

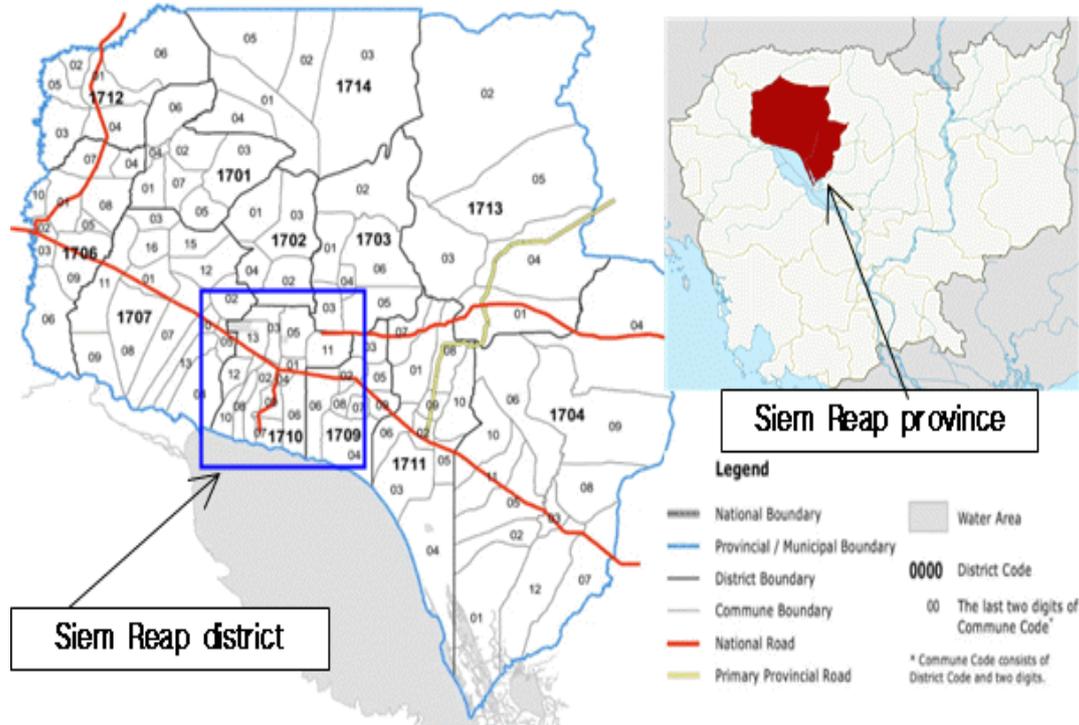
**Ex-post Evaluation of  
Construction of Siem Reap Sewerage System and  
Improvement of Siem Reap River Project  
in the Kingdom of Cambodia**

**- Executive Summary -**

**April 2021**

## 1. Project Overview

- 1) **Project Name** : Construction of Siem Reap Sewerage System and Improvement of Siem Reap River (the “Project”)
- 2) **Project Area** : Siem Reap District, Siem Reap Province



<Figure 1> Project Area

- 3) **Project Objective** : The objective of the Project was to construct a sewage treatment facility in the project area and conduct river maintenance. Consequently, improving water quality and natural scenery of the riverside will help maintain the reputation of Siem Reap as an international tourist destination as well as improve the local living conditions and sanitation.
- 4) **Project Background** : Project area, where *Angkor Wat*, a World Heritage Site, is located, is socially, economically, and culturally significant in the Kingdom of Cambodia (the “Cambodia”). However, the Project area's living environment has deteriorated due to the increased population and tourist inflow into an area where environmental infrastructure is absent. Furthermore, severe problems were created

due to urban flooding during the rainy season. Therefore, implementation of urban infrastructure improvement projects was needed.

- The sewage treatment sector was prioritized as one of the national tasks in Cambodia's National Strategy Development Plan (2006) to expand the urban sewage supply rate to 75% by 2015.
- The Royal Government of Cambodia ("the RGC") established a sewage treatment facility in Siem Reap to prevent environmental pollution, preserve tourism resources, and improve the living conditions.
- The Government of the Republic of Korea (the "Korean Government") proposed support for sewage treatment facilities by prioritizing aid for improving sanitation and enhancing water management infrastructure through the Cambodia Country Partnership Strategy (the "CPS").
- The two governments agreed to propose the Project during the Policy Dialogue held in December 2007 and the EDCF approved a loan for the Project in 2008.

**5) Project Period :** The Project was planned for 48 months from the effective date of the loan agreement until the completion date. The actual project period was 61 months.

**6) Project Cost :** EDCF provided 72.8% (US\$29,812 thousand) while the RGC provided 27.2% (US\$11,159 thousand) of the total project cost (US\$40,971 thousand).

- Additional expenses were incurred due to changes in the project scope and extended project period. The contingency fund was utilized 4 times, so the total cost increased but did not exceed the EDCF loan limit, using up to 99.6% of the loan.

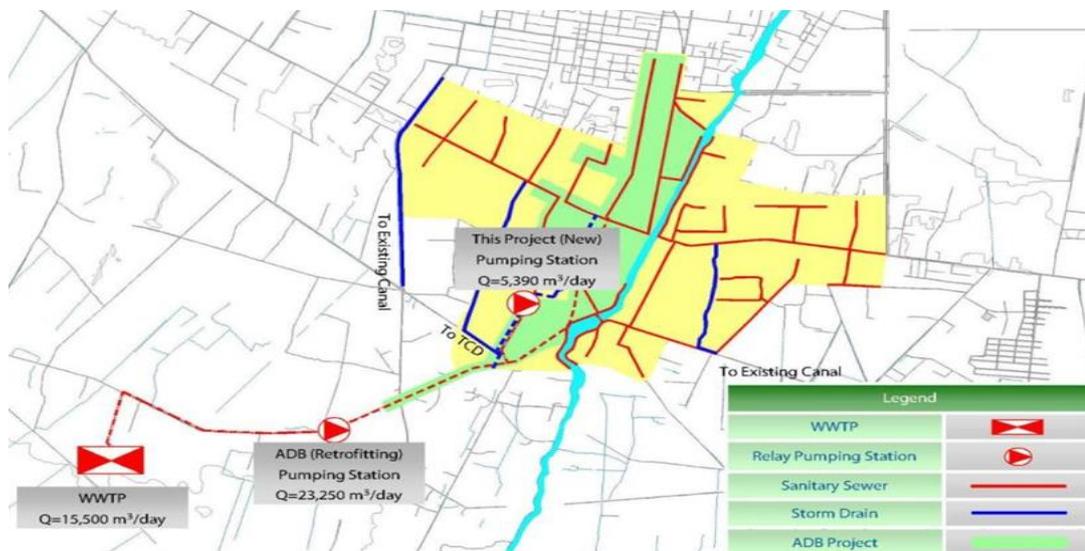
**<Table 1> Project Cost**

(US\$ thousand)

Category	Planned (A)	Actual (B)	Difference (A-B)
<b>Total Project Cost</b>	40,708	40,971	△263
<b>EDCF</b>	29,960	29,812	148

7) **Project Plan** : The Project plan was to construct a sewage treatment facility in the Siem Reap District downtown and conduct river maintenance of the Siem Reap River that flows through downtown.

- EDCF planned to construct the sewage treatment facility (10,000 m<sup>3</sup>/day) next to the sewage treatment facility (5,500 m<sup>3</sup>/day) financed by ADB on the southwestern side of Siem Reap.
- The total planned service area was 670ha, the sum of 365ha on the East Side of the Siem Reap River and 305ha on the West Side, which is not included in the ADB project area.
- Wastewater pipes (47km) and stormwater pipes (6km) were planned for construction in the four Communes within the Project area. Siem Reap River survey, embankment maintenance, and floodgate replacement were also planned for river improvement.



**<Figure 2> Construction Plan of the Sewerage System**

## 2. Evaluation Results

- 1) **Evaluation Purpose :** By analyzing the project performance, this evaluation aimed to provide lessons and recommendations that can be used in promoting similar projects in the future.
- 2) **Evaluation Criteria :** The evaluation was conducted by utilizing the Integrated Evaluation Manual for International Development Cooperation (2018) from the Office for Government Policy Coordination and the EDCF Evaluation Manual (2020). Out of the 5 OECD DAC evaluation criteria, four criteria – relevance, efficiency, effectiveness, and sustainability, excluding impact – were evaluated.
- 3) **Evaluation Method :** The evaluation was conducted based on various relevant reports on the Project and Project area, site visits, surveys, and interviews with the project stakeholders. A score was assigned for each item of the evaluation criteria and the final grade was calculated by giving the same weight (25%) to the average score for each evaluation criterion.
- 4) **Evaluation Results :** The final score is 3.1 out of 4, which is successful.

**<Table 2> Grading System and Result by Evaluation Criteria**

Criteria	Category	Result	Scores
Relevance	- Compatibility of development strategy with needs of the partner country	Relevant	3.7
	- Compatibility with ODA strategy of the donor country		
	- Relevance of project design and implementation		
	- Ownership of the partner country		
Efficiency	- Efficiency of project cost	Efficient	2.7
	- Efficiency of project period		
	- Performance compared to budget input		
Effectiveness	- Degree of achievement on outputs, objectives and goals	Effective	3.0
Sustainability	- Sustainability of manpower, institutions, and finances	Sustainable	3.0
	- Degree of maintenance, management system and risk response		
<b>Total Score</b>		<b>3.1</b>	
<b>Overall Grade</b>		<b>Successful</b>	

**A. Relevance : The Project was relevant (3.7/4.0).**

- Relevance is evaluated based on the compatibility with the development policies and strategies of the partner country, compatibility with the Korean government's country partnership strategy, the relevance of project design and implementation, and ownership of the partner country, etc.
- The Project was consistent with the development policy of the RGC and CPS of the Korean government. The Project aimed to improve the living conditions and help the RGC to create a tourism complex by constructing a sewage treatment facility in downtown Siem Reap, which had emerged as an economic hub.
- The Project was designed considering the connection with the ADB project and reflected the geographical features of Cambodia. However, there were many design changes during the construction, thus the relevance of the project design and implementation is deemed relatively insufficient.
- The performance indicators presented in the Appraisal Report (2008), such as mid/long-term effects, outputs, and outcomes, were appropriately designed.
- Cambodia's central government showed a high sense of ownership by playing a leading role in the loan consultation, site selection, as well as in the design and construction processes. However, the local governments and the on-site operating organization showed a lower sense of ownership.

**B. Efficiency : The Project was efficient (2.7/4.0).**

- Efficiency is evaluated by measuring the appropriateness of the Project's duration and budget compared to the plan.
- The Project as a whole took 61 months, which was 13 months longer than the plan (48 months). After the loan agreement became effective (2009.08), the

Project was completed in September 2014 with an extension due to delays in consultant selection, bidding and contractor selection, and construction.

- There was a change in budget during the project period due to increased raw material prices and labor costs as well as changes in the project details. However, the EDCF loan for the Project (US\$29,812 thousand) was executed within the budget without exceeding the original plan (US\$29,960 thousand).
- Although six years have passed since project completion, there remains difficulty in operating the sewage treatment facility due to damage to the sewage pipes and frequent breakdown of pumping stations. Consequently, sewage is stored in a septic tank and repeatedly transported to a sewage treatment facility using a manure truck. In addition, 81.8% of the sewage is lost in the middle due to inadequate construction of the pipes connecting the houses and the sewage pipes.
- The construction cost of the sewage treatment facility, which is a main facility, was appropriate compared to that of Korean standards. However, considering that the facility is not fully functioning, overall performance compared to input was only partially efficient.

**C. Effectiveness : The Project was effective (3.0/4.0).**

- Effectiveness is evaluated based on the degree of achievement of the project objectives and goals, and the short-, mid-, and long-term performance.
- The capacity of sewage treatment facility and the length of the sewage pipes were reduced to 52% and 76% of the original plan, respectively. Moreover, the capacity of the relay pumping station increased by 354% when compared to the plan. Thus, the output was significantly changed compared to the original plan.
- According to the effluent water quality measurement data of the sewage treatment facility, the Biochemical Oxygen Demand (BOD) of effluent was sound with

33mg/L. However, the Chemical Oxygen Demand (COD) was 135mg/L, which exceeded the limit.

- According to data from the Ministry of Public Works and Transportation (the “MPWT”) and WaterAid, the rate of the sewage treatment service supply for the population reached 50%. However, the sewage treatment rate was only 24%.
- In many cases, individual households were not directly connected to the sewage pipes in the project area. Some of the sewage stored in the sewage pipes flew back and were discharged to nearby paddy fields. These factors led to the low sewage treatment rate.
- The river water quality of the Siem Reap River, which was a mid-to long-term indicator, had improved significantly (BOD: 2.2mg/L, COD: 3.9mg/L). As a result, the living environment of local residents had improved. Therefore, 84% of residents responded that they are satisfied with the project results.
- The effect of river maintenance is evaluated as excellent, as the river surroundings have emerged as a major tourist destination due to elimination of odor and improvements in the river landscape.
- The sewage treatment component of the Project did not present the expected results, but the river maintenance component was carried out as planned. Therefore, the effectiveness of the Project was moderate.

**D. Sustainability : The Project is sustainable (3.0/4.0).**

- Sustainability evaluates whether the partner country has the technical and institutional capabilities for maintaining the facility.
- MPWT, the central government body of Cambodia, has established strategies and policies for sewage treatment at the national level. In October 2016, the

government established a department dedicated to sewage management.

- However, the local sewerage office of MPWT cannot adequately cope with the damage and breakdown of sewage facilities. Therefore, the sustainability of the Siem Reap sewage treatment facility in terms of human resources is not high.
- In addition, the local sewerage office cannot adequately respond to damages and breakdowns of the facility as it is difficult to procure components or parts of the system, which were made in Korea.
- In the Siem Reap District, the sewage tax policy was newly introduced and the tax has been collected after the sewage treatment facility was established. However, some residents occasionally refuse to pay sewage treatment fee, causing difficulties for collectors.

**E. Cross-cutting Issues :** The health and hygiene in the Project area has improved. However, some residents complained about the odor generated during the sewage treatment process.

### **3. Lessons and Recommendations**

#### **1) Lessons Learned**

##### **A. Success Factors**

- The success factors include establishment of close partnership between the donor and the partner country, and high sense of ownership by the central government of the partner country.

##### **B. Limitations**

- The Project was jointly promoted and implemented with ADB. However, the

operation of the sewage treatment facility was limited due to poor construction in ADB's project scope and lack of proper maintenance due to technical incapacity of the project operating organization.

- A large-scale design change occurred during the detailed design and construction stages due to insufficient primary investigation during the pre-construction phase.
- The project period was slightly extended due to Cambodia's delayed administrative process and unexpected design change request from the MPWT.

## **2) Recommendations**

### **A. Recommendations for EDCF**

- There must be sufficient primary investigation for the project area during the feasibility study to prevent frequent design changes as well as to set realistic project cost estimate and project period. When establishing the project plan, it is necessary to fully prepare the operation and maintenance (the "O&M") plan, including the procurement plan for Korean components or parts.
- The Project's scope and cost were significantly changed during the detailed design and construction process. Furthermore, the construction period was extended with the change of project scope. Therefore, it is necessary to remove as much uncertainty as possible by conducting thorough feasibility study.
- In addition, it is essential to provide systematic follow-up training to strengthen Cambodia's maintenance capability. In consideration of the difficulties in tracking project performance due to insufficient record of O&M data, it is crucial to encourage the partner country to recognize the importance of regular monitoring and the systematic management of operation data.
- When using components or parts made in Korea during the construction process,

it is necessary to procure enough spare parts or establish a detailed procurement plan so that the O&M can be easier.

## **B. Recommendations for the RGC**

- Modifying the laws and national standards related to the sewage system is required for the advanced sewage management. In addition, for efficient maintenance of sewage facilities, it is necessary to secure financial resources with the improved fee collection system.
  
- As there are difficulties related to the lack of various standards and guidelines in the sewerage facility construction, it is also required to improve and enact relevant laws and regulations at the national level.
  
- The Socialist Republic of Vietnam (“Vietnam”), a neighboring country, has a good example of improving the efficiency of water supply and sewage facility construction and operation through public-private partnership projects. Cambodia needs to benchmark this case of Vietnam for the advanced sewage system.
  
- Furthermore, there are issues regarding fee collection as some users refuse to pay under the current billing system. Introduction of an integrated billing system for water supply and sewage treatment fees is expected to reduce tax resistance and improve financial sustainability in the future.