT] 2. Procurement of traffic signal linkage equipment, signal control, traffic control, etc. [DPWT] 3. Installation of traffic signal linkage equipment, signal control, traffic control, etc. [Traffic
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	signal and signal control system developer] 4. Operation of traffic signal linkage equipment, signal control, traffic control, etc. [DPWT]
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Improvements to the traffic signal system were also made through the 38 Road Construction Project, and 20 signals were improved. On the other hand, these signals are stand-alone and not connected to the traffic control system.

22. M-05 Traffic Safety Management Improvement

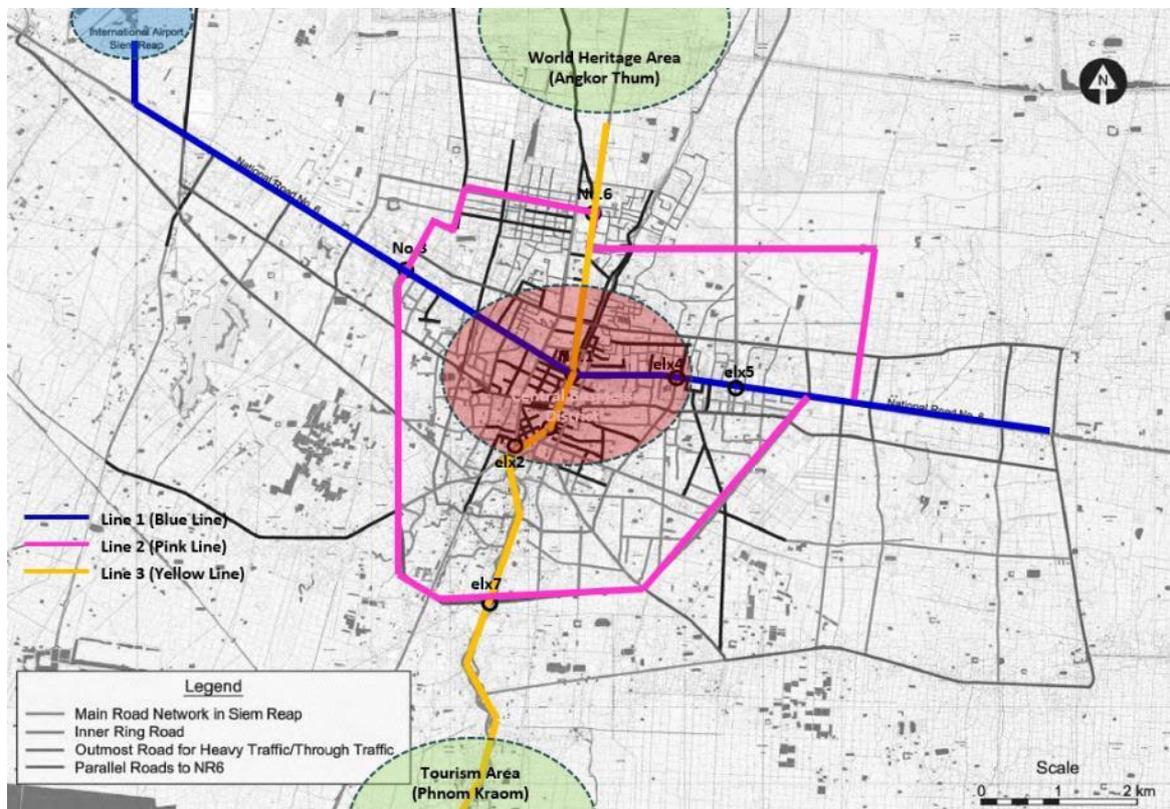
Action to be completed	<ol style="list-style-type: none"> 1. Formulation of items for specifying traffic incidents, data acquisition plans, and plans for reflection on countermeasure projects [DPWT, Provincial Administration] 2. Securing and arranging cooperators for installation of the application and drive recorder [Provincial Administration] 3. Installation of application service for collection of driving behavior [Service provider] 4. Data collection, accumulation of status survey results, and data provision [Service provider] 5. Accumulation of various data on the data platform and opening the data to public [DPT] 6. Holding traffic safety training for drivers [Provincial Police]
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At present, no specific action has been taken because there are no collaborators for data collection. The Project plans to look for collaborators, including private companies.

23. M-06 EV Promotion

Action to be completed	<ol style="list-style-type: none"> 1. Formulation of policy for promotion of EV introduction [Provincial Administration] 2. Introduction of charging spots and EV for PoC [Provincial Administration] 3. Monitoring of EV tuk-tuk using subsidies, convenience evaluation, survey of willingness to pay by domestic and foreign tourists [Provincial Administration] 4. Introduction of EV as a business [EV provider]
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EV charging stations have been installed in Siem Reap city. A pre-FS for the introduction of electric buses is currently planned to be funded by the Cities Development Initiative for Asia (CDIA). Electric tuk-tuks are being piloted by private companies that partially implement shared mobility. Preferential treatment for electric vehicles will need to be considered at the national level.



Source: Pre-Feasibility Assessment on Electric Buses in Siem Reap, Cambodia

Map of Proposed 3 Lines for e-bus

24. S-01 CCTV System Introduction

Action in progress/completed	1. CCTV installation [Provincial Administration]
Action to be completed	2. Data monitoring system development for existing CCTVs (including 6 for traffic monitoring and 20 for street environment monitoring in the Pub Street area) [Private Business] 3. Development for an operation and monitoring structure and system for security maintenance [Provincial Police] 4. System operation and maintenance [Private Business] 5. Data processing system development for privacy protection [Private Business] 6. Accumulation and disclosure of processed data to the data platform [DPT]

Two hundred CCTVs have been installed through the 38 Road Construction Project.

The optimization of their operation methods will be studied.

25. S-02 Flood Warning System Development

Action to be completed	1. Formulation of sensor installation plan [Provincial Administration, Provincial Police, and civil association] 2. Explanation to stakeholders (local residents, etc.) [Provincial Administration] 3. Installation of sensors in the city center (Old market, Pub Street area, etc.) [Private Business (fire alarm manufacture)] 4. Data visualization and dissemination [Provincial Administration]
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Specific actions have not yet been taken. On the other hand, the capacity development necessary for data collection is underway using environmental sensors in the provincial administration.

The location of specific sensors will be considered in the future.

26. S-03 Fire Alarm System Installation

Action to be completed	1. Formulation of fire alarm installation plan [Provincial Administration, Provincial Police, and civil association] 2. Explanation to stakeholders (local residents, etc.) [Provincial Administration] 3. Installation of fire alarms in fire vulnerable areas in the city center (Old market, Pub Street area, etc.) [Private Business (fire alarm manufacture)] 4. Training and educational activity on rapid evacuation and initial fire suppression using information from fire alarms [Provincial Administration, Provincial Police]
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In the Old Market area of Siem Reap, capacity development for disaster reduction is being conducted in cooperation with a Japanese university. It is envisioned that this area will be used as a model area to develop a disaster resilient community.

27. S-04 Public Relations Improvement for Safety

Action to be completed	1. Establishment of a system for centralized collection and management of daily crime and traffic accident-related information within the Provincial Police [Provincial Police] 2. Development of tools and systems for disseminating crime and traffic accident-related information [Private Business (system providers)] 3. Dissemination of the above information on crime and traffic accidents through the Provincial Police and Provincial Administration web pages and tourism applications [Provincial Police]
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CCTV and a control room for this purpose have been established in the 38 Road Construction Project.

In the future, it will be necessary to expand the capacity of the Siem Reap administration, including job responsibilities, for the efficient operation of that system. At the same time, it will be necessary to establish and disseminate rules for the handling of CCTV.

28. W-01 Solid Waste Management System and Environmental Education

Action in progress/completed	1. To select and discuss solid waste management systems (collection/disposal/fee collection) [DoE, Model District] 2. Planning of implementation method and management system, explanation, and consensus to citizen [Provincial Administration, DoE, Model District]
Action to be completed	3. Implementation of solid waste management system (collection/disposal/fee collection) [Model District] 4. Introduction of the method of the environmental education by using technologies [Provincial Administration]

	Administration] 5. Introduction of environmental education and guidance to household to reduce waste and recycling [Model District]
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- Changes: Title updated for clarity. Other contents were expanded.

The development partners (GIZ and JICA), in cooperation with Siem Reap City, have formed a sub-committee for waste management in accordance with Sub-decree 113.

In the future, priority areas will be established, and pilot projects will be implemented as model districts. In addition, environmental education using projectors is also being considered.

29. W-02 IoT Installation for Garbage Collection

Action in progress/completed	1. Installation of the sensor for garbage track
Action to be completed	2. Preparation of waste management plan [City Government, APSARA National Authority] 3. 1Explanation of implementation method and waste management plan to communes to make consensus. [City Government, Communes, Concessionaire] 4. Sensor will be installed in the garbage box to clarify the volume. [City Government, Concessionaire] 5. Accumulation the related data (amount of garbage and) [City Government,] 6. Utilizing the IoT system for efficient garbage collection

All garbage trucks are equipped with GPS (implemented by MoE).

In the future, Siem Reap officials will examine ways to utilize said GPS, including considering more efficient timetables and routes.

30. W-03 Landfill Management

Action to be completed	1. Discussing for the management of the landfill [Provincial Administration, Concessionaire, APSARA National Authority] 2. Preparation of implementation plan and request form for sanitary landfill [Provincial Administration, Concessionaire, APSARA National Authority] 3. Design and construction of the sanitary landfill that comply with the environmental standards [Provincial Administration, Development Partners] 4. Plan for appropriate operation and management of sanitary landfill [Private Business]
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World Bank conducted the study. The World Bank, in cooperation with several ministries, is planning a six-year, \$60 million project to improve solid and plastic waste management in five provinces, including Siem Reap.

31. W-04 Improving River Quality and River Use

Action in progress/completed	1. Development of water quality improvement plan and spatial planning along Siem Reap River [Provincial Administration, DPWT, Private Business] 2. Implementation of Siem Reap River water quality improvement [DPWT, Private Business] 3. Implementation of spatial planning [Provincial Administration, DoT, Private Business]
Action to be completed	4. Monitoring for water quality and odor of Siem Reap River using sensor. [DPWT] 5. Data storage and publication on data platforms [DPT]

The 38 Road Construction Project has developed the river space. Along the river, sidewalks, benches, and streetlights have been built, and many people enjoy the group activities. Water quality sensors should be considered simultaneously with the Flood Warning System.

32. W-05 Wastewater Facility System Improvement

Action to be completed	1. Development of the maintenance management system for drainage pipes [DPWT, Provincial Administration] 2. Accumulation of data on existing drainage pipes and monitoring of drainage capacity [DPWT] 3. Planning and financing for new sewage treatment plant [Provincial Administration, MPWT] 4. Construction of new sewage treatment plant
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Business Verification Survey by JICA for water facility mapping is being surveyed

33. W-06 Public Utilities Charging Unification

Action in progress/completed	1. Formulating the subcommittee for waste management [City Hall]
Action to be completed	2. Data storage and disclosure to data platforms [DPT] 3. Data collection and evaluation of current situation and consideration of new system [Provincial Administration, Water Supply Authority, Waste collector, MPWT] 4. Composition of SPC [Water Supply Authority, Waste Collector] 5. Collection / monitoring system development [SPC] 6. Utility charge collection, status monitoring [SPC]

Aiming to achieve Subdecree 113 in waste management, a method of payment for waste will be studied. The need for integration with water and wastewater is the next step and has not yet been started.

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