

# **Ex-Post Project Evaluation 2020: Package IV-1 (Morocco, India)**

**February 2022**

**JAPAN INTERNATIONAL COOPERATION AGENCY**

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**Octavia Japan, CO., LTD.**

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The Kingdom of Morocco

FY2020 Ex-Post Evaluation Report of Japanese ODA Loan

“Sewage System Development Project (II)”

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## 0. Summary

In this project, sewage systems were installed to increase the number of areas served by sewage systems in small and medium-sized cities in Morocco, thereby contributing to the improvement of hygiene and the living environment of residents. In the *Economic and Social Development Plan* and the *National Sewage Plan*, formulated by the government of Morocco, the need to upgrade sewerage facilities and sewerage connection rates, as well as improve public health and the environment was paramount. In the small and medium-sized cities in Morocco, there is a significant need for the development and expansion of sewage treatment facilities and sewage networks, and consistency with Japan’s ODA policy is confirmed. Therefore, the relevance is high. While the actual project cost was within the initial plan, the project period was longer than the initial plan, as the process of procuring consultants and contractors required a significant amount of time; thus, efficiency is fair. Regarding the quantitative effect indicators, the target values were almost achieved or the actual values were close to the target values, whereas the BOD<sup>1</sup> (sewage treatment plant exit) has not been achieved. On the other hand, it was confirmed during the interviews that by improving sewage treatment facilities, etc., this project has contributed to the conservation of water quality of the water sources around the target areas and has prevented flooding from rainwater and sewage, the sanitation and environmental conditions, as well as the living environment of residents have improved. Therefore, the effectiveness and impact are judged to be fair. There are no major concerns regarding the organizational structure, technical aspect, financial aspect and operational maintenance status of the ONEE<sup>2</sup> local organizations or the contractors (private companies) responsible for the operation and maintenance of the developed facilities, therefore, sustainability is judged to be high.

In light of the above, this project is evaluated to be satisfactory.

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<sup>1</sup> Biochemical Oxygen Demand (BOD) - the amount of oxygen required to decompose organic matter in water.

<sup>2</sup> Before the start of this project, the executing agency was the Office National de l’Eau Potable (ONEP). However, after the reorganization of the administrative organizations in 2012, it became the Office National de l’Electricite et de l’Eau Potable (referred to as the “ONEE”). Throughout this evaluation report, the notation is unified to “ONEE.”

## 1. Project Description



Sewage treatment facility  
developed by this project  
(El Kelaa des Sraghna City)



Sewage treatment facility  
developed by this project  
(Amizmiz City)

### 1.1 Background

In Morocco, where population growth and urbanization was progressing rapidly, the development of sewerage infrastructure facilities was advanced in large cities, such as Rabat and Casablanca. However, delays were noticeable in many small and medium-sized cities. The existing sewerage system did not function sufficiently, and a large amount of untreated sewage was being discharged into rivers, etc., causing serious environmental pollution. In addition, residents in the lower reaches, who used river water for agriculture and domestic use, were at risk of health problems. In addition, lowland areas faced flood damage during periods of heavy rain, due to inadequate stormwater drainage facilities. Therefore, from the viewpoint of improving the sanitary environment and reusing scarce water resources, the development of sewerage infrastructure facilities in small and medium-sized cities was an urgent issue<sup>3</sup>.

### 1.2 Project Outline

The objective of this project is to expand the areas served by sewage systems in small and medium-sized cities in Morocco by installing sewage systems, thereby contributing to the

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<sup>3</sup> The situation regarding the sewerage and sanitary environment in each city before the start of the project was as follows. 1) El Kelaa des Sraghna City: there was no sewage treatment facility, and untreated sewage was connected to irrigation canals which were used for agriculture. There was a sewer pipe in the existing urban area, but it was aging and needed repair. 2) Ben Guerir City: most of the sewage was discharged into rivers untreated, as there was no sewage treatment facility. 3) Ait Aourir City: this city was being developed as a commuter town of Marrakech, where tourism was the main industry. The sewage treatment facility had deteriorated significantly. Due to the soaring land prices in Marrakech, urban development was expected to expand in this city, requiring the repair and expansion of existing sewer pipes and the construction of sewage treatment facilities. 4) Amizmiz City: this urban area was built across the Amizmiz River, and sewage treatment facilities had been constructed on both the right and left banks, but they had deteriorated considerably. The sewage was untreated and discharged directly into the Amizmiz River.

improvement of hygiene and the living environment of residents.

Loan Approved Amount / Disbursed Amount	5,054 million yen / 3,034 million yen	
Exchange of Notes Date / Loan Agreement Signing Date	March 30, 2007 / March 30, 2007	
Terms and Conditions	Interest Rate	0.75%
	Repayment Period (Grace Period)	40 years 10 years)
	Conditions for Procurement	General Untied
Borrower / Executing Agency(ies)	Office National de l'Electricite et de l'Eau Potable (ONEE) / ONEE	
Project Completion	July 2017	
Target Area	El Kelaa des Sraghna City, Ben Guerir City, Ait Aourir City, Amizmiz City	
Main Contractor(s) (Over 1 billion yen)	Viales y Obras Publicas S.A. (Spain)	
Main Consultant(s) (Over 100 million yen)	Fichtner Water & Transportation GMBH (Germany) / Nippon Koei Co., Ltd. (Japan) (JV)	
Related Studies (Feasibility Studies, etc.)	Nationwide Master Plan for Sewage Networks (Schema Directeur National d'Assainissement Liquide: SDNAL), Government of Morocco (1997)	
Related Projects	<p>[ODA Loan]</p> <ul style="list-style-type: none"> <li>- "Sewage System Development Project (I)" (2005)</li> <li>- "Sewage System Development Project (III)" (2013)</li> </ul> <p>[Other International Organizations, Aid Agencies, etc.]</p> <ul style="list-style-type: none"> <li>- "Grant and Loan Aid to 22 Cities" (Kreditanstalt für Wiederaufbau (hereinafter referred to as "KfW"))</li> <li>- "Loan Assistance to 29 Cities Including Co-Financing with European Investment Bank and European Union" (hereinafter referred to as "EU") (Agence Française de Développement (hereinafter referred to as "AFD"))</li> <li>- "Grant Assistance to 22 Cities Including Co-Financing with AFD and European Investment Bank" (EU), etc.</li> </ul>	

## 2. Outline of the Evaluation Study

### 2.1 External Evaluator

Kenichi Inazawa, Octavia Japan, Co., Ltd.

### 2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted with the following schedule.

Duration of the Study: January 2021–February 2022

Duration of the Field Study: It was conducted remotely with a local survey assistant.

### 2.3 Constraints during the Evaluation Study

Due to the spread of COVID-19, the external evaluator did not travel internationally. With the local survey assistant, the external evaluator carried out site visits, collected information and data and conducted interviews with the relevant individuals and residents, and carried out a qualitative survey remotely. The external evaluator analyzed the information collated, so as to evaluate, analyze and make judgement.

## 3. Results of the Evaluation (Overall Rating: B<sup>4</sup>)

### 3.1 Relevance (Rating: ③<sup>5</sup>)

#### 3.1.1 Consistency with the Development Plan of Morocco

Prior to the start of this project, the government of Morocco formulated the *Economic and Social Development Plan* (2000–2004), which placed emphasis on the “prevention of and measures for environmental pollution.” In addition, the government formulated the *National Sewerage Master Plan* (developed in 1997) in order to urgently promote sewerage development from the perspectives of effective management of water resources and the improvement of the living environment of the people, environment and public health. Furthermore, the ONEE, the executing agency of this project, formulated *the Medium-Term Investment Plan for Developing Sewage Systems* (2003–2017), indicating its policy of proceeding with development sequentially across the cities with a high level of maturity and urgency.

At the time of the ex-post evaluation, the government of Morocco had invested 43 billion dirham, intended for 260 locations in the country, based on the *National Sewerage Plan* (established in 2006), which is the basic plan of the sewage sector. This demonstrates the efforts being made towards the improvement in public health and the environment by developing sewerage facilities and increasing sewerage connection rates. In 2008, after the start of this project, the government jointly conducted a strategic review of the *National Sewerage Plan* with the World Bank and the KfW to check progress up to 2018, revise the project direction and develop action plans to achieve the set objectives<sup>6</sup>. The ONEE, the executing agency of this project and the Ministry of Internal Affairs, which is its supervisory authority, have jointly organized the contents as the *Progress Report and Prospects of the National Sewerage Plan*, thereby

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<sup>4</sup> A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

<sup>5</sup> ③: High, ②: Fair, ①: Low

<sup>6</sup> Under the coordination of the ministries, 72 medium-sized cities and 366 small cities were planned to be developed.

establishing the development policy and prospects of the sewerage program.

Thus, it is clear that the sewerage development policy was regarded as important in Morocco before the start of this project and at the time of the ex-post evaluation, therefore, it can be said that this project is consistent with Morocco's development policy.

### 3.1.2 Consistency with the Development Needs of Morocco

Prior to the start of this project, the amount of sewage increased sharply throughout Morocco due to rapid industrialization and growing tourism. At the same time, the treatment capacity of the sewage treatment facilities was insufficient, and these structures were aging. In some cases, residents used sewage directly for agriculture and irrigation, and there were concerns regarding the outbreak of infectious diseases. In small and medium-sized cities, in particular, sewerage development was delayed, due to rapid urbanization and lack of funds. Many existing sewerage systems were not functioning satisfactorily; as a result, large amounts of untreated sewage were discharged into rivers and the like, causing serious environmental pollution. Residents in the lower reaches, who use river water for agriculture and domestic purposes, were at risk of health hazards. They also faced flood damage, due to inadequate stormwater drainage facilities in lowland areas. For this reason, the development of sewerage facilities was recognized as one of the important issues that should be resolved immediately.

At the time of the ex-post evaluation, the government of Morocco stipulates that in order to protect water resources and improve public health, the environment surrounding household and industrial sewage needs to be improved through the expansion of sewage networks and sewage treatment facilities. By December 2020, the ONEE had implemented sewerage projects in small and medium-sized cities (142 communes) in the country, and the total treatment capacity of all sewage treatment facilities (119 locations) was 450,405 m<sup>3</sup>/day, providing a sewerage service to approximately 5.8 million people<sup>7</sup>. By 2021, the sewerage service was scheduled to be operational in 11 new communes, benefitting approximately 5.9 million people. The ONEE not only implements new sewage projects but also expands and repairs existing sewage networks and sewage treatment facilities in sequence, mainly in small and medium-sized cities.

Based on the above, the protection of water resources and the improvement of public health were regarded as important in Morocco before the start of this project and at the time of ex-post evaluation. In small and medium-sized cities, sewage networks and sewage treatment facilities

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<sup>7</sup> Given that Morocco has a population of around 36.03 million (source: World Bank data, 2018), approximately 16% of the population uses sewerage services.

are being developed, and there is a great need for public health and environmental improvement.

### 3.1.3 Consistency with Japan’s ODA Policy

JICA formulated the *Medium-Term Strategy for Overseas Economic Cooperation Operations* in April 2005, in which “a foundation for sustainable growth” was identified as a priority area, focusing on assistance for promoting economic growth through the building of economic and social infrastructures, including sewer-related facilities. In addition, the Ministry of Foreign Affairs formulated the *Official Development Assistance (ODA) Country Data Book* (2002), referencing support for water resource development to ensure the efficient use of limited water resources and support for local development, so as to correct the disparities between cities and regions as areas requiring assistance from Japan. This project supports environmental infrastructures in the small and medium-sized cities of Morocco, where there were delays in the development of sewerage essential for sanitation and environmental conservation, which is in line with the aforementioned principles and priority areas. Therefore, it can be stated that this project was in line with Japan’s assistance policy.

This project has been highly relevant to Morocco’s development plan and development needs, as well as Japan’s ODA policy. Therefore, its relevance is high.

## 3.2 Efficiency (Rating: ②)

### 3.2.1 Project Outputs

Table 1 shows the plan and actual outputs at the time of the ex-post evaluation (underlined sections denote major differences from the plan).

Table 1: The Output Plan and Actual Results of This Project at the Time of the Ex-Post Evaluation

Plan (at the time of the appraisal: 2007)	Actual (at the time of the ex-post evaluation: 2020–2021)
1) Civil Engineering Work and Procurement Equipment a) El Kelaa des Sraghna City: new sewage treatment plant (stabilized pond method (anaerobic pond, permeable pond): 9,150 m <sup>3</sup> /day), new pumping station, sewage pipe	1) Civil Engineering Work and Procurement Equipment a) El Kelaa des Sraghna City: new sewage treatment plant (trickling filter method ( <u>anaerobic pond, secondary settling tanks, etc.</u> ): 8,400 m <sup>3</sup> /day), new pumping station (as



<p>laying (repair approx. 1.2 km, expansion approximately 26.8 km), etc.</p> <p>b) Ben Guerir City: new sewage treatment plant (stabilized pond method (anaerobic pond, aptitude pond): 7,250 m<sup>3</sup>/day), new pumping station, sewage pipe laying (reinforcement/expansion (total) approx. 58.4 km), repair/expansion of rainwater gutters (approx. 16.3 km), etc.</p> <p>c) Ait Aourir City: new sewage treatment plant (stabilized pond method (anaerobic pond, permeable pond): 1,750 m<sup>3</sup>/day), sewage pipe laying (repair approx. 5.8 km, reinforcement approx. 2.6 km, expansion approx. 7.2 km), etc.</p> <p>d) Amizmiz City: new sewage treatment plant (stabilized pond method (anaerobic pond, aptitude pond): 850 m<sup>3</sup>/day, new pumping station, sewage pipe laying (repair approx. 4.5 km, expansion approx. 7.9 km), etc.</p>	<p>planned: one location), sewage pipe laying (repair approx. 26.02 km, expansion approx. 12.27 km), etc.</p> <p>b) Ben Guerir City: new sewage treatment plant (<u>not constructed in this project (a phosphorite company constructed another plant with an activated sludge method)</u>), new pumping station (as planned: one location), sewage pipe laying (<u>reinforcement approx. 28.06 km, expansion approx. 5.14 km</u>), repair/expansion of rainwater gutters (<u>*handled by local government</u>), etc.</p> <p>c) Ait Aourir City: new sewage treatment plant (stabilized pond method (anaerobic pond, permeable pond): <u>*not implemented</u>, sewage pipe laying (<u>repair approx. 4.4 km, expansion approx. 5.2 km</u>), etc.</p> <p>d) Amizmiz City: new sewage treatment plant (stabilized pond method (anaerobic pond, permeable pond): <u>850 m<sup>3</sup>/day</u>), new pumping station (as planned: <u>one location</u>), sewage pipe laying (<u>repair approx. 2.4 km, expansion approx. 11.71 km</u>), etc.</p>
<p>2) Consulting Service</p> <p>a) Detailed design review, bid assistance</p> <p>b) Construction supervision, etc.</p>	<p>2) Consulting Service</p> <p>Implemented as planned.</p>

Source: documents provided by JICA (at the time of the appraisal), Project Completion Report and the ONEE's answers to the questionnaire (at the time of the ex-post evaluation).

Differences between the plan at the time of the appraisal and the actual outputs at the time of the ex-post evaluation, shown in Table 1, are explained below.

#### 1) Civil Engineering Work and Procurement Equipment

In a) El Kelaa des Sraghna City, the treatment method and capacity of the sewage treatment

plant was changed slightly during the detailed design, after the start of this project<sup>8</sup>. The sewage pipe laying plan was reviewed, and changes were made to the repairs and expansions/extensions, however, these were not major changes, and the outputs were generally as planned.

In b) Ben Guerir City, the initial plan was the construction of a new sewage treatment plant and a pumping station, sewage pipe laying and the repair/expansion of rainwater gutters. However, after the project started, a phosphorite company (Office Chérifien des Phosphates: hereinafter referred to as “OCP”), operating in the city, wished to purify the phosphate they handled, using the treated water from the sewage treatment facility constructed in this project; they proposed to the ONEE that the treated water should be of a high standard. In order to reach the level required by the company, it was necessary to change the sewage treatment method from the stabilized pond method to the activated sludge method, and it was estimated that the cost for the development would be approximately 8 to 10 times higher than originally planned. The OCP proposed that they would provide funding for this, suggesting that the ONEE build the required treatment plant. Based on this proposal, the ONEE signed an agreement with the OCP in relation to the development of a sewage treatment plant in May 2008; subsequently, the construction of the sewage treatment facility, proposed by this project, was canceled. At the time of the ex-post evaluation, the sewage treatment facility utilizing the activated sludge method had been completed and was operating as a basic sanitary infrastructure facility for residents. According to the ONEE, the OCP is one of the largest companies in Morocco and employs many workers. The city is making an effort to improve not only sewage treatment plants but also infrastructure facilities, including universities and parks. As the development of the OCP’s sewage treatment plant was intended to purify the phosphate produced and the plant was considered as beneficial for environmental conservation and water saving, etc., there was no opposition from the citizens. It is not clear to what extent the situation regarding the project site and the local economy/society was captured at the project appraisal stage; it could also be the case that the situation had changed. Nevertheless, based on the circumstances and the situation, the cancellation of the project was deemed to be unavoidable. However, it was desirable to confirm the circumstances surrounding the project site and the local economic and social conditions to as great an extent as possible at the stage of project appraisal. The new construction of the city’s pumping station and the laying

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<sup>8</sup> Atrickling filter method can be constructed on smaller lands than a stabilized pond method. Since the population treated was expected to increase as a result of expanding the city’s outskirts in the future, it was thought that the trickling filter method would be able to utilize the surplus land and respond to the expansion of the population treated. Therefore, ONEE requested to change the construction method. It can be said that the change of the method was in anticipation of population growth after completion of the project.

of sewage pipes were carried out using an ODA loan, with 28.06 km of reinforcement and 5.14 km of expansion. In addition, the local government paid for the repair and expansion of the rainwater gutters. In any case, it is evident that the project plan has undergone major changes.

In c) Ait Aourir City, the sewage treatment plant was not constructed. The reason was that local residents opposed the construction of the facility during the acquisition of land for construction. The ONEE and the local government tried to negotiate the land acquisition with the landowners, but they could not reach an agreement, which required a significant amount of time. As a result, the construction was canceled<sup>9</sup>. The ONEE requested that JICA cancel it and both parties agreed. On the other hand, as regards the laying of sewage pipes (reinforcement/expansion), this project's fund was utilized, and 4.4 km of reinforcement and 5.2 km of expansion were developed. According to the ONEE, the sanitary conditions of the city are the same as before the start of this project, with many existing sewerage and drainage networks aging further, amid concerns regarding the drainage of contaminated water. However, in March 2021 during this evaluation study, the local government resolved the issue of land acquisition with the landowners, and there is a prospect of securing land. The ONEE has indicated that it intends to start construction as soon as the budget is secured. Therefore, it is desirable that the ONEE conducts a fact-finding survey on the city's sewerage system and establishes a sewerage facility development policy to eliminate public health and environmental concerns, as the need to do so constituted a high priority at the time of the appraisal.

In d) Amizmiz City, the outputs were largely implemented as planned. There is a slight difference between the plan and the actual number of sewage pipe laying extensions. This is due to a review based on a detailed design which was conducted after the start of this project.

### 3.2.2 Project Inputs

#### 3.2.2.1 Project Cost

At the time of appraisal, the total project cost was planned to be 6,739 million yen (of which 5,054 million yen was to be financed by an ODA loan), whereas the actual total cost was 4,522 million yen (of which 3,034 million yen was covered by an ODA loan). As explained in 3.2.1 Project Outputs, the construction of sewage treatment facilities in Ben Guerir City and Ait Aourir City under this project was canceled. Based on the documents of JICA and the ONEE, the total project cost after the cancellation (the value of the changed plan) was estimated to be 5,281

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<sup>9</sup> The details will be explained in 3.3.2.2 Other Positive and Negative Impacts, 2) Resettlement and Land Acquisition.

million yen. Considering this, the actual total amount (4,522 million yen) was approximately 86% of the value of the changed plan (5,281 million yen). The main reasons for this difference are the change in the number of sewage pipes laid after the detailed design (increase/decrease in the repairs/expansions compared to the initial plan) and the influence of the exchange rate (strong yen, weak Moroccan dirham).

### 3.2.2.2 Project Period

Table 2 shows the initial plan and the actual project period. At the time of the appraisal, the project was planned between March 2007 and December 2012, a duration of five years and 10 months (70 months)<sup>10</sup>. However, the actual period was between March 2007 and June 2019 (148 months). Therefore, the project period was significantly delayed, approximately 211% of the initial plan. The main causes of the delay were: the consulting service began late because the consultant selection procedure required time; there was a delay in selecting contractors for the sewage treatment plant construction, etc.; the negotiation with landowners regarding the land acquisition in Ait Aourir City was time-consuming and there was a delay in the civil engineering work due to the performance of the contractor<sup>11</sup>.

Table 2: Initial Plan and Actual Project Period

	Initial Plan	Actual
(Overall Project)	March 2007–December 2012 (70 months)	March 2007–June 2019 (148 months)
1) Consultant Selection	April 2007–March 2008 (12 months)	April 2007–March 2009 (24 months)
2) Consulting Service	April 2008–December 2011 (45 months)	April 2009–July 2017 (100 months)
3) Procurement of Materials and Equipment	January–August 2010 (8 months)	December 2011–June 2016 (55 months)
4) Civil Engineering Work and Warranty Period	October 2008–December 2012 (51 months)	October 2009–June 2019 (117 months) (*of which the civil engineering work was conducted between October 2009–February 2019)
		The actual construction period of each city was as follows:

<sup>10</sup> At the time of appraisal, the completion of this project was defined as being “when the civil engineering work ends (including the warranty period).”

<sup>11</sup> Mainly the construction relating to sewage networks in Amizmiz City. According to the ONEE, although a contract was signed with a contractor, the quality of the construction was questioned and the contract subsequently canceled, resulting in another contractor being procured to carry out the construction, causing a delay.

		<ul style="list-style-type: none"> <li>- El Kelaa des Sraghna City: April 2012–June 2017</li> <li>- Ben Guerir City: October 2009–February 2019<sup>12</sup></li> <li>- Ait Aourir City: February 2010–June 2012<sup>13</sup></li> <li>- Amizmiz City: December 2010–June 2018</li> </ul>
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Source: documents provided by JICA (initial plan), the Project Completion Report and the ONEE’s answers to the questionnaire (actual).

### 3.2.3 Results of Calculations for Internal Rates of Return (Reference only)

#### (Financial Internal Rate of Return (FIRR))

FIRR was not calculated at the time of the appraisal, as this project was not designed to increase profitability. For this reason, a recalculation was not carried out at the time of the ex-post evaluation.

#### (Economic Internal Rate of Return (EIRR))

At the time of the appraisal, the EIRR was calculated to be 13.0%, assuming that the increase in the sewage treatment population and the number of sewage connections were considered as “benefits” and the project cost and operation and maintenance cost were regarded as “cost” with a project life of 40 years. Under the same conditions as the period of the appraisal, recalculation was attempted at the time of the ex-post evaluation. The result was 10.5%, which was slightly lower than what was assumed at the time of appraisal (13.0%). The reason for this was the fact that a sewage treatment plant was not constructed in Ait Aourir City, etc.

#### [Summary of Efficiency]

Sewage treatment plants were not constructed in Ben Guerir City and Ait Aourir City through ODA loan, and the overall outputs were reduced from those outlined the plan. With regard to the project cost, a total cost of 6,739 million yen was anticipated at the time of appraisal, whereas the actual total cost was 4,522 million yen. With the cancellation of the construction of sewage treatment plants in both cities, the planned amount of the total project cost (planned amount after the change) is estimated to be 5,281 million yen. Therefore, the actual total amount (4,522 million yen) is approximately 86% of the planned amount after the change (5,281 million yen), which is within the planned amount after the change. The project period exceeded the initial plan, as it took

<sup>12</sup> The period only refers to the laying of certain sewer pipes. While the sewage treatment plant was put into service in 2019 in Ben Guerir City using the funds of the OCP, as will be explained in 3.4.3 Financial Aspect of Operation and Maintenance, the sewage network was renovated and expanded with the assistance of the AFD from 2016 to mid-2020.

<sup>13</sup> This period only refers to the laying of certain sewer pipes.

a long time to procure the consultant and the contractors. Based on the above, although the project cost was within the plan, the project period exceeded the plan. Therefore, efficiency of the project is fair.



Photo 1: Inside the sewage treatment facility, constructed with OCP funds (Ben Guerir City)



Photo 2: Overall view of the sewage treatment facility, constructed with OCP funds (Ben Guerir City)

### 3.3 Effectiveness and Impacts<sup>14</sup> (Rating: ②)

#### 3.3.1 Effectiveness

##### 3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

Table 3 shows the quantitative effect indicators (baseline, target, actual) of this project.

Table 3: Operation and Effect Indicators of This Project (Baseline, Target, Actual)

Indicator	Baseline (2004) Before the Project Began	Target (2013) 1 Year After Completion	Actual		
			2018	2019	2020 1 Year After Completion
1) Population treated (unit: thousand persons)	El Kelaa des Sraghna City	El Kelaa des Sraghna City	El Kelaa des Sraghna City		
	0	86	101.2	107.6	110.6
	Ben Guerir City	Ben Guerir City	Ben Guerir City (Reference ) *Note 1		
	0	65	83.6	92.0	95.6
	Ait Aourir City	Ait Aourir City	Ait Aourir City *Note 2		
	0	24	N/A	N/A	N/A
	Amizmiz City	Amizmiz City	Amizmiz City		
	0	11	N/A	12.2	12.4
2) Rate of facility utilization (unit: %)	El Kelaa des Sraghna City	El Kelaa des Sraghna City	El Kelaa des Sraghna City		
	0	84	89	117	87

<sup>14</sup> Sub-rating for Effectiveness is to be put with consideration of Impacts.

	Ben Guerir City	Ben Guerir City	Ben Guerir City (Reference) *Note 1		
	0	74	70	77	84
	Ait Aourir City	Ait Aourir City	Ait Aourir City *Note 2		
	0	86	N/A	N/A	N/A
	Amizmiz City	Amizmiz City	Amizmiz City		
	0	88	N/A	10	53
3) Amount of wastewater treated (unit: m <sup>3</sup> /day)	El Kelaa des Sraghna City	El Kelaa des Sraghna City	El Kelaa des Sraghna City		
	0	7,600	7,457	9,874	7,305
	Ben Guerir City	Ben Guerir City	Ben Guerir City (Reference) *Note 1		
	0	5,400	5,000	5,500	6,000
	Ait Aourir City	Ait Aourir City	Ait Aourir City *Note 2		
	0	1,500	N/A	N/A	N/A
	Amizmiz City	Amizmiz City	Amizmiz City		
	0	750	N/A	86	448
4) BOD (influent of sewage treatment plant) (unit: mg/L)	El Kelaa des Sraghna City	El Kelaa des Sraghna City	El Kelaa des Sraghna City		
	N/A	430	287	445	350
	Ben Guerir City	Ben Guerir City	Ben Guerir City (Reference) *Note 1		
	N/A	440	420	430	430
	Ait Aourir City	Ait Aourir City	Ait Aourir City *Note 2		
	N/A	630	N/A	N/A	N/A
	Amizmiz City	Amizmiz City	Amizmiz City		
	N/A	600	N/A	289	358
5) BOD (discharge of sewage treatment plant) (unit: mg/L)	El Kelaa des Sraghna City	El Kelaa des Sraghna City	El Kelaa des Sraghna City		
	N/A	44	78	75	73
	Ben Guerir City	Ben Guerir City	Ben Guerir City (Reference) *Note 1		
	N/A	69	9	10	10
	Ait Aourir City	Ait Aourir City	Ait Aourir City *Note 2		
	N/A	98	N/A	N/A	N/A
	Amizmiz City	Amizmiz City	Amizmiz City		
	N/A	97	N/A	118	153
6) Ratio of Population Served (unit: %)	El Kelaa des Sraghna City	El Kelaa des Sraghna City	El Kelaa des Sraghna City		
	87	92	93.3	96.0	95.3
	Ben Guerir City	Ben Guerir City	Ben Guerir City (Reference) *Note 1		
	78	80	82.3	87.4	87.8
	Ait Aourir City	Ait Aourir City	Ait Aourir City *Note 2		
	85	91	N/A	N/A	N/A
	Amizmiz City	Amizmiz City	Amizmiz City		
	76	92	74.2	73.4	72.4

Source: documents provided by JICA (baseline, target), answers to the questionnaire (actual).

Note 1: as the sewage treatment plant was constructed with the funds of the OCP in Ben Guerir City, the data will be listed for reference purposes.

Note 2: as the sewage treatment plant was not constructed in Ait Aourir City, the situation has not changed since prior to the start of this project. For this reason, the actual data are not shown.

In this project, six indicators were set at the time of appraisal: 1) population treated, 2) rate of facility utilization, 3) amount of wastewater treated, 4) BOD (influent of sewage treatment plant), 5) BOD (discharge of sewage treatment plant), 6) ratio of population served. The target year was set to one year after completion. As discussed in 3.2.2.2 Project Period under Efficiency, this project was completed in 2019. Therefore, we will basically compare the actual values for 2020, one year after the completion year of 2019, with the target values. In addition, it should be noted that the sewage treatment facility in Ben Guerir City was constructed with OCP funding. As shown in Table 3, the actual values exist. However, it is appropriate to treat these as a reference when judging the project effects. Regarding Ait Aourir City, the sewage treatment plant was not developed, and the sewerage service system has not been established. Therefore, the actual values could not be captured for all the indicators. In relation to Amizmiz City, it should be noted that the sewage treatment plant became operational after 2019, and the values for 2020 reflect the situation in which the plant is slowly brought up to speed. Based on these situations, we will verify and analyze 1) to 6).

1) Population treated: the actual value exceeded the target values in all three cities. It can be stated that this is as a result of the sewage treatment plants and sewage pipes constructed during this project. According to the ONEE, the number of sewerage service users in the three cities has been increasing year on year, which is also related to the analysis of 6) the ratio of the population served.

2) Rate of facility utilization: this indicator shows whether the sewerage network has been properly developed; the result exceeded the target in El Kelaa des Sraghna City<sup>15</sup> and was very close to the target in Ben Guerir City. On the other hand, the result was lower than the target in Amizmiz City. This is because the connection pipe to the pumping station needed to be repaired, and the inflow of sewage and drainage temporarily decreased during the repair. However, this has already been repaired by the ONEE so as to secure the initial expected inflow, and the facility utilization rate is expected to increase in the future.

3) Amount of wastewater treated: the amount of wastewater treated in El Kelaa des Sraghna City and Ben Guerir City was similar to the target value. On the other hand, the actual amount of wastewater treated in Amizmiz City was low. This was due to the repair of the connecting pipe,

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<sup>15</sup> The facility utilization rate (117%) was high in 2019. Heavy rains and storms occurred during the same year, which increased the inflow of wastewater from the city to the sewage treatment plant; as a result, the utilization rate of the sewage treatment plant increased.



as in the case of the 2) rate of facility utilization above<sup>16</sup>. In the future, the amount of wastewater treated is expected to increase as the facility utilization rate increases.

4) BOD (influent of sewage treatment plant): the BOD of wastewater and sewage flowing into sewage treatment plants in all three cities was generally within the set target values. According to the ONEE, BOD has generally been stable in recent years.

5) BOD (discharge of sewage treatment plant): although the actual value recorded in El Kelaa des Sraghna City deviates from the target value, it is regarded by the ONEE as being within an acceptable range, as Morocco's standard BOD emission level at a sewage treatment plant is within 120 mg/L<sup>17</sup>. As a matter of fact, the developed sewage treatment plant adopts a trickling filter method (anaerobic pond, secondary settling tanks, etc.)<sup>18</sup>, and the ONEE does not expect that the BOD will reach the target level, set at the time of the appraisal (44 mg/L). In order to reach 44 mg/L, this should be the value after adopting another construction method, such as an aeration-type stabilizing pond (aeration type lagoon)<sup>19</sup>. In addition, since farmers around the sewage treatment plant harvest olives from November to January every year, it has been confirmed that wastewater flows intensively during the processing work<sup>20</sup>. Secondly, although the actual value of Ben Guerir City is listed as a reference, the target value has been achieved, since a high-specification sewage treatment plant was constructed using the funds of the OCP. The actual value of Amizmiz City did not reach the target value and exceeded the country's BOD emission standard (within 120 mg/L). The reason is that the sewage treatment plant in Amizmiz City, is a stabilized pond lagoon (anaerobic pond, permeable pond), and it is not easy to reach the set target value (97 mg/L). Although a stabilization pond typically takes time to treat the inflow sewage before being drained as effluent, the process was incomplete between 2019 and 2020, according to the ONEE. In other words, the untreated portion remained in the stabilization pond, as an insufficient time was allowed to treat the sewage (which was not completely treated), and a high BOD was measured around the outlet of the sewage treatment plant<sup>21</sup>. It is estimated that the BOD (discharge of sewage treatment plant) will improve in the future, provided that sufficient time is

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<sup>16</sup> The sewage treatment plant began its operation after June 2018 in this city, and sufficient data were not recorded that year.

<sup>17</sup> Kingdom of Morocco's Decree No. 1607-06 (enforced on July 25, 2006). There are no other legal standards.

<sup>18</sup> Trickling filter method is a biological purification process with a culture fixed on an immobile support (purifying treated water using bacteria immobilized on filter beds). Generally, not only the maintenance is easy but is energy saving.

<sup>19</sup> This method purifies with a low load and a long residence period, using a large aeration tank such as a pond.

<sup>20</sup> The BOD concentration during the harvesting period is extremely high. While the measurement is around 100 to 160 mg/L, the monthly average during the non-harvesting period is around 60 mg/L.

<sup>21</sup> As a supplementary explanation, the sewage treatment plant of El Kelaa des Sraghna City became operational in June 2017, and the sewage treatment plant of Amizmiz City in June 2018. The latter began its operation relatively recently, consequently, a rather high BOD concentration was detected.

allocated, and the untreated portion is eliminated before being measured.

6) Ratio of population served: the actual values recorded in El Kelaa des Sraghna City and Ben Guerir City achieved the target. On the other hand, that of Amizmiz City was around 80% of the target. The reason is that the city's sewage treatment plant became operational in 2019, and 2020 was the year immediately after the plant began operating. If the operation goes smoothly, the rate of population served is expected to increase.

### 3.3.1.2 Qualitative Effects (Other Effects)

(Conservation of the Water Quality of Water Sources, Prevention of Flooding Due to Rainwater and Sewage, etc. around the Project Target Area)

When we interviewed the ONEE branch offices and the surrounding communes<sup>22</sup> in this field survey, we received the following comments regarding the water source and water quality conservation status in the project areas.

- "No pollution of water resources has been confirmed around the project site where the sewage network was established either before or after the project implementation."
- "The development of the sewage treatment facility (by this project) can directly reduce the health and environmental risks of residents."

In addition, the following comments were received regarding the flooding occurrence and situation, due to rainwater/sewage.

- "Improvement of the sewer network is contributing to the control of flood inundation in the city center."
- "During the implementation of this project, damage caused by heavy rain occurred four times in El Kelaa des Sraghna City, six times in Amizmiz City, and twice in Ben Guerir City. However, the developed sewage treatment facilities are helping to treat excess rainwater."

Based on the above comments, it can be inferred that this project contributes to water quality conservation and water source protection around the project sites, as well as prevention of flooding due to rainwater and sewage in the city centers.

### 3.3.2 Impacts

#### 3.3.2.1 Intended Impacts

(Contribution to the Improved Sanitation and Living Environment in Small and Medium-Sized

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<sup>22</sup> They refer to communes in El Kelaa des Sraghna City, Amizmiz City and Ben Guerir City.

Cities)

In this evaluation study, we interviewed residents and retail store owners in relation to whether the sanitary conditions and living environment of residents have improved in El Kelaa des Sraghna City, Ben Guerir City (note that the sewage treatment plant was constructed by the OCP) and Amizmiz City, where sewage treatment facilities have been developed<sup>23</sup>. A high level of satisfaction with regard to the sewage project was noted in all cities. The following are the comments obtained during the interviews.

- “The water quality around my house has improved. I feel that the inflow of sewage and drainage into rivers has also decreased. The stench which was a problem before has gone. I think this is because of the development of the sewerage facility.”
- “Previously, the city roads were flooded, and drained water accumulated during periods of heavy rain. That is no longer the case.”
- “I think that the improvement of the sewerage facility has enhanced the beautification of the city and made the tourist area cleaner.”
- “Sewage no longer flows into irrigation canals like before. I think the sewerage facility protects agricultural products from contaminated water.”
- “I think the outbreak of mosquitoes has decreased.”
- “I think the incidence of skin diseases and infectious diseases is decreasing.”
- “I think that awareness of hygiene in the home has increased since the sewerage facility was constructed. The frequency of hand-washing and the use of showers and toilets has increased.”

Based on such comments, it can be judged that this project has improved the hygiene and environmental conditions of the surrounding area, as well as the living environment of the residents.

### 3.3.2.2 Other Positive and Negative Impacts

#### 1) Impact on the Natural Environment

This project did not fall under the vulnerable sectors/characteristics or vulnerable areas listed in the *Japan Bank for International Cooperation Guidelines for Confirmation of Environmental and Social Considerations*<sup>24</sup>, and it was classified as Category B, as the undesired impact on the

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<sup>23</sup> Individual interviews and key informant interviews were conducted with 11 households, retailers and small businesses connected to sewerage services in El Kelaa des Sraghna City, Ben Guerir City and Amizmiz City (3 cities x 11 locations: 33 locations in total). As far as possible, interviews were conducted by selecting people who could understand the situation before the completion of the project and at the time of the ex-post evaluation.

<sup>24</sup> Established in April 2002.

environment was judged to be non-significant. The Environmental Impact Assessment (EIA) was approved by the Moroccan Ministry of Land Planning, Water and Environment (MATEE) in March 2007.

Through the questionnaire and interviews with the ONEE, as well as the site visits, it was confirmed that there were no particular negative impacts on the natural environment (air pollution, vibration, noise, impacts on the ecosystem, etc.) during the implementation of this project and after the completion of the project. For example, the contractor of this project made efforts to protect the natural environment. Additionally, waterproof sheets were used in the area around the project sites, vehicle speed was reduced in the construction areas and water was regularly sprinkled to prevent the spread of dust during construction. As a noise countermeasure, no construction was carried out at night or on weekends. In addition, structurally appropriate positions were selected for the sewer networks to protect areas with groundwater resources. No events affecting the ecosystem have been observed around the project sites. According to the ONEE, there are no reports of health hazards to local residents, and no complaints or damage reports have been confirmed. Based on the above, it can be considered that the negative impact of this project on the natural environment was minimal.

The ONEE's sanitation and environment division is responsible for environmental monitoring during and after the project completion. Should any problem arise, the sanitation and environment division will deal with it in consultation with the local government and the Ministry of Environment. At the time of the ex-post evaluation, no serious problems had occurred.

## 2) Resettlement and Land Acquisition

While there was no resettlement in this project, land acquisition did occur. Table 4 provides an overview. The land acquisition plan was formulated in accordance with the law. The ONEE identified the target people, confirmed and scrutinized the situations around the project sites and worked in cooperation with the local governments, etc. The target lands were all located in the suburbs away from the center of each city. According to the ONEE, it took time to pay compensation to landowners, but with the cooperation of local governments and communes, the procedure generally progressed smoothly. As shown in Table 4, the OCP provided the land and funds for the construction of the sewage treatment plant in Ben Guerir City. In addition, regarding the projects in Ben Guerir City and Amizmiz City, landowners were provided with alternative

lands without monetary compensation<sup>25</sup>. At the time of the ex-post evaluation, there was no discontent, and no complaints had been received from the landowners. On the other hand, regarding Ait Aourir City, as mentioned above, land acquisition was delayed and the construction of the sewage treatment plant was postponed. The ONEE, local governments and local communes continued negotiations with multiple landowners regarding relocation and the provision of alternative land. However, as there were differences in relation to the compensation packages and the conditions of the relocation sites, these negotiations did not reach a satisfactory conclusion<sup>26</sup>. As a result of the serious delay in negotiations, the ONEE requested JICA to cancel the construction of the sewage treatment plant in this city, and JICA also agreed. However, as previously mentioned, at the time of this evaluation study (as of April 2021), the local government succeeded in negotiating with the landowners, and there is a prospect of securing land. According to the ONEE, work on the sewerage project in this city will commence as soon as the budget is secured.

Table 4: Status of Land Acquisition for This Project

<El Kelaa des Sraghna City>

	Pumping Station	Sewage Treatment Plant	Landowners
Target Area	356 m <sup>2</sup>	Approx. 29 ha	21 people
Compensation Amount	A total of 3,592 thousand Moroccan dirham were paid to the landowners		

<Ben Guerir City>

	Pumping Station	Sewage Treatment Plant	Landowners
Target Area	2,000 m <sup>2</sup>	Land owned by the OCP *Note 1	721 people *Note 2
Compensation Amount	Monetary compensation was not incurred, and landowners were provided with alternative land		

Note 1: this project's funds were not used because the land was provided by the OCP.

Note 2: landowners around the pumping facility.

<Amizmiz City>

	Pumping Station	Sewage Treatment Plant	Landowners
Target Area	Approx. 600m <sup>2</sup>	Approx. 10ha	Multiple shared ownership *Note
Compensation Amount	Monetary compensation was not incurred, and landowners were provided with alternative land		

Note: the specific number of people could not be recorded, due to shared ownership. Some areas of land were state-owned.

Sources of the above: answers to the questionnaire.

<sup>25</sup> Support for the livelihood recovery of landowners was not deemed necessary and was not provided specifically.

<sup>26</sup> According to the ONEE, there are a number of similar problems in Morocco apart from the sewerage projects.

[Summary of Effectiveness and Impact]

Regarding the effectiveness/quantitative effect indicators for El Kelaa des Sraghna City, Ben Guerir City (the sewage treatment plant was developed with OCP funds) and Amizmiz City, the actual values mostly correlated with the targets or were close to the targets in terms of 1) the population treated, 2) the rate of facility utilization, 3) the amount of wastewater treated, 4) the BOD (influent of sewage treatment plant) and 6) the ratio of the population served. As for 5) the BOD (discharge of sewage treatment plant), the targets have not been achieved in El Kelaa des Sraghna City and Amizmiz City<sup>27</sup>. With respect to the qualitative effects, it was confirmed that the development of sewage treatment facilities, etc. contributed to the conservation of the water quality of water sources and the prevention of flooding, due to rainwater and sewage around the project target areas. Regarding the impacts, it was confirmed via the interview survey that the hygiene and environmental conditions around the target areas have improved, as has the living environment of the residents. Based on the above, this project has achieved its objectives to some extent. Therefore, effectiveness and impact of the project are fair.

### 3.4 Sustainability (Rating: ③)

#### 3.4.1 Institutional/Organizational Aspect of Operation and Maintenance

The executing agency of this project is the ONEE (the sanitation and environment division). Regarding the operation and maintenance of the facilities and equipment developed by this project, the Tensift Regional Office under the ONEE and each joint office (El Kelaa des Sraghna Joint Office, Rehamna Joint Office, Al Haouz Joint Office) have been assigned on-site responsibilities. Table 5 shows the organization and system. The actual maintenance works, including the cleaning of sewage networks and facilities/equipment, are outsourced to local companies<sup>28</sup>.

Table 5: Organization/System of the Operation and Maintenance of This Project

		Work Description
Tensift Office	Regional	Development of electricity and water facilities relating to the sewerage facilities, contractual works and general supervision of the cleaning and maintenance of laid sewer pipes, etc., in three cities: El Kelaa des Sraghna City, Ben Guerir City, Amizmiz City.
El Kelaa des Sraghna Joint Office		Responsible for the operation and maintenance of the sewage treatment plants, sewage networks and pump facilities in El Kelaa

<sup>27</sup>As the sewage treatment plant in Ait Aourir City was not developed, due to the unsuccessful land acquisition, the ONEE labels the status as non-complete under this project. Therefore, the effectiveness and impact were not analyzed.

<sup>28</sup> The responsibilities are reviewed every one to three years, depending on the content and based on which consignment contracts are agreed.

	des Sraghna City (the cleaning and maintenance of facilities and equipment are outsourced to local companies).
Rehamna Joint Office	Responsible for the operation and maintenance of the sewage treatment plant (constructed with OCP funds) by the OCP, meanwhile Rehamna Joint Office is responsible for sewage networks and pump facilities in Ben Guerir City (the cleaning and maintenance of facilities and equipment are outsourced to local companies).
Al Haouz Joint Office	Responsible for the operation and maintenance of the sewage treatment plants, sewage networks and pump facilities in Amizmiz City (the cleaning and maintenance of the facilities and equipment are outsourced to local companies).

Source: answers to the questionnaire.

Regarding the number of staff in each organization shown in Table 5, at the Tensift Regional Office two staff members handle sanitation activities and monitoring according to the amount of work and the situation. The El Kelaa des Sraghna Joint Office has 12 staff members, the Rehamna Joint Office has five and the Al Haouz Joint Office has three. Although it was not possible to capture the number of outsourced staff responsible for the actual maintenance work, such as the cleaning of the sewage networks and facilities/equipment, a certain number of staff are assigned to this function, based on the outsourcing contract with the ONEE, and the work is being carried out. From information acquired through the questionnaire and interviews with the ONEE, the organization/system and the number of staff in Table 5 seemed sufficient in the field survey. According to the ONEE, if the sewerage projects and maintenance works increase in the target areas in the future, the organization and system, including the contractors used, will be reviewed and the system will be strengthened.

The equipment for the maintenance of sewerage facilities is stored and managed responsibly through the local companies outsourced by each organization in Table 5. Situations, such as offices not keeping pace with the required work, due to a lack of maintenance equipment, were not highlighted in the questionnaire or during the interviews with the ONEE.

Based on the above, it was concluded that there is no particular problem in relation to the institutional/organizational aspect of the operation and maintenance of this project.

### 3.4.2 Technical Aspect of Operation and Maintenance

Regarding the sewage treatment plants and sewage networks in each city, it was confirmed that the ONEE staff (staff of each organization in Table 5), engaged in the operation and maintenance work, have abundant work experience. According to the ONEE, training for staff is also conducted regularly at the regional and central office. All organizations in Table 5 provide training on themes

related to operation and maintenance, as well as skill improvement. Over the last three to four years, training themes such as “Comprehensive training for water quality engineers,” “Pump station operation,” “Training for sewage treatment pond staff,” “Sewage network operation” and “Hygiene and safety” have generally been offered over a duration of 2 to 10 days. The selection and recruitment of new staff is carried out according to clear criteria (qualifications, skills/abilities, experience, etc.); after being hired, staff are assigned the appropriate job in accordance with their knowledge and experience. On-the-job training (OJT) is also provided. Training for a period of around eight weeks is being given on themes such as practical and theoretical training, on-site training and organizational operation.

Manuals on the operation and maintenance of sewage treatment plants and sewage networks are available in all of the organizations shown in Table 5. The ONEE and outsourced staff refer to the manuals as needed, utilizing them in their daily work. Following interviews with staff engaged in the operation and maintenance works, it was confirmed that they were aware of the importance of maintenance works.

Based on the above, no particular problems exist in relation to the technical aspect of the operation and maintenance of this project.

### 3.4.3 Financial Aspect of Operation and Maintenance

Table 6 shows the changes in the operation and maintenance costs for sewerage facilities in the target areas of this project.

Table 6: Operation and Maintenance Costs Related to Sewerage Projects in the Target Areas of This Project (Actual Amount for the Last Three Years)

(Unit: thousand Moroccan dirham)

Target Area	2017	2018	2019
El Kelaa des Sraghna City	1,252	2,443	3,678
Ben Guerir City	671	743	1,296
Amizmiz City	133	1,022	1,412

Source: ONEE’s document.

According to the ONEE, “operation and maintenance costs are expended in consideration of the actual amount of work, necessity, urgency, etc.” Should major repairs or equipment replacement be required at a sewage treatment plant, etc., based on the request of the site, the finance division will review and allocate. Interviews with on-site operation and maintenance staff did not indicate any lack of maintenance costs or concerns in particular. The costs for 2019



increased by comparison with the previous year in all cities, which shows that the level of expenditure coincides with the start of the operation of the sewage treatment plants.

Based on the above, it has been concluded that there are no major problems relating to the financial aspect of the operation and maintenance of this project.

Table 7 presents the changes in the amount of sewerage fees collected<sup>29</sup> for reference.

(Reference) Table 7: Sewerage Fees Collected in the Target Area of this Project  
(Actual Amounts for the Last Three Years)

(Unit: million Moroccan dirham)

Target Area	2018	2019	2020
El Kelaa des Sraghna City	8.68	10.06	9.5
Ben Guerir City	0	0	7.63
Amizmiz City	0	0.49	0.79

Source: ONEE's document.

According to the ONEE, the sewerage fees collected were generally favorable in El Kelaa des Sraghna City. In Ben Guerir City, while the sewage treatment plant went into operation in 2019, the sewage network was being renovated and expanded between 2016 and mid-2020. Sewerage fees were collected after mid-2020. For this reason, fees were not actually collected until 2019. Moreover, the sewage treatment plant in Amizmiz City was not operational until 2019. The ONEE has indicated that the fees collected in Ben Guerir City and Amizmiz City will increase in the future.

#### 3.4.4 Status of Operation and Maintenance

At the time of the ex-post evaluation, there were no major problems regarding the operating status of the sewerage facilities, etc., developed in the three cities of El Kelaa des Sraghna, Ben Guerir and Amizmiz. It was confirmed that the operation and maintenance were being carried out properly based on the on-site inspections, the completion of the questionnaire and the interviews conducted with the ONEE and the outsourced staff. Every year, maintenance work is carried out after a maintenance plan is formulated. The maintenance plan is divided into daily, symptomatic

<sup>29</sup> In Morocco, sewerage charges for general residences, government/government agencies/public facilities and industrial/commercial premises are agreed upon separately. In addition to the basic charge, each charge is based on a pay-as-you-go system. As of 2020, the basic charge for general residences is 36 Moroccan dirham per year, plus 0.75 Moroccan dirham/m<sup>3</sup> for 0–6 m<sup>3</sup>, 3.51 Moroccan dirham/m<sup>3</sup> for 6–20 m<sup>3</sup>, 4.71 Moroccan dirham/m<sup>3</sup> for 20 m<sup>3</sup> and above. For government/government agencies/public facilities, the basic charge is 72 Moroccan dirham per year, plus 4.21 Moroccan dirham/m<sup>3</sup>. As for industrial/commercial premises, the basic charge is 144 Moroccan dirham per year, plus 4.71 Moroccan dirham/m<sup>3</sup>.

and preventive maintenance, based upon which the actual maintenance work is carried out. At each local office, the spare parts for the maintenance of sewerage facilities are procured as required responsibly through the local companies outsourced by each organization, and delivered to the project site. Spare parts are correctly stored and managed in storage facilities.

Based on the above, it is judged that there are no particular problems in relation to the operation and maintenance status.

No major problems have been observed regarding the institutional, technical and financial aspects of the project or the current status of the operation and maintenance system. Therefore, the sustainability of the project effects is high.



Photo 3: Sewage pipe cleaning equipment  
(El Kelaa des Sraghna City)



Photo 4: Storage of spare parts  
(El Kelaa des Sraghna City)

## 4. Conclusion, Lessons Learned and Recommendations

### 4.1 Conclusion

In this project, sewage systems were installed to increase the number of areas served by sewage systems in small and medium-sized cities in Morocco, thereby contributing to the improvement of hygiene and the living environment of residents. In the *Economic and Social Development Plan* and the *National Sewage Plan*, formulated by the government of Morocco, the need to upgrade sewerage facilities and sewerage connection rates, as well as improve public health and the environment was paramount. In the small and medium-sized cities in Morocco, there is a significant need for the development and expansion of sewage treatment facilities and sewage networks, and consistency with Japan's ODA policy is confirmed. Therefore, the relevance is high. While the actual project cost was within the initial plan, the project period was longer than the

initial plan, as the process of procuring consultants and contractors required a significant amount of time; thus, efficiency is fair. Regarding the quantitative effect indicators, the target values were almost achieved, or the actual values were close to the target values, whereas the BOD (sewage treatment plant exit) has not been achieved. On the other hand, it was confirmed during the interviews that by improving sewage treatment facilities, etc., this project has contributed to the conservation of water quality of the water sources around the target areas and has prevented flooding from rainwater and sewage, the sanitation and environmental conditions, as well as the living environment of residents have improved. Therefore, the effectiveness and impact are judged to be fair. There are no major concerns regarding the organizational structure, technical aspect, financial aspect and operational maintenance status of the ONEE local organizations or the contractors (private companies) responsible for the operation and maintenance of the developed facilities, therefore, sustainability is judged to be high.

In light of the above, this project is evaluated to be satisfactory.

## 4.2 Recommendations

### 4.2.1 Recommendations to the Executing Agency

- Land acquisition negotiations were difficult in Ait Aourir City, and the construction of a sewage treatment plant was postponed. On the other hand, at the time of the ex-post evaluation (as of April 2021), the land problem has been resolved, and there are no obstacles to the development of the sewage treatment plant. Based on this, it is desirable that the ONEE conducts a fact-finding survey around the site and a sewerage needs survey, and strives to secure a project budget, so as to implement the postponed development of the sewage treatment plant.
- Regarding “BOD (discharge of sewage treatment plant),” which constitutes an effectiveness/quantitative effect indicator, the inflow sewage was not kept in the stabilization pond for long enough (not completely treated); as a result, an untreated portion remained, and a high BOD concentration was measured around the outlet of the sewage treatment plant in El Kelaa des Sraghna City and Amizmiz City. The BOD (discharge of sewage treatment plant) is expected to improve in the future, provided that sufficient time is taken, and the untreated portion is eliminated before being measured. Nevertheless, it is desirable that the ONEE does not neglect to monitor the concentration measurement at the sewage treatment plants in both cities, and fully implements the treatment process so that the BOD will steadily decrease in the stabilization pond.

#### 4.2.2 Recommendations to JICA

- At the time of the ex-post evaluation, the sanitation status of Ait Aourir City is the same as before the start of this project. With the deterioration of the existing sewage and drainage networks, there are concerns that contaminated water is being drained. However, the city's land acquisition negotiations have been resolved and there is no obstacle to developing the sewage treatment plant. As previously mentioned, it is desirable that the ONEE conducts a fact-finding survey around the site and a sewerage needs survey, strives to secure the project budget, and establishes a sewerage facility maintenance policy. At the same time, it is important that JICA monitors the city's sanitary conditions and sewerage facility development needs as necessary, and encourages the ONEE to work towards the development of a sewage treatment plant. The situation cannot be left unaddressed, considering the fact that there was a high demand and priority for the development of a sewage facility in the city at the time of the project appraisal.

#### 4.3 Lessons Learned

##### Importance of Finding a Way to Deal with and Solve Problems That Are Expected to Have a Significant Impact on the Project's Progress, Such as Land Acquisition at an Early Stage

- As previously mentioned, the land acquisition negotiations faced challenges in Ait Aourir City and the development of a sewage treatment plant was postponed. Although the ONEE, local government and communes attempted to negotiate with the landowners regarding resettlement to alternative land and compensation, they could not reach an agreement. As a result, a significant delay occurred, which affected the project's progress. The issue may have been countered and resolved, had the problems been identified at the time of the project formation or shortly after commencement of the project. Not only in this project, but in other similar projects, it would be desirable to anticipate the challenges relating to land acquisition as early as possible, so as to share and discuss these difficulties with the relevant parties, and in so doing strengthen the system of facilitating negotiations with landowners.

##### Necessity of Capturing the Project Effects by Setting Appropriate Indicators

- Regarding the BOD (discharge of sewage treatment plant), a quantitative effect indicator of this project, the actual values have not reached the targets in El Kelaa des Sraghna City and Amizmiz City. While the target value about El Kelaa des Sraghna City, set at the time of the appraisal, was 44 mg/L, it was considered that the introduction of an aeration-type stabilized pond (aeration type) would be more realistic in reaching 44 mg/L. The sewage treatment plant constructed in this

project has a trickling filter method (anaerobic pond, secondary settling tanks, etc.), and it is less likely to achieve the target value, perhaps because it is not as effective in terms of performance as the aeration-type stabilized pond. The same applies to Amizmiz City, where the target value was set at 97 mg/L, which was difficult to achieve with the stabilizing pond. Although we were unable to establish in depth reasons for this, it would be desirable to set a quantitative effect indicator that matches the method adopted and considers the prospect of achievement, not only in relation to this project but when formulating other similar sewage projects.

Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
1. Project Outputs	<p>1) Civil Engineering Work and Procurement Equipment</p> <p>a) El Kelaa des Sraghna City: New sewage treatment plant (stabilized pond method (anaerobic pond, permeable pond): 9,150 m<sup>3</sup>/day), new pumping station, sewage pipe laying (repair approx. 1.2 km, expansion approx. 26.8 km), etc.</p> <p>b) Ben Guerir City: New sewage treatment plant (stabilized pond method (anaerobic pond, aptitude pond): 7,250 m<sup>3</sup>/day), new pumping station, sewage pipe laying (reinforcement/expansion (total) approx. 58.4 km), repair/expansion of rainwater gutters (approx. 16.3 km), etc.</p> <p>c) Ait Aourir City: New sewage treatment plant (stabilized pond method (anaerobic pond, permeable pond): 1,750 m<sup>3</sup>/day), sewage pipe laying (repair approx. 5.8 km, reinforcement approx. 2.6 km, expansion approx. 7.2 km), etc.</p> <p>d) Amizmiz City: New sewage treatment plant (stabilized pond method (anaerobic pond, aptitude pond): 850 m<sup>3</sup>/day, new pumping station, sewage pipe laying (repair approx. 4.5 km, expansion approx. 7.9 km), etc.</p>	<p>1) Civil Engineering Work and Procurement Equipment</p> <p>a) El Kelaa des Sraghna City: New sewage treatment plant (trickling filter method (<u>anaerobic pond, secondary settling tanks, etc.</u>): 8,400 m<sup>3</sup>/day), new pumping station (as planned: 1 location), sewage pipe laying (<u>repair approx. 26.02 km, expansion approx. 12.27 km</u>), etc.</p> <p>b) Ben Guerir City: new sewage treatment plant (not constructed in this project (a phosphorite company constructed another plant with an activated sludge method)), new pumping station (as planned: 1 location), sewage pipe laying (<u>reinforcement approx. 28.06 km, expansion approx. 5.14 km</u>), repair/expansion of rainwater gutters (<u>*handled by local government</u>), etc.</p> <p>c) Ait Aourir City: New sewage treatment plant (stabilized pond method (anaerobic pond, permeable pond): <u>*Not implemented</u>, sewage pipe laying (<u>repair approx. 4.4 km, expansion approx. 5.2 km</u>), etc.</p> <p>d) Amizmiz City: New sewage treatment plant (stabilized pond method (anaerobic pond, permeable pond): 850 m<sup>3</sup>/day), new pumping station (as planned: <u>1 location</u>), sewage pipe laying (<u>repair approx. 2.4 km, expansion approx. 11.71 km</u>), etc.</p>
2. Project Period	March 2007–December 2012 (70 months)	March 2007–June 2019 (148 months)
3. Project Cost		
Amount Paid in Foreign	1,824 million yen	3,431 million yen

Currency		
Amount Paid in Local Currency	4,915 million yen	1,091 million yen
	(366.8 million Moroccan dirham)	(99.2 million Moroccan dirham)
Total	6,739 million yen	4,522 million yen
ODA Loan Portion	(5,054 million yen)	(3,034 million yen)
Exchange Rate	1 Moroccan dirham = 13.4 yen (As of December 2006)	1 Moroccan dirham = 11.0 yen Average between 2010 and 2017 based on International Monetary Fund's International Fiscal Statistics: average of major spending period)
4. Final Disbursement	July 2017	

The Kingdom of Morocco

FY2020 Ex-Post Evaluation Report of

Japanese ODA Loan

“Urban Areas Living Environment Improvement Project”

External Evaluator: Kenichi Inazawa, Octavia Japan, Co., Ltd.

## 0. Summary

The objective of this project was to improve the access to basic social infrastructure (water supply, sewerage, electricity, road) services for unsanitary areas in regional cities near the Rabat metropolitan area. The government of Morocco formulated the *National Development Initiative* and the *Cities without Slums Program* (Le programme “Villes sans bidonvilles”: hereinafter referred to as the “VSB Program”) and advocated the need to improve access to the basic infrastructure social services for vulnerable groups (poor, unsanitary housing residents, etc.) and to reduce poverty. While there is a strong need to provide and improve these services to the increasing number of poor households, it is in line with the assistance policy of Japan; therefore, the relevance is high. Regarding efficiency, the project cost significantly exceeded the initial plan, when comparing the planned amount and the actual amount by emphasizing the relevance of the initial financial plan including the yen loan. The project period was significantly longer than the initial plan because it took time to complete the procedures for changing the target site to the Jnane district, reviewing the land acquisition plan, and the re-implementation and approval of the Environmental Impact Assessment (hereinafter referred to as “EIA”); therefore, the efficiency is low. As for the quantitative effect indicators, verifying the effectiveness and impact after the project target area was changed to the Jnane district, targets have been achieved in terms of the household electrification ratio, the percentage of water supplied population, the percentage of the sewage treated population, and the percentage of legal possession of land. Considering the progress in housing construction, the fact that residents including poor households are using and benefiting from the water supply, sewerage and electric power services, and the fact that they are accessing schools and commercial facilities within the areas using the developed roads, it can be said that this project is contributing to the improvement in the living environment of the residents; and therefore, the effectiveness and impacts are considered to be high. There are no major concerns in the institutional/organizational, technical, financial aspects and the status of operation and maintenance of the Kenitra City Public Corporation (La Régie Autonome de Kenitra; hereinafter referred to as “RAK”) and Kenitra Commune (local government), etc., responsible for the operation and maintenance of the



developed infrastructure facilities. Therefore, the sustainability is judged to be high.

In light of the above, this project is evaluated to be satisfactory.

## 1. Project Description



Residential area constructed after residential land development (Jnane area, the same applies below)



Developed substation equipment

### 1.1 Background

Since the 1950s, the government of Morocco has taken measures against the expansion of unsanitary residential areas, which is mainly caused by population concentration in urban areas. However, due to a range of factors, such as insufficient financial resources, the lack of a public financial system, rising land prices, the inadequate involvement of local governments, a lack of coordination among government agencies, etc., effective and integrated measures were not taken. As a result, especially in the vicinity of big cities, unsanitary residential areas have spread, leading to housing shortages. In unsanitary residential areas near the capital, Rabat, water taps were limited, domestic wastewater and human waste permeated underground, and electricity supply was limited. Most of the roads were unpaved, and environmental and hygiene problems were becoming serious. Therefore, improving the living environment by developing basic infrastructure facilities (water supply, sewerage, electricity, roads) for unsanitary residential areas was an urgent task.

### 1.2 Project Outline

The objective of this project is to improve access to basic social services in regional cities around Rabat, the capital of Morocco, by installing basic infrastructure facilities (water supply, sewerage, electricity, roads) for unsanitary residential areas, thereby contributing to the

improvement of the living environment of residents in the target areas and the stimulation of local economies.

Loan Approved Amount / Disbursed Amount	5,537 million yen / 1,609 million yen
Exchange of Notes Date / Loan Agreement Signing Date	March 30, 2007 / March 30, 2007
Terms and Conditions	<p>[Water Supply, Sewerage, Consulting Service]  Interest Rate 0.75 %  Repayment Period 40 years  (Grace Period 10 years)  Conditions for Procurement: General Untied</p> <p>[Electricity, Road]  Interest Rate 1.50 %  Repayment Period 30 years  (Grace Period 10 years)  Conditions for Procurement: General Untied</p>
Borrower / Executing Agency	Holding Al Omrane (hereinafter referred to as “HAO”) / HAO
Project Completion	March 2021
Target Area	Jnane district (in the Ouled M’barek sector, Kenitra City)
Main Contractor(s) (Over 1 billion yen)	Swtrap Sarl (Morocco), Univers Bat (Morocco), Setrat (Morocco)
Main Consultant(s) (Over 100 million yen)	None (the HAO arranged it with its own funds)
Related Studies (Feasibility Studies, etc.)	Special Assistance for Project Formation (SAPROF), JICA, 2007
Related Projects	<p>[Other International Organizations, Aid Agencies, etc.]</p> <ul style="list-style-type: none"> <li>- “Living Environment Sector Development Policy Loan” (World Bank)</li> <li>- “Loan for Pillar Association Infrastructure Development” (European Investment Bank (EIB))</li> <li>- “Support for the Improvement of Unsanitary Residential Areas” (French Development Agency (AFD))</li> <li>- “Strengthening Local Governance, Including Fostering Social Workers to Strengthen Citizen Initiatives in Unsanitary Housing Measures” (United States Agency for International Development (USAID))</li> </ul>

## 2. Outline of the Evaluation Study

### 2.1 External Evaluator

Kenichi Inazawa, Octavia Japan, Co., Ltd.

### 2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted with the following schedule.

Duration of the Study: January 2021–February 2022

Duration of the Field Study: It was conducted remotely utilizing a local survey assistant.

(The remote field surveys by the local survey assistant were conducted in March–April, June–July, and September 2021)

### 2.3 Constraints during the Evaluation Study

Due to the spread of COVID-19, the external evaluator did not travel internationally. Utilizing the local survey assistant, the external evaluator carried out the site visits, collected information and data and conducted interviews with the relevant individuals remotely. The external evaluator analyzed the information collated, so as to carry out an evaluation and make a judgment. It was not possible to conduct an interview survey with the residents of the Jnane district as permission was not granted on the Moroccan side. Consequently, we could not interview directly to the beneficiaries directly regarding the access to basic social infrastructure services, living environment and poverty alleviation.

## 3. Results of the Evaluation (Overall Rating: B<sup>1</sup>)

### 3.1 Relevance (Rating: ③<sup>2</sup>)

#### 3.1.1 Consistency with the Development Plan of Morocco

Prior to the start of this project, the Ministry of Housing and Urban Planning, which has jurisdiction over unsanitary residential areas, formulated the *VSB Program* in 2004, with the aim to improve unsanitary residential areas near major cities. In addition, His Majesty King Mohammed VI announced the *National Initiative for Human Development* (INDH) in 2005, which aimed to improve access to basic social services (health, education, etc.), through support for income creation activities and the development of facilities such as civic halls for the socially vulnerable in regional and urban areas (the poor, those living in unsanitary residential

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<sup>1</sup> A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

<sup>2</sup> ③: High, ②: Fair, ①: Low

areas, etc.), linking it to the reduction of poverty, which was set as the objective of national policy.

As of the time of the ex-post evaluation, the government of Morocco has formulated the *Five-Year Government Program (2017–2021)* and set goals such as stable economic growth, unemployment rate control, poverty reduction, the correction of social disparities through local development, and the promotion of investment. While the government had initially set 2010 as a target year for the previously mentioned *VSB Program*, working toward improving unsanitary residential areas, it is still ongoing at the time of the ex-post evaluation. Although it was declared that 59 of the 85 unsanitary residential areas in the country were eradicated by the second half of 2020, the need to provide basic social infrastructure services and develop housing is still recognized in 26 cities.

Based on the above, before this project began and at the time of the ex-post evaluation, policies and measures aimed at improving unsanitary residential areas are regarded as important in Morocco, and therefore, this project is recognized as being consistent with Morocco's development policies and measures.

### 3.1.2 Consistency with the Development Needs of Morocco

Before the start of this project, in the Sidi Taibi district located near the capital Rabat, the entire population relied on drinking water from a limited number of faucets. Regarding sewerage facilities, neither sewage pipes nor rainwater/drainage pipes were installed, and domestic wastewater and human waste permeated underground. Most of the roads were unpaved and there was no electricity supply. There were environmental and hygiene problems such as chronic flooding on roads and the discharge of domestic wastewater. Similarly, the Ouled M'barek district in Kenitra City, located near Rabat, was a slum formed by the unapproved construction and settlement of barracks by immigrants from other areas in the city's common land. The situation was similar to that of the Sidi Taibi district, and there were environmental and hygiene problems.

At the time of the ex-post evaluation, the Ministry of National Territory Planning, Land Planning, Housing and City Policy of Morocco points out the necessity of taking drastic measures, including revisions, to accelerate the progress of the above-mentioned *VSB Program* after 2020 and to implement and promote effective solutions. This is because while there were about 270,000 poor households at the start of the *VSB Program* (in 2004), the number had increased to about 450,000 households by the end of 2019. Another factor is that there is an

increasing need for the improvement of basic social infrastructure services for poor households, the diversification of housing provision through the entry of the private sector, and the livelihood support. As will be explained in 3.2.1 Project Outputs under Efficiency, the target site of this project was changed from the Sidi Taibi and Ouled M'barek districts to the Jnane district, where there is a significant need for housing development and associated basic infrastructure facilities (water supply, sewerage, electricity, roads, etc.) for poor households. The HAO, which is the executing agency of this project, and the RAK, which is responsible for the operation and maintenance, are responding to such a need by working on the development of the above infrastructure facilities, service provision and housing construction, etc.<sup>3</sup>

Based on the above, there was a high demand for the improvement of basic social infrastructure services and housing construction for poor households in Morocco before the start of this project and at the time of ex-post evaluation, and therefore this project is confirmed to be consistent with the development needs.

### 3.1.3 Consistency with Japan's ODA Policy

The Japanese Ministry of Foreign Affairs formulated the *Official Development Assistance (ODA) Country Data Book* (2002), referencing support for correcting the disparities between cities and regions as one of the priority sectors requiring assistance from Japan. In addition, JICA formulated the *Medium-Term Strategy for Overseas Economic Cooperation Operations* in April 2005, in which “building a foundation for sustainable growth” and “support for poverty reduction” were identified as priority areas. Furthermore, JICA formulated the *Country Assistance Policy for Morocco* in 2006, which referred to a sustainable comprehensive regional plan including urban environment improvement as a pillar for its support.

This project intended to improve the living environment of the poor by developing unsanitary residential areas as urban areas. As this is consistent with the priority support areas above, it is deemed consistent with Japan's assistance policy.

Based on the above, this project has been highly relevant to the country's development plan and development needs, as well as Japan's ODA policy. Therefore, its relevance is high.

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<sup>3</sup> In the Jnane area, apart from the development of basic infrastructure facilities by this project, development of the following facilities was confirmed during the field survey: housing, elementary and junior high schools, clinics, social sports centers, junior high schools, youth centers, sports stadiums, mosques (under construction as of first half of 2021), high schools (under construction), etc.

### 3.2 Efficiency (Rating: ①)

#### 3.2.1 Project Outputs

Table 1 shows the plan and actual outputs at the time of the ex-post evaluation. In addition, Figure 1 shows the flow chart depicting the changes in the project target areas.

Table 1: The Output Plan and Actual Results of This Project at the Time of Ex-Post Evaluation

Plan (at the time of appraisal: 2007)	Actual (at the time of the ex-post evaluation: 2021)
<p>[Sidi Taibi (near the capital Rabat), Ouled M'barek district (within the Ouled M'barek sector, Kenitra City)]</p> <p>1) Civil Engineering Work</p> <p>(1) Installation of water and sewage systems (installation of water pipes and drainpipes for rainwater and sewage): 39.3 km of water pipes, 23.9 km of drainpipes for rainwater and sewage</p> <p>(2) Installation of electricity distribution networks: 32.0 km</p> <p>(3) Construction, widening and asphaltting of roads: 11.0 km</p>	<p>[Jnane district (within the Ouled M'barek sector, Kenitra City)]</p> <p>1) Civil Engineering Work</p> <p>(1) Installation of water and sewage systems (installation of water pipes and drainpipes for rainwater and sewage): 67.9 km of water pipes, 87.2 km of drainpipes for rainwater and sewage (combined system), stormwater management pond and pumping facility</p> <p>(2) Installation of electricity distribution networks: 244.0 km</p> <p>(3) Construction, widening and asphaltting of roads: 5.5 km</p>
<p>2) Assistance for Local Residents</p> <p>(1) Provision of project information to the target residents of the project</p> <p>(2) Support for the resettlement procedures</p> <p>(3) Training for residents' organizations</p> <p>(4) Monitoring of the living environment of the relocated residents</p>	<p>2) Assistance for Local Residents</p> <p>The HAO implemented (1)–(4) listed on the left.</p>
<p>3) Consulting Services</p> <p>(1) Reviewing detailed design</p> <p>(2) Bid support</p> <p>(3) Construction supervision</p> <p>(4) Environmental monitoring</p>	<p>3) Consulting Services</p> <p>The HAO implemented (1)–(4) listed on the left by hiring consultants with its own funds.</p>

Source: Documents provided by JICA (at the time of appraisal), Project Completion Report and answers to the questionnaire (at the time of the ex-post evaluation)

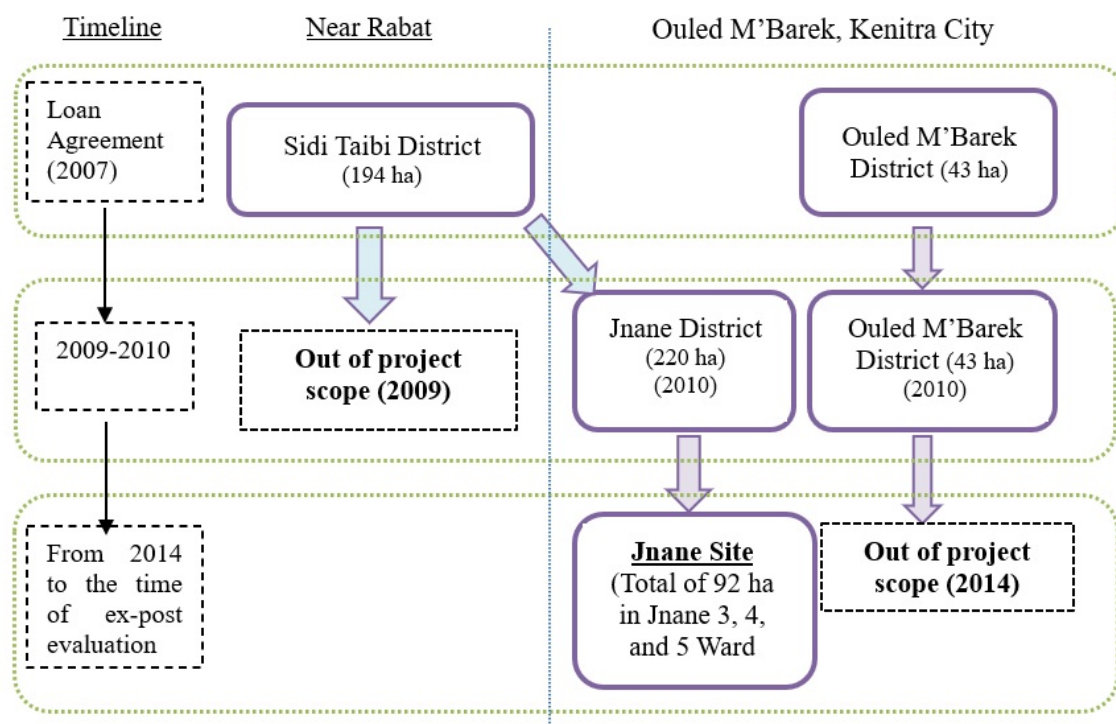


Figure 1: Transition of the project target areas (signing of loan agreement–ex-post evaluation)

Differences between the plan at the time of the appraisal and the actual outputs at the time of the ex-post evaluation, shown in Table 1, are analyzed below.

### 1) Civil Engineering Work

The initial plan was that basic infrastructure facilities would be developed in the Sidi Taibi district near the capital Rabat and in the Ouled M'barek district in the Ouled M'barek sector. However, after the start of the project, both sites were excluded from the project scope and changed to the third, fourth and fifth wards of Jnane (hereinafter referred to as the “Jnane site”) inside the Ouled M'barek sector. The details of the change will be explained in a) and b) below.

#### a) 2009–2014:

The HAO submitted a request to JICA for removing the originally planned Sidi Taibi district from the project target areas and changing the site to the Jnane district adjacent to the Ouled M'barek district. The Sidi Taibi district was removed because the project implementation body was transferred from the HAO to Sidi Taibi Commune (local government) and it became outside the jurisdiction of the HAO, following the policy change of the Moroccan central

government (a change due to the organization of the administrative structure<sup>4</sup>). In 2009, the two districts, the Ouled M'barek district (43 ha) and the Jnane district (220 ha), became the target areas of the project. It was expected that existing residents from other parts of the Ouled M'barek sector would relocate to the Jnane district. Over the period of 2012–2014, JICA received the draft EIA and land acquisition plan for the Jnane district from the HAO, conducted a field survey, and confirmed the contents and scale of the project plan, project cost, implementation structure, etc. On the other hand, the Moroccan side approved the EIA and completed the land acquisition between 2013 and 2014.

b) 2014–2015:

The land acquisition was delayed in the Ouled M'barek district (in the Ouled M'barek sector, Kenitra City). As the situation did not improve at all, the HAO requested JICA continue the project by changing the target area to the Jnane district.<sup>5</sup> JICA scrutinized the request, and considering that the Jnane district was an extension of the Ouled M'barek district and that it is located within the Ouled M'barek sector, Kenitra City, decided to continue this project in the Jnane district on the grounds that “it is not considered as a change in the project target area and does not conflict with the contents of the loan agreement and the provision policy.”<sup>6</sup>

Based on the above process, it was decided that this project would cover a total of 92 ha in the third, fourth and fifth wards of the Jnane district (total area of 220 ha) for the development of water and sewage facilities, electricity networks, the construction and expansion of roads, pavement of roads, support for resettlement, etc. Regarding these major changes, it may not have been easy at the time of the appraisal to anticipate changes in the political situation and unexpected factors after the start of the project. Nevertheless, one could argue that both the

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<sup>4</sup> One of the factors was that the HAO had a land ownership problem in this area, but the details were unknown.

<sup>5</sup> According to JICA's documents, at the beginning of the project, a method was planned (the drawer method) in which residents were gradually relocated within the Ouled M'barek district and the construction of basic infrastructure facilities was carried out on the vacant land. In fact, this method was extremely difficult for both the HAO and those engaged in the project (local governments, contractors hired for land maintenance, etc.) because: (1) with this method, the land was divided into small areas, and the infrastructure work was carried out on the vacant land while gradually relocating the residents, so the work had to be carried out in stages in a very small area, (2) it therefore took a long time to complete the construction of one slum area, and meanwhile some residents moved to this area, which made it difficult to secure temporary relocation sites for all the residents, (3) it has become clear that apart from the dense population in a small area hindering the construction work, construction itself affects the lives of the residents, and (4) some residents expressed opposition to the relocation. As a result, it was decided among those engaged in the project that it would be difficult to continue the project in this district. The reason why the drawer method was adopted was that there was no other suitable relocation site near the area at the time of initial planning. On the other hand, while utilizing the Jnane area was not expected due to local circumstances at the time of initial planning, it became a possibility and the momentum for continuing the project in the Jnane area increased among those engaged in the project; the HAO in particular showed its intention to actively proceed.

<sup>6</sup> Similarly, according to JICA's documents, strictly speaking, the decision was made based on the judgment that although there will be changes in terms of the project district, there will be no change in the project target sector and no impact on the loan agreement framework.



development assistance agency and the recipient country should have established a thorough system, whereby the progress of the project was envisaged, external factors and obstacles were shared, risks and problems responded to, and a cooperating system put in place.<sup>7</sup>

## 2) Consulting Service

During this project, a consultant was recruited after the start of the project and the service commenced. However, due to the above-mentioned reason, almost no work was carried out and the contract was canceled. On the other hand, the HAO recognized the need to hire consultants for work such as support for local residents; around the time of the project site change, the HAO recruited consultants with their own funds and conducted the detailed design review, bid support, construction supervision, environmental monitoring, etc. Funds and personnel were also allocated to the support for local residents, and activities were carried out.

### 3.2.2 Project Inputs

#### 3.2.2.1 Project Cost

The total project cost was planned to be 7,383 million yen (of which 5,537 million yen was to be covered by ODA loan) at the time of the appraisal. In reality, the actual total cost was 11,591 million yen (of which 1,609 million yen was an ODA loan) (approximately 157% of the initial plan). Due to the change in the project target area to the Jnane site, the project cost plan was also revised and calculated to be 13,188 million yen. Table 2 shows the initial project cost, the project cost after the plan change, and the actual amount. Comparing the project cost after the plan change (13,188 million yen) with the actual amount (11,591 million yen), one can say that the actual cost was within the plan. However, due to the impact of the change in the project site, the actual amount of the ODA loan (1,609 million yen) was less than the originally planned amount (5,537 million yen). This indicates that the Moroccan side used more funds of their own for the development of the basic infrastructure facilities (water supply, sewerage, drainage, roads, electricity).<sup>8</sup> Regarding the evaluation of project costs, considering that a comparison

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<sup>7</sup> Considering the fact that the project scope and the target area changed significantly, it can be said that there was a problem in the process approach of the project implementation. As will be explained in 3.2.2.1 Project Cost under Efficiency, while the utilization of the ODA loan did not progress, it can be said that there were no mistakes in the choices to be made and the approach to achieving the project objectives, considering that before and after the project implementation the needs for implementing the project remained unchanged, thereby contributing to the elimination of unsanitary residential areas and the improvement of the living environment.

<sup>8</sup> The loan agreement was not changed according to the project cost plan. The planned loan was 5,537 million yen, while the actual amount was 1,609 million yen, because according to the loan agreement, the loan execution deadline was set for 2015, and it became difficult to complete the construction of the basic infrastructure facilities within that deadline. One factor is that following the change in the project target site to the Jnane district, it took time for the Moroccan side to confirm the plan for land acquisition and to process the EIA approval, which delayed the start of the

with the actual amount must be made by focusing on the validity of the initial financial plan, including the ODA loan plan and the actual amount, the project cost and the actual amount were not necessarily efficient.

Table 2: Planned Project Cost and the Actual Amount

(Unit: million yen)

Planned Project Cost		Actual Amount
At the Time of the Loan Agreement (2007)	At the Time of the Plan Change (2014)	
7,383 (5,537)	13,188	11,591 (1,609)

Source: Documents provided by JICA, Project Completion Report

Note: The amounts in parentheses shown in the table indicate the ODA loan fund.

### 3.2.2.2 Project Period

Table 3 shows the initial plan and the actual project period. At the time of the appraisal, it was planned to be implemented from March 2007 to June 2014, for the duration of seven years and four months (88 months).<sup>9</sup> On the other hand, the actual period was from March 2007 to March 2021, for the duration of 14 years and one month (169 months). The actual project period was approximately 192% of the initial plan, which is a significant delay. This was because time was required for the project site change, review and procedure for the land acquisition plan, re-implementation and approval of the EIA. It was also because the construction commenced late due to the delay in the progress of the land acquisition. As explained in 3.2.1 Project Outputs, (1) selection of consultant was done, and (2) consulting services were started, but after that, the HAO decided to handle it with its own funds. (3) bidding was also continued with the support of the consultants hired by the HAO.

Table 3: Initial Plan and Actual Project Period

	Initial Plan	Actual
Entire Project	March 2007–June 2014 (88 months)	March 2007–March 2021 (169 months)
1) Selection of consultant	April 2007–February 2008	After March 2008–Before September 2010 <sup>10</sup> (Recruited using the HAO's own funds)

construction period. In other words, while it took time to redo the procedures, the loan execution deadline was approaching, and the opportunity to promote the ODA loan was lost.

<sup>9</sup> At the time of the examination, this project's completion was defined as "when the civil engineering work guarantee period was completed and the support for local residents was completed."

<sup>10</sup> The detailed selection period could not be identified. The selection period for the consultant who was recruited before the HAO hired their own consultants was April 2007–February 2008.

2) Consulting Services	March 2008–June 2013	October 2010–November 2015 <sup>11</sup> (Recruited using the HAO’s own funds)
3) Bidding	April 2007–May 2009	October 2010–Before May 2014 <sup>12</sup> (Implemented by the HAO)
4) Civil Engineering Work	September 2008–June 2014	- Water: March 2013–February 2020 (Completion of the warranty period is February 2021) - Sewerage: December 2012–February 2020 (Completion of the warranty period is February 2021) - Road: October 2012–February 2020 (Completion of the warranty period is February 2021) - Electricity: June 2014–March 2020 (Completion of the warranty period is <u>March 2021</u> )
5) Support for Local Residents	July 2007–June 2014	2014–2016 <sup>13</sup>

Source: Documents provided by JICA (initial plan), the Project Completion Report and answers to the questionnaire (actual)

### 3.2.3 Results of Calculations for Internal Rates of Return (Reference only)

At the time of the appraisal, the internal rate of return (FIRR) was calculated to be 6.1%, with the fee income, connection income and sales of residential lands from the use of basic social infrastructure services as “benefits” and the project cost and operation/maintenance expenses as “costs,” covering the Sidi Taibi and Ouled M’barek districts. In addition, the economic internal rate of return (EIRR) was calculated to be 10.9%, with the same fee incomes and the increase in the value of the residents’ assets in the project target areas as “benefits” and the project cost and operation/maintenance expenses as “costs.” On the other hand, the project target area was changed to the Jnane district in this project, and there is a big difference in the assumptions at the time of appraisal and of the ex-post evaluation. In addition, as will be explained in 3.4.3 Financial Aspect of Operation and Maintenance, the expenditure of operation and maintenance costs, which is a “cost,” has not actually started at the time of the ex-post evaluation, and the data on fee income, which is a “benefit,” were not presented by the HAO or the RAK, who are responsible for the operation and maintenance. Therefore, the EIRR and FIRR were not recalculated.

<sup>11</sup> The employment period of the consultant financed with the ODA loan was February 2008–before September 2010.

<sup>12</sup> The detailed bidding period could not be identified. Since the HAO’s own funds were utilized, bidding assistance was not provided using the ODA loan funds.

<sup>13</sup> The start month and the completion month could not be identified.

[Summary of Efficiency]

This project was continued after the project target area was changed to the Jnane district. Regarding the project cost, it is necessary to compare the planned amount with the actual amount by focusing on the validity of the initial financial plan including the ODA loan, and it cannot be concluded that the actual amount was necessarily efficient (approximately 157% of the plan). Regarding the project period, it took time to complete the procedure for changing the site to the Jnane area, reviewing and proceeding with the land acquisition plan, and re-implementing and approving the EIA; there was also a delay in the construction period. As a result, the delay was significant (approximately 192% of the plan). Therefore, the efficiency of the project is low.



Photo 1: Developed road



Photo 2: Developed stormwater management pond



Figure 2: Map of the project site location (Jnane district)

### 3.3 Effectiveness and Impacts<sup>14</sup> (Rating: ③)

#### 3.3.1 Effectiveness

##### 3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

Table 4 shows the baseline and target values of the operation and effect indicators set at the time of the appraisal. Table 5 shows the target value of the Jnane site set in response to the change in the project target area, and Table 6 shows the actual value of the Jnane site. Table 7 shows the number of water and sewerage service users and the number of land relocations in the Jnane site as reference indicators.

<sup>14</sup> Sub-rating for Effectiveness is to be put with consideration of Impacts.

Table 4: Operation and Effect Indicators of this Project  
(Baselines and Targets at the Time of Appraisal)

Indicator	Baseline (2006)		Target (2016) [2 Years After Completion]	
	Sidi Taibi	Ouled M'barek	Sidi Taibi	Ouled M'barek
Household electrification ratio (unit: %)	28	24	100	100
Percentage of water supplied population (unit: %)	0	7	60	92
Percentage of the sewage treated population (unit: %)	0	0	60	98
Percentage of legal possession of land (unit: %)	31.8	N/A	100	100

Source: Documents provided by JICA



Review of the target values following the project site change

Table 5: Operation and Effect Indicators of This Project  
(Target Values that JICA and the HAO Agreed<sup>15</sup>)

Indicator	Target
	Project Site After the Change: Jnane Site
Household electrification ratio (unit: %)	100
Percentage of water supplied population (unit: %)	100
Percentage of the sewage treated population (unit: %)	100
Percentage of legal possession of land (unit: %)	100

Source: JICA's documents, Minutes of Discussion (M/D) between JICA and the HAO, Project Completion Report

Table 6: Actual Values of the Operation and Effect Indicators of This Project  
(At the Time of the Project Completion and at the Time of the Ex-Post Evaluation)

Indicator	Actual (Jnane Site)	
	2016 (At the time of the Completion)	2021 (At the Time of the Ex-Post Evaluation)
Household electrification ratio (unit: %)	76	100
Percentage of water supplied population (unit: %)	76	100
Percentage of the sewage treated population (unit: %)	91	100
Percentage of legal possession of land (unit: %)	N/A	Approx. 100

Source: Answers to the questionnaire, HAO's document

<sup>15</sup> As of February 23, 2015, JICA and the HAO have exchanged minutes of the discussion (M/D) to mutually confirm the scope, implementation schedule, review of the operation and effect indicators, etc., following the change in the project target area.

(Reference) Table 7: Numbers of Water Supply/Sewerage/Electric Power Service Users, Number of Land Relocations in the Jnane Site (Changes in the Last Three Years: Actual)

	2018	2019	2020
Average daily water supply (unit: m <sup>3</sup> /day)	N/A	N/A	N/A
Number of water service users (unit: household)	404	1,444	2,004
Number of sewerage service users (unit: household)	404	1,444	2,004
Number of electric power service users (unit: household)	549	1,561	2,101
Number of land relocations (unit: number)	Cumulative up to 2020 (at the time of the ex-post evaluation): 1,957 *Note		

Source: Answers to the questionnaire, the HAO's document

\*Note: The number of relocations for households that were forced to relocate from outside the Jnane district. This does not include the lots of the residents who had previously lived in the area or those who have land rights, or the lots to be sold in the future.

For this project, the baseline and target values were set as shown in Table 4 at the time of the appraisal. As the project target area was changed to the Jnane site, JICA and the HAO agreed to reset the target values as shown in Table 5. At the time of the ex-post evaluation, 4,689 lots of land have been developed in the Jnane site, in which 2,004 households reside. Table 6 shows the actual data for 2016 at the time of project completion and 2021 at the time of the ex-post evaluation (two fiscal years). The total area covered by infrastructure facilities in the Jnane site is 92 ha,<sup>16</sup> and the total number of land lots is 4,689. As of the time of the ex-post evaluation, these 4,689 lots are classified into three types: (1) the lots for (mainly low-income) households who have been forced to relocate due to the land acquisition from outside the district (1,960 lots), (2) the lots of residents who had resided or had land rights before the development of this district (1,637 lots), and (3) the lots that will be sold in the future (1,092 lots). Through this project, infrastructure facilities such as water supply/sewerage, electricity and roads have been developed in a total of 4,689 lots (1,960 + 1,637 + 1,092 lots) by the time of the ex-post evaluation, and residents will be able to access them when they build houses. In other words, regarding the targets shown in Table 5, 100% was achieved for the household electrification ratio, percentage of water supplied population, and percentage of the sewage treated population.<sup>17</sup> Concerning the percentage of legal possession of land, there are no illegal occupants in this district, and all occupants have either been relocated by land acquisition,

<sup>16</sup> The breakdown is 50 ha in the third ward of the Jnane district, 32 ha in the fourth ward of the Jnane district, and 10 ha in the fifth ward of the Jnane district (92 ha in total).

<sup>17</sup> Connections including piping and wiring have been completed in this area, and basic social infrastructure services can be used immediately.

purchased land or have the right to own land (of the above 4,689 lots, (1) and (2) apply). In addition, as will be explained below, of “(1) the lots for (mainly low-income) households who have been forced to relocate due to the land acquisition from outside the district (1,960 lots)” that are actually subject to the land relocation, 1,957 lots have already been relocated. Thus, it can be said that approximately 100% has been achieved (= 1,957/1,960 lots).<sup>18</sup>

Table 7 shows the water supply/sewerage/electric power services and the number of land relocations in the Jnane site for reference. At the time of the ex-post evaluation (as of 2021), 2,004 households reside in the Jnane site.<sup>19</sup> Although the average daily water supply is unknown, as shown in the table, the number of water supply service users has been increasing year-on-year, and so it is thought that the average daily water supply is increasing. Regarding the sewerage service, the number of users is the same because the household heads sign up for the service at the same time as the water supply. The number of electric power service users is also on the rise.<sup>20</sup> The number of land relocations is the cumulative data up to 2020. Of the 4,689 lots explained above, this shows that 1,957 lots have been relocated<sup>21</sup> of the 1,960 lots allocated for the households that were forced to move from other districts classified as (1). The HAO commented that “the lots under the category (1) are set up for resettlement, and the land has almost been relocated,” and concerning the other lots (mainly (2) and (3) above), “the move to the Jnane district is continued. The population is also on the rise,<sup>22</sup> and land relocation is expected to increase for the time being.” Based on these comments, it is estimated that the number of users of water supply, sewerage, and electric services will continue to increase.

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<sup>18</sup> (2) The lots of residents who had resided or had land rights before the development of this district (1,637 lots) are not included in the percentage of legal possession of land in Table 6 or in the number of land relocations in Table 7. This is because this group is not a target of the relocation, strictly speaking.

<sup>19</sup> Table 7 shows the number of houses that are mostly developed of a total of 4,689 lots. As explained in the main text, basic infrastructure services can be used as soon as a house is constructed. However, as of the time of the ex-post evaluation, not much time has passed since the lots have been completed, and the number of households is not large compared to the number of lots that have been developed.

<sup>20</sup> The actual for 2020 (2,101 households) is more than the actual number of households (2,004 households). This is because there are cases where the building is also used by shops (combined housing), and there are cases where two households live together in one building, with multiple contracts.

<sup>21</sup> At the time of the ex-post evaluation, the lots are mixed, such as where the relocation is completed and the residential building is already constructed, where it is under construction, and where it is planned to be constructed in the future. In any case, all lots have been prepared and developed and can be connected to each infrastructure service, which can be used.

<sup>22</sup> Morocco has a population of approximately 36.03 million (source: World Bank data, 2018). The population of Kenitra City, to which the Jnane district belongs, was 362,000 in 2005, 402,000 in 2010, and 445,000 in 2015 (source: <https://fr.statista.com/statistiques/1005100/population-evolution-kenitra/> accessed on July 27, 2021). It can be said that there is an increasing trend in population as a whole.



### 3.3.1.2 Qualitative Effects (Other Effects)

#### (Improving Access to Basic Social Infrastructure Services through Project Implementation)

In this evaluation study, a qualitative interview survey was planned to be conducted for the residents of the Jnane site. However, this has not materialized because permission was not given by the Moroccan side to conduct the survey. On the other hand, through site visits (visual inspection), the following was confirmed in the district: (1) housing construction is in progress, (2) after the housing is constructed and the relocated people start living there, they are using the water supply/sewerage and electric power services, (3) those who moved in are using the developed road to attend schools and visit commercial facilities, and (4) there were no particular problems or issues with the substation equipment, the electronic control panel in the pumping station installed in the stormwater management pond, or the sewerage pumping facility introduced by this project. It is thought that the residents are accessing the basic social infrastructure services due to the implementation of this project.

### 3.3.2 Impacts

#### 3.3.2.1 Intended Impacts

##### (Contribution to Improving the Living Environment of the Residents and Revitalizing the Local Economy in the Target Area)

As previously mentioned, residents of the Jnane site are believed to be benefiting from the services provided through the water supply/sewerage, electricity and road infrastructure facilities. As shown in Table 7, considering the fact that the number of service users is increasing, it is highly possible that the living environment of residents is improving compared to before the start of this project.

For reference, Table 8 shows the changes in the poverty rate by region including the Kenitra region (Rabat-Salé-Kénitra) to which the Jnane district belongs, and Table 9 shows the changes in the GDP of the region.

(Reference) Table 8: Changes in Poverty Rate by Region (Comparison between 2001 and 2014<sup>23</sup>)

(Unit: %)

Region	2001	2014
Drâa-Tafilalet	40.3	14.6
Marrakech-Safi	20.2	5.4
Oriental	18.2	5.3
Souss-Massa	16.7	5.1
Fès-Meknès	16.6	5.2
<b><u>Rabat-Salé-Kénitra</u></b>	<b><u>15.5</u></b>	<b><u>3.8</u></b>
Béni Mellal-Khénifra	14.4	9.3
Tanger-Tétouan-Al Hoceima	11.5	2.2
Casablanca-Settat	6.9	2.0
South Region (Souss-Massa-Draa)	6.0	3.3

Source: High Commission for Planning (HCP, Haut Commissariat au Plan)

(Reference) Table 9: GDP of the Rabat-Salé-Kénitra Region (Latest Five Years)

(Unit: million Moroccan dirham)

2014	2015	2016	2017	2018
152,086	158,313	162,515	171,838	172,738

Source: Statistics Directorate of Morocco

With respect to the statistical data in Tables 8 and 9, it is difficult to prove to what extent this project directly contributes to economic revitalization and poverty reduction in the Jnane district. However, it is highly probable that the development of the basic infrastructure facilities, commercial and public facilities, etc., enabled the increase in employment, opening of new businesses, and the securing and increasing of income, leading to the revitalization of the local economy. It should be noted that the most recent year shown in Table 8 is 2014, and that these are data from during the implementation of this project. The poverty rate decreased nationwide compared to 2001. Given that the gross domestic product (GDP) increased year-on-year as shown in Table 9, it is possible that the poverty rate has further declined until the ex-post evaluation due to the realization of economic growth. Nevertheless, considering that it is still a speculation, we will treat it as a reference.

<sup>23</sup> In Morocco, statistical data will be created based on the census. The last census was in 2014 and the next census will be in 2024. Accurate data are not available in the meantime.

### 3.3.2.2 Other Positive and Negative Impacts

#### 1) Impacts on the Natural Environment

This project was classified as Category A because it was judged to have the characteristics that are likely to have an impact as listed in the *Japan Bank for International Cooperation Guidelines for Confirmation of Environmental and Social Considerations*.<sup>24</sup> The EIA was approved by the Moroccan Ministry of Land Management, Water, and Environment (MATEE) in November 2006. As mentioned above, following the change of the project target area to the Jnane district, the EIA was carried out again by the Moroccan side, which was approved in August 2014.

Through the questionnaire and interviews with the HAO, it was confirmed that there were no particular negative impacts on the natural environment (air pollution, vibration, noise, impacts on the ecosystem, etc.) during the implementation of this project and after the completion of the project. The contractor for this project made efforts to prevent the spread of dust by regularly sprinkling water on the project site during times of little rain. There are no events that show the effects on the ecosystem around the project site. In addition, according to the HAO, there are no health hazards to the residents of the Jnane district, no phenomena related to this project, and no complaints have been reported. Based on the above, it can be considered that the negative impact on the natural environment is minimal in this project.

During the implementation of this project, the contractor was conducting the environmental monitoring in cooperation with the HAO regional branch (Kenitra branch). The branch is still responsible for the environmental monitoring after the project's completion, and no serious problems have occurred nor has action been taken as of the time of the ex-post evaluation.

#### 2) Resettlement and Land Acquisition

In the Jnane district, land was owned by local tribesmen for grazing. Before the start of the project, it was almost vacant,<sup>25</sup> and most of the lots for the low-income group in this project utilized this land. In implementing this project, the HAO provided a total of 1,637 lots as alternative land to the rights holders.<sup>26</sup> According to the HAO, based on the land acquisition

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<sup>24</sup> Established in April 2002.

<sup>25</sup> According to the document provided by JICA, seven households were actually living there, but the HAO agreed to relocate them to the location desired by the household heads before the formal land acquisition procedure, and prepared and provided the land. There were no protests from the concerned people nor problems. It can be said that there was no need for large-scale resettlement or the provision of financial compensation.

<sup>26</sup> Although the specific number of landowners could not be identified, it is unlikely that the number matches the 1,637 lots because presumably there are people who own multiple lots and some lots may have multiple owners. The landowners live in the Jnane district (220 ha), and alternative land was provided within the same district. As

plan, the land acquisition proceeded in cooperation with the local government,<sup>27</sup> and although the procedure took time, it was generally smooth, and there have been no complaints or objections thus far.

[Summary of Effectiveness and Impact]

Verifying the situations after the project target area was changed to the Jnane site, the targets regarding the quantitative data (operation and effect indicators) have been achieved for the household electrification ratio, the percentage of water supplied population, the percentage of the sewage treated population and the percentage of the legal possession of land. It has been confirmed that housing construction is progressing, residents including poor households are using and benefiting from the water supply/sewerage and electric power services, and they are accessing schools and commercial facilities in the district using the improved roads. Therefore, it is highly possible that this project is contributing to improving the living environment of the residents. Therefore, effectiveness and impacts of the project are high.<sup>28</sup>



Photo 3: House under construction



Photo 4: Vacant lots

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mentioned above, this was limited to the provision of alternative land, and no compensation or livelihood recovery support was given to the landowners. According to the HAO, they did not face a situation in which compensation or livelihood recovery support was required.

<sup>27</sup> JICA received and confirmed the land acquisition plan for the Jnane district from the HAO, and the land acquisition was proceeded in agreement with the HAO. The HAO followed the procedures prescribed by the Moroccan Ministry of Interior and completed the land acquisition.

<sup>28</sup> As a supplementary explanation, while the possibility is not ruled out that it differs from the initial assumption of the project effect because the Jnane district became the project target area, there is no difference in terms of the nature of the project components (water supply, sewerage, electric power, road infrastructure facilities) from the time of the appraisal. In addition, this project responds to the needs for “improvement of basic social infrastructure services and housing construction for poor households as the number of poor households increases nationwide in Morocco,” and the project design remained unchanged throughout the project implementation. Considering the above, its effectiveness and impact cannot be said to be low.

### 3.4 Sustainability (Rating: ③)

#### 3.4.1 Institutional/Organizational Aspect of Operation and Maintenance

The executing agency of this project is the HAO. Table 10 shows the operation and maintenance structure of the developed outputs. The HAO regional branch (Kenitra branch) is in a position to supervise the operation and maintenance of each output by coordinating and collaborating with the RAK and the Kenitra Commune (local government), which provides basic social infrastructure services in Kenitra City.

Table 10: Organizational Structure of the Operation and Maintenance of This Project

Developed Infrastructure Facility	Jnane district
Water supply facility	Kenitra City Public Corporation (RAK)
Sewerage facility, stormwater drainage facility	
Electric power facility	
Road	Kenitra Commune

Source: Answers to the questionnaire

Based on the questionnaire and interviews with the HAO headquarters, the HAO regional branch (Kenitra branch), the RAK, and Kenitra Commune staff, the number of staff responsible for the operation and maintenance of each infrastructure facility that has been developed is observed to be sufficient. Information on the number of staff at each infrastructure facility is as follows.

The “Water Supply and Sanitation Operation Division” of the RAK is in charge of the water supply facilities. One supervisor and two full-time staff are responsible for the daily and preventive maintenance of water supply facilities and the water quality management of water distribution, while the outsourced contractors employed by the RAK carry out the actual operation and maintenance work. The “Sewerage and Sanitation Management Division” of the RAK is in charge of the sewerage and stormwater drainage facilities. One supervisor and two full-time staff are responsible for the daily and preventive maintenance of the sewerage networks, the maintenance of the sewage pumping station and the sewage treatment facilities, while the outsourced contractors employed by the RAK carry out carry the actual operation and maintenance works, as it is in the case of the water supply facilities. The “Electrical Construction and Service Management Division” of the RAK is in charge of the electric power facility. In terms of the technical staff, 35 staff carry out the maintenance of public distribution

substations and medium-pressure and low-voltage power grids. The road is the responsibility of the Kenitra Commune, who carries out maintenance such as road repairs and cleaning. Although the number of full-time staff could not be identified and the number of staff varies depending on the volume of the work, it was reported that works are being done on an as-needed basis. Regarding the number of full-time staff of the water supply and sewerage facilities, the RAK is considering increasing the number of staff, as the number of users of the water supply and sewerage services is on the rise as shown in Table 7 above.

Based on the above, it is judged that there is no particular problem in the operation and maintenance system or structure of this project.

### 3.4.2 Technical Aspect of Operation and Maintenance

The RAK staff engaged in the operation and maintenance of the water supply, sewerage, and stormwater drainage facilities have expertise in hydraulic engineering, while the RAK staff engaged in the electric power facilities have expertise in electrical engineering. Although Kenitra Commune staff engaged in road operation and maintenance are not required to have a high specialization in particular, they do have knowledge of road maintenance and repairs.

The RAK's human resource department formulates and implements training plans for the operational and maintenance staff. Training is mainly carried out by governmental organizations such as the National Office of Electricity and Drinking Water (ONEE) and a technique private company (LYDEC<sup>29</sup>). At times training is conducted within the RAK. Examples of the training conducted in the last three to four years include "maintenance of safety and health at construction sites" and "reduction of workload and risk during electrical work in accordance with norms." The RAK also conducts on-the-job training (OJT) when new staff are hired.

For Kenitra Commune staff engaged in the operation and maintenance of roads, there is no particular training on improving road expertise. However, knowledge and experience are being acquired through on-site training.

Through the interviews conducted during the field survey, it was confirmed that the staff of the RAK and Kenitra Commune recognize the importance of operation and maintenance works. Each department has manuals on operation and maintenance. Staff refer to them as needed, utilizing them in their daily work.

From the above, it is judged that there are no major technical problems related to the

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<sup>29</sup> A public service company responsible for the operation of social infrastructure such as water supply, sewerage, and electric power. It has a training center in Casablanca, Morocco's largest city.

operation and maintenance of this project.

### 3.4.3 Financial Aspect of Operation and Maintenance

Table 11 shows the actual amount of the operation and maintenance costs of the entire RAK (actual amount of the areas serviced by the RAK including the Jnane district) for the last three years. Since it does not directly indicate the actual situation of the Jnane district of this project, it is used as reference information.

(Reference) Table 11: Operation and Maintenance Costs of Water Supply, Sewerage, and Electric Power Facilities for the Entire RAK Including the Jnane District (Actual Amount)  
[Water Supply Facility]

(Unit: thousand Moroccan dirham)

	2018	2019	2020
Operation cost	75,000	83,000	97,000
Maintenance cost	264,000	673,000	127,000

[Sewerage/Stormwater Drainage Facility]

(Unit: thousand Moroccan dirham)

	2018	2019	2020
Operation cost	46,000	51,000	54,000
Maintenance cost	96,000	129,000	85,000

[Electricity Power Facility]

(Unit: thousand Moroccan dirham)

	2018	2019	2020
Operation cost	90,000	105,000	132,000
Maintenance cost	240,000	322,000	210,000

Source of the above: Answers to the questionnaire

According to the HAO and the RAK, “the population and the number of residential units are increasing year by year in the service areas under the jurisdiction of the RAK. Necessary operation and maintenance costs for each district and infrastructure facility, including the Jnane district, have been allocated for the past few years.<sup>30</sup>” On the other hand, as discussed in 3.2.2.2 Project Period under Efficiency, most of the basic infrastructure facilities were completed in the first half of 2021, and were within the warranty period right before the timing of the ex-post evaluation. Until then, the contractors were responsible for the operation and maintenance by investing funds. In other words, practically, many operations and maintenance costs have not yet

<sup>30</sup> Although data on the actual amount for 2021 was not available, the RAK suggests that it is on an increasing trend compared to 2020.

occurred. While it is necessary to pay close attention to the trend of budget allocation by the RAK for the time being, the RAK has indicated that it intends to allocate the necessary amount to the developed infrastructure facilities.<sup>31</sup> Regarding the road operation and maintenance costs, Kenitra Commune has indicated that it intends to allocate the necessary amount according to the road surface conditions and repair needs. In the future, it has indicated that it intends to allocate 2.5 million Moroccan dirham to the operation and maintenance cost as an annual budget.

Based on the above, it is judged that there are no major financial problems related to the operation and maintenance of this project.

#### 3.4.4 Status of Operation and Maintenance

At the time of the ex-post evaluation, there were no major problems with the operation and maintenance of the water supply/sewerage/stormwater drainage facilities, electric power facilities, and roads developed in the Jnane district. It was confirmed through site visits, questionnaire responses, and interviews with the RAK and Kenitra Commune staff that the operation and maintenance is being carried out appropriately. The RAK purchases, procures and stores spare parts related to each infrastructure facility and equipment as needed. Spare parts are sourced from the European Union (EU) or the Moroccan domestic market.<sup>32</sup> By the time of the ex-post evaluation, there was no shortage of parts, and there has not been any case where maintenance was delayed due to a parts shortage.

No major problems have been observed in the institutional, technical, financial aspects and current status of the operation and maintenance system. Therefore, sustainability of the project effects is high.

## 4. Conclusion, Lessons Learned and Recommendations

### 4.1 Conclusion

The objective of this project was to improve the access to basic social infrastructure (water supply, sewerage, electricity, road) services for residents of unsanitary areas in regional cities near the Rabat metropolitan area. The government of Morocco formulated the *National*

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<sup>31</sup> According to the RAK, as of the first half of 2021, of the amount shown in Table 11, the proportion of the operation and maintenance costs of the basic infrastructure facilities (water supply, sewerage, electricity) in the Jnane area developed by this project is approximately slightly more than 7% for water supply, approximately slightly less than 10% for sewerage, and approximately slightly more than 6% for electricity. However, as the allocations cannot be confirmed, it is considered reference information.

<sup>32</sup> According to the RAK, the average procurement period is two to three months.



*Development Initiative* and the *VSB Program* and advocated the need to improve access to the basic infrastructure social services for vulnerable groups (poor, unsanitary housing residents, etc.) and to reduce poverty. While there is a strong need to provide and improve these services to the increasing number of poor households, it is in line with the assistance policy of Japan; therefore, the relevance is high. Regarding efficiency, the project cost significantly exceeded the initial plan, when comparing the planned amount and the actual amount by emphasizing the relevance of the initial financial plan including the yen loan. The project period was significantly longer than the initial plan because it took time to complete the procedures for changing the target site to the Jnane district, reviewing the land acquisition plan, and the re-implementation and approval of the EIA; therefore, the efficiency is low. As for the quantitative effect indicators, verifying the effectiveness and impact after the project target area was changed to the Jnane district, targets have been achieved in terms of the electrification ratio, percentage of population supplied with water, sewerage population treated, and the percentage of legal possession of land. Considering the progress in housing construction, the fact that residents including poor households are using and benefiting from the water supply, sewerage and electric power services, and the fact that they are accessing schools and commercial facilities within the areas using the developed roads, it can be said that this project is contributing to the improvement in the living environment of the residents; and therefore, the effectiveness and impacts are considered to be high. There are no major concerns in the institutional/organizational, technical, financial aspects and the status of operation and maintenance of the RAK and Kenitra Commune (local government), etc., responsible for the operation and maintenance of the developed infrastructure facilities. Therefore, the sustainability is judged to be high.

In light of the above, this project is evaluated to be satisfactory.

## 4.2 Recommendations

### 4.2.1 Recommendations to the Executing Agency

None

### 4.2.2 Recommendations to JICA

None

## 4.3 Lessons Learned

The Importance of Making a Prediction as Much as Possible at the Appraisal Stage, Sharing

External Factors and Obstacles, Responding When a Risk or Problem Arises, Establishing a Cooperative System, Monitoring Project Supervision

- After the start of this project, the target area of the project was changed to the Jnane district, where the basic infrastructure facilities were improved. Due to the influence of Morocco's administrative organization (the Sidi Taibi district) and the fact that the situation did not improve due to delays in land acquisition (the Ouled M'barek district), these two districts were excluded from the project scope. While it may not be easy to anticipate at the appraisal stage changes in the political situation and unexpected factors that may occur after the start of a project, when formulating similar projects in the future, it is important for the development assistance agency and the recipient country to manage the project using a thorough system, that is making a certain prediction for the progress of the project, reporting external and obstructive factors each other, responding to risks and problems, confirming the cooperation system, mutual monitoring the project supervision during the project implementation, eliminating unexpected factors, and taking prompt action if the need arises.

Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
<p>1. Project Outputs</p>	<p>[Sidi Taibi district (near the capital Rabat), Ouled M'barek district (within the Ouled M'barek sector, Kenitra City)]</p> <p>1) Civil Engineering Work</p> <p>(1) Installation of water and sewage systems (installation of water pipes and drainpipes for rainwater and sewage): 39.3 km of water pipes, 23.9 km of drainpipes for rainwater and sewage</p> <p>(2) Installation of electricity distribution networks: 32.0 km</p> <p>(3) Construction, widening and asphaltting of roads: 11.0 km</p> <p>2) Assistance for Local Residents</p> <p>(1) Provision of project information to the target residents of the project</p> <p>(2) Support for the resettlement procedures</p> <p>(3) Training for residents' organizations</p> <p>(4) Monitoring of the living environment of the relocated residents</p> <p>3) Consulting Services</p> <p>(1) Reviewing detailed design</p> <p>(2) Bid support</p> <p>(3) Construction supervision</p> <p>(4) Environmental monitoring</p>	<p>[Jnane district (within the Ouled M'barek sector, Kenitra City)]</p> <p>1) Civil Engineering Work</p> <p>(1) Installation of water and sewage systems (installation of water pipes and drainpipes for rainwater and sewage): 67.9 km of water pipes, 87.2 km of drainpipes for rainwater and sewage (combined system), stormwater management pond and pumping facility</p> <p>(2) Installation of electricity distribution networks: 244.0 km</p> <p>(3) Construction, widening and asphaltting of roads: 5.5 km</p> <p>2) Assistance for Local Residents</p> <p>The HAO implemented (1)–(4) listed on the left.</p> <p>3) Consulting Services</p> <p>The HAO implemented (1)–(4) listed on the left by hiring consultants with their own funds.</p>

2. Project Period	March 2007–June 2014 (88 months)	March 2007–March 2021 (169 months)
3. Project Cost		
Amount Paid in Foreign Currency	357 million yen	0 million yen
Amount Paid in Local Currency	7,026 million yen	11,591 million yen
Total	7,383 million yen	11,591 million yen
ODA Loan Portion	(5,537 million yen)	(1,609 million yen)
Exchange Rate	1 Moroccan dirham = 13.4 yen (As of December 2006)	1 Moroccan dirham = 11.13 yen (International Monetary Fund International Fiscal Statistics 2010–2016 average: average of major expenditure period)
4. Final Disbursement	October 2015	

India

## FY2020 Ex-Post Evaluation Report of Japanese ODA Loan Project

### "Amritsar Sewerage Project"

External Evaluator: Keisuke Nishikawa, Octavia Japan, Co., Ltd.

#### 0. Summary

The objective of this project was to provide stable sewerage services by constructing sewerage facilities in Amritsar (MCA), thereby contribute to the improvement of sanitation and living conditions of the residents including the poor in the city. This project has a high level of relevance as it is consistent with development policies and needs of India at the time of appraisal and ex-post evaluation, and with Japan's ODA policy at the time of appraisal. In terms of project implementation, although there was a difficulty in calculating the exact actual amount against the planned cost based on the planned components, the efficiency of the project is low because the actual project cost exceeded the plan by more than 5% by taking into account of the project scope practically reduced against the plan, and the project period exceeded the plan. Regarding the project effects, it was confirmed that the quantitative indicators achieved the target values and the qualitative effects were also achieved. In terms of impact, the project has contributed to the improvement of the living environment in the target areas and the sanitation of the local population. Therefore, the effectiveness and impact of the project are high. As for the sustainability of the project, there are some problems in the institutional, technical and financial aspects of the operation and maintenance of sewerage treatment facilities, so the sustainability of the project effects is fair.

In light of the above, this project is evaluated to be partially satisfactory.

#### 1. Project Description



Project location



Sewerage treatment plant (Settling basin)

## 1.1 Background

In India, population growth had led to serious imbalance between water supply and wastewater treatment, with sewerage failing to keep pace with rising water consumption and over-dependence on groundwater causing the groundwater level to fall. In addition, the health condition of local population had been threatened with diarrhoea and hepatitis caused by contaminated water by the deterioration of living environment due to the rapid influx of people into urban areas, the discharge of sewage beyond the treatment capacity due to industrialisation, and the discharge of sewage into rivers which was far in excess of their natural purification capacity. In response to this situation, the Government of India advocated in "*The 10th Five Year Plan (2002-2007)*" the provision of adequate and safe drinking water to all citizens, clean-up of major polluted rivers and improvement of the basin environment.

Amritsar, a core city in the north-western Indian state of Punjab, bordering Pakistan, had a sewerage coverage rate of only 62% for a rapidly population growth (from 590,000 in 1981 to 980,000 in 2001) and was suffering from poor sanitation due to the discharge of sewage around its houses. Since there wasn't any sewerage treatment plant, all of wastewater was discharged into surrounding rivers directly, which caused the pollution of international rivers flowing into neighbouring Pakistani territory<sup>1</sup>. This project was to support the expansion of the sewerage treatment capacity to meet the growing need for improved sanitation in Amritsar.

## 1.2 Project Outline

The objective of this project is to provide stable sewerage services by constructing sewerage facilities in Amritsar, thereby contributing to the improvement of sanitation and living conditions of the poor and other residents in the area.

### <ODA Loan Project>

Loan Approved Amount / Disbursed Amount	6,961million yen / 6,154 million yen
Exchange of Notes Date / Loan Agreement Signing Date	March 2007 / March 2007
Terms and Conditions	Interest Rate 0.75%
	Repayment Period 40 years (Grace Period) (10 years)
	Conditions for Procurement General Untied
Borrower / Executing Agency	The President of India

<sup>1</sup> The water quality immediately prior to the inflow into Pakistan was as serious as 80mg/l BOD (based on data provided by JICA).

	Punjab Water Supply and Sewerage Board: PWSSB
Project Completion	March 2019
Target Area	Amritsar, Punjab State
Main Contractor(s)	Oriental Ceramics & Refractories Pvt. Ltd (India) Jyoti Build Tech Pvt. Ltd. (India) / Abhyudaya Housing & Constructions Pvt. Ltd. (India), Passavant Rodeiger GmbH (Germany) / Shapporji Pallonji (India), M/S Nagarjuna Construction Company Ltd (India)
Main Consultants	Poyry Environment GmbH (Germany) Tokyo Engineering Consultants Co. Ltd. Tetra Tech Inc (USA)
Related Studies (Feasibility Studies, etc.)	<ul style="list-style-type: none"> <li>• Feasibility Study by Punjab Water Supply and Sewerage Board (2005)</li> <li>• Special Assistance for Project Formation (SAPROF) for Amritsar Water Supply and Sewerage Project in India (2006)</li> </ul>
Related Projects	[Technical Assistance] The Formulation and Revision of Manuals on Sewerage and Sewage Treatment in the Republic of India (2009-2013)

## 2. Outline of the Evaluation Study

### 2.1 External Evaluator

Keisuke Nishikawa (Octavia Japan, Co., Ltd.)<sup>2</sup>

### 2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted with the following schedule;

Duration of the Study: February, 2021 - February, 2022

Duration of the Field Study: July, 2021 - November, 2021 (Remote implementation)

### 2.3 Constraints during the Evaluation Study

Due to the COVID-19 outbreak, the evaluator could not conduct a field study, and collection of information for ex-post evaluation was conducted by the local consultant and through online interviews based on the questionnaire. Therefore, some information and data were not sufficiently

<sup>2</sup> From QUNIE Corporation, assisting Octavia Japan, Co., Ltd. with this ex-post evaluation.

provided by the executing agency and implementing consultants, which limited the analysis of some of the project contents and outcomes.

### 3. Results of the Evaluation (Overall Rating: C<sup>3</sup>)

#### 3.1 Relevance (Rating: ③<sup>4</sup>)

##### 3.1.1 Consistency with the Development Plan of India

At the time of appraisal, the national development plan in India, "*The 10th Five Year Plan (2002-2007)*" put forward the provision of adequate and safe drinking water to all citizens, the clean-up of major polluted rivers and the improvement of their basin environments. Also, in "*Common Platform (May 2004)*", which was developed by the administration at the time of appraisal, and "*National Urban Renewal Mission*", which started from 2005, stated that public investment in urban infrastructure, including water supply, sewerage and sanitation, should be increased. The latter also included plans for administrative reforms, such as strengthening the financial foundations of each state and local government, and for large-scale support from the central government for development of infrastructure, with consideration to the poor.

"*Atal Mission for Rejuvenation and Urban Transformation (2015)*", a national policy at the time of ex-post evaluation, plans to improve urban infrastructure facilities, particularly water supply and sewerage facilities, in 500 cities across the country. "*Swachh Bharat Mission (Urban) 2.0*" launched in 2021 aims to ensure access to sanitation facilities in urban areas over a period of five years up to 2026 and promotes the development of sewerage facilities, waste management and hygiene awareness. "*Jal Jeevan Mission (Urban)*", also launched in 2021, aims to improve sanitation by providing wastewater treatment facilities for each household in the 500 cities covered by "*National Urban Renewal Mission*". In order to implement the aforementioned "*Atal Mission for Rejuvenation and Urban Transformation (2015)*" at the state level, the Government of Punjab has also developed "*State Annual Action Plan (3rd) after the year 2017*". In this action plan, sewerage system has been identified as the second priority after water supply and sewage pipes will be connected to households and commercial buildings in a phased manner. It also sets out indicators and targets for sewerage development and sewerage treatment facilities.

As mentioned above, the development of sewerage systems was a prioritized issue in the national development policy at the time of appraisal. Also, at the time of ex-post evaluation, the importance of sewerage systems has been more strongly recognized and various policies have been implemented to improve the sanitation environment, especially in urban areas. In Punjab, where Amritsar is located, an action plan has been formulated to implement these

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<sup>3</sup> A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

<sup>4</sup> ③: High, ②: Fair, ①: Low



national policies, and sewerage development has been set as one of the priorities. Therefore, this project, which includes the construction of sewerage treatment plants, sewage pipes and other civil works in Amritsar, has been in line with the development policy of India at the time of appraisal and ex-post evaluation.

### 3.1.2 Consistency with the Development Needs of India

At the time of appraisal, Amritsar had no sewerage treatment plant and the sewerage network had not kept pace to respond to the population growth. As a result, untreated sewage was discharged directly into the rivers, causing water pollution in the international rivers flowing into Pakistan. Specifically, the sewerage coverage was only 62%<sup>5</sup> and the sewerage network, especially in the periphery of the city, was unmaintained. Due to the sewage being discharged, the hygiene and living conditions of the local population deteriorated in these areas. At that time, the amount of sewage in the city was about 61 million litres per day (61 MLD<sup>6</sup>) and with population growth, the daily sewage generation was expected to reach 201 MLD by 2025.

At the time of the ex-post evaluation, the indicators for the sewerage system were checked: the utilisation rate of sewerage treatment plants was 91% (2020) and the amount of sewerage treatment was 164 MLD (2020)<sup>7</sup>. Therefore, it is estimated that the amount of sewage generated has increased from 61 MLD at the time of the appraisal to around 180 MLD. In addition, the population in 2001 was 980,000 and in 2011 was 1.13 million (*Census of India, 2011*) in Amritsar. Therefore, the population in 2020 is estimated to be just under 1.3 million. This suggests that Amritsar is experiencing a trend of population growth and an increase in the amount of sewage generated and treated, which will further increase the need for sewerage treatment.

Therefore, this project, which supported the construction of the first sewerage treatment plant in Amritsar, has met the needs of sewerage treatment in the city.

### 3.1.3 Consistency with Japan's ODA Policy

At the time of appraisal, JICA's "*Overseas Economic Cooperation Operation Implementation Policy (1 April, 2005 - 30 September, 2008)*" (2005) set four prioritised areas, one of which was "infrastructure development for sustainable growth," which mentioned the importance of economic and social infrastructure development. The other prioritised area was "support for global issues and peacebuilding," which mentioned the degradation of the urban

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<sup>5</sup> Data from the ex-ante evaluation report of JICA.

<sup>6</sup> 1MLD=1,000m<sup>3</sup>

<sup>7</sup> Data provided by the executing agency.

environment caused by water pollution from industrial activities and urban life, and the growth of urban population. In the same policy, it was advocated that assistance to India should focus on three prioritised areas; "development of economic infrastructure", "rural development benefiting the poor", and "addressing environmental problems", with the aim of reducing poverty through sustainable growth. In providing this support, it was also stated that efforts would be made to strengthen the capacity of organisations and human resources, and to provide intellectual and technical support for the improvement of policies and institutions.

Since the development of sewerage systems is intended to support the development of economic and social infrastructure, as well as to address the environmental degradation caused by population growth and industrialisation, the social infrastructure development and social development implemented under this project are consistent with these policies. In addition, since all of components of this project are in line with the three prioritised areas of assistance to India, the project has been highly consistent with Japan's ODA policy at the time of appraisal.

This project has been highly relevant to India's development plan and development needs, as well as Japan's ODA policy. Therefore, the relevance is high.

### 3.2 Efficiency (Rating: ①)

#### 3.2.1 Project Outputs

In this project, implemented components were construction of sewerage facilities (construction of sewerage treatment plants, sewage pipes, sewerage house connections and pumping stations), social development on hygiene, consulting services to Municipal Corporation Amritsar (MCA) (project supervision and institutional improvement). Planned and actual outputs of the project are shown in Table 1 .

Table 1 Planned and Actual Outputs of the Project

Components	Plan	Actual
(1) Civil works, procurement of equipment, etc.		
1) Sewerage facilities		
Construction of sewerage treatment plants	3 sites (201 MLD)	2 sites (95 MLD each in South zone and North zone, 190 MLD in total)
Construction of sewage pipes	271 km in total	464 km in total
Construction of sewerage house connections	54,300 connections	29,669 connections
Construction of pumping stations	Relay pumping stations: 2 Final pumping stations: 2	Relay pumping stations: 2 Final pumping stations: 2
Rehabilitation of pumping stations	Existing final pumping station: 1	None

Components	Plan	Actual
2) Social development	Water supply connection support for the poor (promotion of transition from communal taps to individual and shared water supply)	Implemented as part of the project of the Government of India <sup>8</sup>
	Construction of toilets (public toilets at bus stops, communal toilets in slums)	Implemented as part of the project of the Government of India
	Support for the establishment of community self-management of waste and sanitation facilities	Implemented as part of the project of the Government of India
	Public awareness campaign on environment and sanitation	Implemented as part of the project of the Government of India
	Baseline survey	Implemented as part of the project of the Government of India
(2) Consulting services		
1) Project Supervision	Detailed design, tender assistance, construction management, asset condition survey, basic survey and planning for alternative water source development, etc.	Implemented as planned
2) Institutional Improvement	Asset management	The asset register <sup>9</sup> was developed, but leakage management or development of plan of water distribution network improvement was not conducted.
	Promotion of individual connections and tariff payment	Implemented as planned
	Utilization of private sector	Implemented as planned
	Improvement of customer relations	Partially implemented in other projects
	Improvement of management capacity	Partially implemented in other projects <sup>10</sup>

Source: Prepared from materials provided by JICA and interviews with the executing agency.

It was planned to construct one sewerage treatment plant in each of three zones which were the north, south and south-east in the city at the time of planning, however, the plan was changed in February 2010 to construct two sewerage plants in the north and south zones. The south-eastern zone of Amritsar was excluded from targeted areas because of following three reasons; (1) the population had not grown much at the time of the change of the plan, (2) it accounted for only 7% of the project area at the time of the planning, and the need for sewerage

<sup>8</sup> As described below, it was the own campaign of the Government of India called "Swachh Bharat Mission (Urban)" launched in 2014, which targeted eradicating open defecation and improving waste management.

<sup>9</sup> As described below, mapping of assets using Geographic Information Systems (GIS) and electronic asset registration based on Unique IDs were also carried out.

<sup>10</sup> Introduction of double-entry bookkeeping system was implemented in this project.

treatment was not as high as in the north and south, and (3) although it was envisaged that the population would increase in the future, it was considered too early to formulate an urban development plan. Therefore, the sewerage system in the south-eastern region would be developed as a separate sewerage network from sewerage treatment plant to be constructed in this project under *Jawaharlal Nehru National Urban Renewal Mission (JNNURM)*, an initiative of the Ministry of Housing and Urban Affairs. As a result of this change, the total quantity of treated sewage at sewerage treatment plants was reduced from 210 MLD as planned to 190 MLD, but the required quantity of treated sewage in the north and south zones was covered.

The number of construction of sewerage house connections was reduced from the planned number of 54,300 to 29,669 due to the exclusion of the south-eastern zone, the fact that no houses were built on the plots that were to be connected at the time of planning, and delays in the construction work. Although the exact number of connections was not known at the time of ex-post evaluation, MCA is continuing to connect individual houses to sewerage network after the completion of the project.

In addition, the total length of sewage pipes was changed from 271km to 464km in this project. It was decided that a longer sewer was needed because a more detailed survey was carried out at the start of the project, and the population increased more than the estimation after the start of the project.

As for the pumping stations, the construction of the relay and final pumping stations was carried out as planned, but the rehabilitation of one existing final pumping station was not carried out due to changes in the overall plan.



Grit Chamber



Pumping Station

In terms of the component of social development, no activities which were planned were implemented in this project but they were implemented under other projects. Water supply connection support for the poor (promotion of transition from communal taps to individual and shared water supply) has been implemented free of charge as per the policy of the Government of Punjab to promote door to door connection in slums and poor areas. Also, the construction of public toilets and communal toilets in slums was carried out by MCA. Support for the establishment of community self-management of waste and sanitation facilities, public awareness campaign on environment and sanitation and baseline survey were conducted under "Swachh Bharat Mission (URBAN) 2.0". As the results of these activities, Amritsar was awarded the certificate of "Open Defecation Free" by the Government of India.

In consulting services, some activities were partially implemented in this project and others were carried out by other projects. The consultancy of asset management was planned to be carried out through a consultant who was employed in this project, but in fact it was carried out not by the consultant but by PWSSB. However, according to MCA, PWSSB could not provide enough guidance of capacity building and did not reach a certain level at which MCA could subsequently implement asset management on its own. Improvement of customer relations was also not carried out under this project, but was carried out by other projects of the Government of India, which introduced development of a customer database, online payment of water tariffs and other measures to promote digitalisation. Improvement of management capacity was also implemented by other projects. As some of the components were implemented by other projects, the following three new components were implemented as part of the institutional improvement of MCA since 2017.

1. Mapping of assets with Geographic Information System (GIS)  
This includes the establishment of a property tax portal, online applications for water and sewerage use, online applications for trade permits, maintenance of GIS data, and operation of a payroll management system.
2. Asset registration and computerisation based on Unique ID  
Each household and sewerage asset are registered on a GIS map by means of a unique ID, which is then monitored and managed by digital tools.
3. Introduction of double-entry bookkeeping system

It was confirmed that all these components were implemented under this project and that the implementation was completed during the project period.

### 3.2.2 Project Inputs

#### 3.2.2.1 Project Cost

The cost of the project was planned to be 9,073 million yen, including 6,961 million yen as ODA loan. A comparison of planned and actual project costs is shown in Table 2.

Table 2 Comparison of Planned and Actual Project Costs

Unit: Million Yen

Plan		Actual	
Total	Of which, ODA Loan	Total	Of which, ODA Loan
9,073	6,961	9,575	6,154

Source: Materials provided by JICA, Materials provided by the executing agency

Although the disbursed amount was within the plan, the total project cost was 9,575 million yen, which was 5.5% higher than the planned cost. While the length of sewage pipes increased, the scope of the project has been reduced compared to the original plan as a whole according to following reasons: (1) the number of areas covered by the sewerage network was reduced from three to two, (2) some activities, such as the rehabilitation of pumping stations, were not implemented, (3) the number of construction of sewerage house connections was reduced, (4) the social development component was not implemented, (5) some activities of consulting services were implemented in other projects (not implemented in this project). Therefore, the actual cost of the project, taking into account the reduction of the scope, has exceeded the planned total project cost by more than 5.5%.

#### 3.2.2.2 Project Period

The project was planned to be carried out over a total of 62 months, from February 2007 to March 2012. The planned and actual project periods are shown in Table 3 .

Table 3 Comparison of Planned and Actual Project Periods

	Plan	Actual
Project Period	February 2007 - March 2012 (62 months in total)	March 2007 (L/A signed)- March 2019 (145 months in total) 234% of the planned period
Consulting Services (including selection period)	February 2007 - March 2012	March 2007 - June 2018
Tendering and Contracting	December 2007 - August 2009	May 2014 - May 2017
Construction works	September 2009 - March 2012	June 2008 - March 2019
Social Development	October 2007 - March 2012	Implemented as part of the project of the Government of India

Source: Prepared from materials provided by JICA and materials provided by the executing agency.

Tenders, contracts and construction works were significantly delayed from the original plan. The main reasons for this were as follows:

- The pre-appraisal and preparation of the tender documents for the sewage pipes and sewerage treatment plants, the change of the target area (see 3.2.1), and review of the project took 18 months.
- It took about a year to finalise the sewerage treatment technology<sup>11</sup>.
- A further one year delay was caused by the re-tendering of sewerage treatment plants (including the preparation of tender documents and the re-implementation of the evaluation process) due to bids exceeding the estimated cost.
- There have been delays in obtaining approvals for the laying of the sewage pipes from various relevant departments, including Indian Railways, National Highways Authority of India and Punjab State Power Corporation Ltd.

As mentioned above, various factors have delayed the commencement of tenders and contracts for the construction of sewerage treatment plants and sewage pipes, and as a result, the completion of the subsequent construction works has also been significantly delayed. Though the planned project period was from February 2007 to March 2012 (62 months), the actual period from the signing of the Loan Agreement to the completion of the construction work was from March 2007 to March 2019 (145 months), which is 234% of the planned period, much longer than the plan.

### 3.2.3 Results of Calculations for Internal Rates of Return (Reference only)

At the time of appraisal, the Economic Internal Rate of Return (EIRR) was assumed to be 11.2%. This figure was calculated on the basis of expenditure (construction, operation and maintenance) and revenue (people's willingness to pay for the improvement of sewerage services and health benefits) over the 40-year life of the project. At the time of ex-post evaluation, the expenditure on construction was clear, but the cost of operation and maintenance and the revenue for each financial year of the project life were not available from the executing agency or MCA who has been responsible for operation and maintenance. Therefore, it was not possible to calculate the EIRR at the time of ex-post evaluation.

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<sup>11</sup> Stricter effluent standards by the Punjab State Government necessitated a review of the sewerage treatment method. At the time of the appraisal, it was decided that the Upflow Anaerobic Sludge Blanket (UASB) system would be adopted, but it was compared and reviewed with the Sequencing Batch Reactors (SBR) system and the Activated Sludge Process (standard system). Finally, the JICA technical appraisal mission visited the site, and based on the results of the technical appraisal, the Activated Sludge Process (standard method) was adopted.

Based on the above, the project cost exceeded the plan and the project period significantly exceeded the plan. Therefore, the efficiency is low.

### 3.3 Effectiveness and Impacts<sup>12</sup> (Rating: ③)

#### 3.3.1 Effectiveness

##### 3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

Five operation and effect indicators were set to measure the quantitative effects of the project, with a target value set for 2015 (two years after completion of the project) based on the value in 2005. A comparison of the planned and actual performance of operation and effect indicators is shown in Table 4 .

Table 4 Comparison of Operation and Effect Indicators

Indicators	Baseline	Target	Actual		
	2005	2015	2018	2019	2020
Population served (1,000 persons)	647	1,048	865 *	1,125 *	1,176 *
Amount of wastewater treated (m <sup>3</sup> /day)	-	148	126	146	164
Rate of facility utilisation (Sewerage treatment plants) (%)	-	74	68	88	91
BOD concentration for each treatment plant (effluent mg/litre)	129-205	Less than 30	13 - 17	15	16-18
Sewerage penetration rate (%)	62	83	70	90	93

\* As the executing agency did not have actual data available, the figures calculated by the external evaluator with multiplying the estimated population by the sewerage penetration rate are given as estimates.

Source: Prepared from materials provided by JICA and the executing agency

As the construction work was completed in March 2019, the actual figures for two years after the completion of the project (2021), which were assumed to be the original target figures, are not available at the time of the ex-post evaluation. Therefore, achievement of the operation and effect indicators of the project was evaluated by confirming the data for the period 2018-2020 and changes over time.

It is considered that generation of effects has been delayed due to the significant extension of the period of construction works, however, the expected quantitative effects have been achieved as all the indicators had exceeded the targets which were set at the time of planning by 2020 and the project has outperformed the previous year's results every year since 2018. Initially, the project was planned to be completed in 2012, and the target values were calculated

<sup>12</sup> Sub-rating for Effectiveness is to be put with consideration of Impacts.



based on the estimated population in 2015 which was over two years after the completion of the project. However, at the time of the actual completion of the project, the population had increased more than assumed for 2015, and the amount of sewage discharged from households and other sources increased accordingly. Therefore, the rate of facility utilisation (sewerage treatment plants) was assumed to be 74% in 2015. But the actual figures for 2020, based on the actual population and the amount of sewage discharged, show that both of the amount of wastewater treated and the rate of facility utilisation (sewerage treatment plants) are higher than the target values.

As described above, the targets set at the time of appraisal have been achieved in all indicators, and the quantitative effects of the project are sufficiently generated.

#### 3.3.1.2 Qualitative Effects (Other Effects)

At the time of the appraisal, it was expected that the implementation of the project would have the qualitative effect of "raising awareness of local residents to improve their sanitation environment".

The component of social development that was envisaged to be implemented at the time of planning, in particular the "public awareness campaign on environment and sanitation", was supposed to raise awareness of sanitation among the local population, but since this activity was not implemented in the project, it was not possible to confirm the direct qualitative effects of this activity. As an alternative way of evaluation, the beneficiary survey was conducted with the local residents of the areas where the sewerage network was newly constructed in this project. Through the results of these interviews, it was checked whether there was any change in hygiene awareness among them. According to a brief interview in this beneficiary survey<sup>13</sup> which was conducted in the process of ex-post evaluation, 95% of respondents answered that their hygiene awareness had been raised through the project period compared to before the construction of the sewerage network. In particular, many respondents said that they came to clean up their bathrooms and the surrounding areas around their houses more often.

From the above, the awareness of local residents towards the improvement of sanitation environment has been raised, comparing the time of planning and the time of ex-post evaluation, and the expected qualitative effects have been generated.

### 3.3.2 Impacts

#### 3.3.2.1 Intended Impacts

At the time of appraisal, the impacts of project implementation were envisaged as follows:

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<sup>13</sup> Twenty local residents (17 males and 3 females) were selected using a purposive sampling method and were interviewed individually based on a questionnaire.

- Improving the living conditions of local population, including the poor, in Amritsar
- Improving conditions of sanitation in Amritsar

As a result of the project, the executing agency confirmed that the connection of the sewage pipes to each house eliminated the need for sewage collection and reduced the odour in the surrounding area caused by the sewage flowing through the gutters.

At the time of ex-post evaluation, the beneficiary survey with local residents based on a questionnaire collected their voice about the improvement of the local sewerage treatment environment, and its main feedbacks were as follows:

- The sewerage treatment environment has been improved and the local population is generally satisfied with the situation.
- Sanitation of nearby ditches and rivers were improved.
- Odours in the vicinity have disappeared or been reduced.
- Mosquitoes and flies are no longer present or have been reduced.
- There were some people who experienced being infected with waterborne diseases before the project, but no longer suffer from them after the completion of the project
- Awareness of hygiene among local residents was raised, and many residents started to clean up their houses and dispose rubbish properly.

As a result of these interviews, it was confirmed that the sewerage treatment environment in the area has been improved, and the development of sewerage treatment facilities under this project has contributed to improve the sanitation environment in the area to a certain extent. Although the component of social development was not implemented as planned, the improvement of the sewerage treatment facilities in this project and the awareness raising activities by the Government of India and NGOs have resulted in a certain level of improvement in the awareness of sanitation among the local people.

### 3.3.2.2 Other Positive and Negative Impacts

#### (1) Impacts on the Natural Environment

At the time of appraisal, the project was considered not to have a significant undesirable impact on the environment (Category: B) as per the "*Japan Bank for International Cooperation (JBIC) Guidelines for Confirmation of Environmental and Social Considerations*" (developed in April 2002). In addition, an Environmental Impact Assessment (EIA) for the project was not required under Indian domestic law. The treated water from sewerage treatment plants constructed under this project is discharged into surrounding rivers in compliance with national standards of India. No specific effects of treated water discharge were foreseen and the project area was not located in or around a sensitive area such as a

national park, so the undesirable impact on the natural environment was assumed to be minimal.

At the time of ex-post evaluation, as a result of the assessment by PWSSB, the executing agency, no adverse effects on the natural environment and the rivers due to the discharge water were observed during and after the project period. BOD for each treatment plant (effluent mg/lit), which is one of the operation and effect indicators, has also fully achieved the target value, and it is considered that the discharge of treated sewage has not caused any pollution of the rivers.

Overall, the project has not had any negative impacts on the natural environment.

## (2) Resettlement and Land Acquisition

At the time of appraisal, it was envisaged that 78 hectares of land would be acquired for the construction of sewerage treatment plants and pumping stations, and that the acquisition process would be carried out in accordance with Indian regulations, with no resettlement associated with land acquisition.

At the time of ex-post evaluation, it was confirmed that 78 acres (about 32 hectares) of land had been acquired and that a total of 74 landowners had been affected by land acquisition, with a total compensation of 412 million rupees. The land acquisition and its compensation were carried out in accordance with the institution of India and "*JBIC Guidelines for Confirmation of Environmental and Social Considerations*" agreed at the time of appraisal, and no resettlement occurred as a result of this land acquisition. In the above-mentioned beneficiary survey with the local residents, it was confirmed that there was no resettlement due to the land acquisition and complaint from the affected residents regarding the land acquisition procedure.

Based on the above, no particular problems related to the land acquisition, including resettlement, have arisen.

This project has mostly achieved its objectives. Therefore, the effectiveness and impacts of the project are high.

### 3.4 Sustainability (Rating: ②)

#### 3.4.1 Institutional / Organizational Aspects of Operation and Maintenance

PWSSB, the executing agency of the project, which is under the jurisdiction of the Department of Local Government of Punjab, is responsible for planning and implementing the development of water supply and sewerage facilities in Punjab State. PWSSB has set up a project implementation unit within the organisation to construct sewerage treatment plants, sewerage pipes and pumping stations. MCA, which is also under the jurisdiction of the

Department of Local Government of Punjab, is responsible for the operation and maintenance of the water supply and sewerage works in Amritsar. After the completion of construction by PWSSB, it was planned that MCA would take responsibility of the operation and maintenance, and actual tasks of the operation and maintenance would be outsourced to a private company. In terms of the maintenance of the public latrines constructed under the component of social development, it was envisaged that community groups would be responsible for sanitation facilities such as communal latrines in slums, and NGOs would be responsible for maintenance of other public latrines.

At the time of ex-post evaluation, MCA is fully responsible for the operation and maintenance of facilities and equipment installed under this project, but PWSSB supervises the operation and maintenance of sewerage treatment plants on behalf of MCA. MCA has obligation to pay the cost of the operation and maintenance to PWSSB, and PWSSB contracts the private contractor who built facilities to carry out the operation and maintenance. PWSSB is responsible for the management and guidance to the private contractor, and there is no adequate institutional structure within MCA to ensure the operation and maintenance of facilities. PWSSB continues to supervise and guide the project after its completion, as MCA does not have enough knowledgeable and experienced engineers in the electrical and mechanical fields to operate and maintain the sewerage treatment facilities, which requires professional expertise. The contract with the private contractor for the operation and maintenance will expire five years after the completion of the project in 2024, however it is unclear whether MCA will assume the responsibility for supervision and guidance that PWSSB has been taking.

As mentioned above, there are some challenges in the system and structure of MCA for the operation and maintenance of sewerage treatment facilities.

#### 3.4.2 Technical Aspects of Operation and Maintenance

At the time of appraisal, it was assumed that PWSSB would not have any technical problems in implementing this project, as it has been implementing water supply and sewerage projects supported by World Bank for the past 5 years and has experience in maintaining anaerobic pre-treatment sewerage treatment plants similar to this project. It was also planned that the consulting services for MCA would include support for capacity building in leakage management, planning of water network improvement, promotion of sewerage house connections and tariff payment, utilisation of private sector and improvement of customer relations and management capacity.

In this project, sewerage treatment facilities and pipes were constructed, with changes as mentioned above, and the manual of the operation and maintenance for sewerage treatment

plants was newly developed and used by PWSSB, in charge of operation and maintenance, but it was confirmed at the time of ex-post evaluation that there was no training on the operation and maintenance conducted for the technicians of MCA during and after the project period. In addition, although the consulting service of the project has improved the capacity of MCA in asset management and utilization of the private sector, it has not reached the level that MCA has had sufficient technical capacity, as being clear from the fact that PWSSB continues to supervise and guide the contractor in operation and maintenance.

Therefore, there are some challenges in technical aspects of the operation and maintenance of sewerage treatment facilities.

### 3.4.3 Financial Aspects of Operation and Maintenance

At the time of appraisal, it was assumed that MCA had no financial concerns, as the costs of water and sewerage maintenance were covered by tariff revenues of water and sewerage and the general funds from the Government of India. However, in terms of the sustainable provision of high-quality public water supply and sewerage services, it was necessary to strengthen the financial constitution of MCA. In order to achieve this, the consulting services of this project were expected to provide support for improvement of management capacity, and through the implementation of measures such as tariff revisions and non-revenue water measures, it is planned that water supply and sewerage tariff revenues would be sufficient to cover all the costs of the maintenance.

At the time of completion of the project, the cost of the operation and maintenance for the first five years of operation of facilities was estimated as shown in Table 5 .

Table 5 Estimated Cost of Operation and Maintenance for Sewerage Treatment Plants Developed in This Project

(Unit: Million rupee)

	1 <sup>st</sup> year	2 <sup>nd</sup> year	3 <sup>rd</sup> year	4 <sup>th</sup> year	5 <sup>th</sup> year
South	14.4	17.3	19.2	21.2	24.1
North	15.2	18.3	20.3	22.3	25.4
Total	29.7	35.6	39.6	43.5	49.5

Source: Project Completion Report

MCA's income and expenditure and their main components are shown in Table 6. As it was not possible to obtain income and expenditure specific to sewerage only, income and expenditure for water and sewerage in general are shown. It can be seen in Table 6 that the water and sewerage revenue does not cover the entire related expenditure, and that MCA has not moved into the black. Although MCA has been allocated subsidies from the Government of Punjab, the collection of water and sewerage charges has not always been sufficient, and in

fact the tariff income has not been as planned. As indicated in section 3.2.1 Project Outputs, consulting services were provided to enhance the management capacity of MCA (asset management, improvement of customer relations, etc.), but no significant improvement in tariff collection was observed at the time of ex-post evaluation.

As described above, the cost of the operation and maintenance of sewerage treatment plants constructed under this project is well covered by tariff income, and expenditure on water and sewerage services as a whole is supported by subsidies from the Government of Punjab. However, as the sewerage network develops, it will be important to ensure that charges are certainly collected.

Table 6 Summary of Revenue and Expenditure of MCA

	(Unit: Million Rupee)		
	2016/17	2017/18	2018/19
<b>Revenue</b>	3,571.8	3,540.0	4,000.0
Income from water and sewerage charges	240.0	260.0	350.0
State Grants	900.0	740.0	420.0
Other income	2,431.8	2,540.0	3,230.0
<b>Expenditures</b>	3,571.8	3,540.0	4,000.0
Current expenditure	2,157.4	2,175.0	2,488.7
<i>of which water and sewerage related</i>	240.0	447.2	467.2
Reserve funds	110.0	105.0	105.0
<i>of which water and sewerage related</i>	3.0	2.5	2.5
Development project costs	1,304.4	1,260.0	1,406.3
<i>of which water and sewerage related</i>	470.1	480.0	220.0

Source: Created based on MCA website (<https://www.amritsarcorp.com/income.html>)

#### 3.4.4 Status of Operation and Maintenance

At the time of ex-post evaluation, it was confirmed that all the facilities were managed by the private contractor commissioned by PWSSB and were generally operating without problems. In addition, the operation and maintenance of the facilities is considered to be in good condition as the operation and effect indicators of the project have been fully achieved as mentioned above.

Therefore, there is not any problem with the status of the operation and maintenance of the facilities built under the project.

Based on the above, some minor problems have been observed in terms of the institutional/organizational, technical and financial aspects. Therefore, the sustainability of the project effects is fair.

## **4. Conclusion, Lessons Learned and Recommendations**

### 4.1 Conclusion

The objective of this project was to provide stable sewerage services by constructing sewerage facilities in Amritsar (MCA), thereby contribute to the improvement of sanitation and living conditions of the residents including the poor in the city. This project has a high level of relevance as it is consistent with development policies and needs of India at the time of appraisal and ex-post evaluation, and with Japan's ODA policy at the time of appraisal. In terms of project implementation, although there was a difficulty in calculating the exact actual amount against the planned cost based on the planned components, the efficiency of the project is low because the actual project cost exceeded the plan by more than 5% by taking into account of the project scope practically reduced against the plan, and the project period exceeded the plan. Regarding the project effects, it was confirmed that the quantitative indicators achieved the target values and the qualitative effects were also achieved. In terms of impact, the project has contributed to the improvement of the living environment in the target areas and the sanitation of the local population. Therefore, the effectiveness and impact of the project are high. As for the sustainability of the project, there are some problems in the institutional, technical and financial aspects of the operation and maintenance of sewerage treatment facilities, so the sustainability of the project effects is fair.

In light of the above, this project is evaluated to be partially satisfactory.

### 4.2 Recommendations

#### 4.2.1 Recommendations to the Executing Agency

It was confirmed that the construction of sewerage treatment facilities has made it possible to provide stable sewerage services, but the establishment of the structure of the operation and maintenance is a challenge to keep it continuously. Currently, MCA, which is responsible for the operation and maintenance, is not involved in the supervision and guidance of the operation and maintenance of sewerage treatment facilities. MCA itself is unlikely to supervise the operation and maintenance after 2024, when the contract between PWSSB and the private contractor which has been in place since the completion of the project will expire. Therefore, it is important for MCA to strengthen its capacity for the operation and maintenance and to establish an appropriate implementation structure for the sustainable provision of stable

sewerage services achieved in this project before the end of the five-year contract with the private contractor.

#### 4.2.2 Recommendations to JICA

In this project, it was confirmed that facilities such as sewerage treatment plants and sewerage pipe networks have been constructed and that the project effects have been fully realized, albeit with some delays. On the other hand, there were some concerns about the sustainability of the project effects as mentioned above.

At the time of ex-post evaluation, management of sewerage treatment facilities was being carried out by PWSSB through supervision of the private contractor responsible for the operation and maintenance of sewerage treatment facilities. However, as it will be difficult for the PWSSB, as a state agency, to continue the supervision in the long term, it is important to develop an adequate structure and secure human resources that can technically supervise the facilities in MCA. In this respect, it would be desirable that JICA, which supported the construction of the facilities, provide appropriate support such as advice and training, with regard to securing a sustainable implementation structure and improving the maintenance and management capacity of engineers, so that sewerage services can continue to be provided in a stable manner.

#### 4.3 Lessons Learned

##### Flexibility to ensure that effectiveness of the project is properly generated

In this project, the operation and maintenance of the sewerage facilities after the completion of the project was outsourced to a private company, and MCA was supposed to manage the facilities. For this purpose, capacity building of MCA was planned through consulting services, but the structure and capacity building were not sufficiently developed, and PWSSB, which was responsible for the implementation of the project, continued to supervise and guide the private contractor in charge of maintenance even after the project was completed.

It is essential for the sustainability of the project to ensure the implementation of capacity building activities for the organization that lacks the capacity to properly carry out the operation and maintenance after the completion of the project. Therefore, in the similar JICA projects in the future, when there are any obstructive factors such as challenges in strengthening the capacity of the organisation in charge of operation and maintenance, it will be important to take flexible measures such as the provision of additional technical assistance to build up its capacity, through consultations among related stakeholders as necessary, in order to resolve obstructive factors and promote the appropriate generation of effectiveness of the project.



Comparison of the Original and Actual Scope of the Project

Items	Plan	Actual
<u>Outputs</u>		
(1) Civil engineering works, procurement of equipment, etc.		
1) Sewerage construction		
Construction of sewerage treatment plants	3 sites (201MLD)	2 sites (95 MLD each in South zone and North zone, 190 MLD in total)
Construction of sewerage pipes	271 km in total	464 km in total
Construction of sewerage house connections	54,300 connections	29,669 connections
Construction of pumping stations	Relay pumping stations: 2 Final pumping stations: 2	Relay pumping stations: 2 Final pumping stations: 2
Rehabilitation of pumping stations	Existing final pumping station: 1	None
2) Social development	Water supply connection support for the poor (promotion of transition from communal taps to individual and shared water supply) Construction of toilets (public toilets at bus stops, communal toilets in slums) Support for the establishment of community self-management of waste and sanitation facilities Public awareness campaign on environment and sanitation  Baseline survey	Implemented as part of the project of the Government of India  Implemented as part of the project of the Government of India Implemented as part of the project of the Government of India Implemented as part of the project of the Government of India  Implemented as part of the project of the Government of India
(2) Consulting services		
Project Supervision	Detailed design, tender assistance, construction management, asset condition survey, basic survey and planning for alternative water source development, etc.	Implemented as planned
Institutional Improvement	Asset management  Promotion of individual connections and tariff payment Utilisation of private sector Improvement of customer relations	The asset register was developed, but leakage management or development of plan of water distribution network improvement were not conducted. Implemented as planned  Implemented as planned Partially implemented in other projects

	Improvement of management capacity	Partially implemented in other projects
<u>Project Period</u>	February 2007 - March 2012 (62 months in total)	March 2007 - March 2019 (145 months in total)
<u>Project Cost</u>		
Amount Paid in Foreign Currency	803 million yen	N/A
Amount Paid in Local Currency	8,270 million yen (3,281 million rupee)	N/A
Total	9,073 million yen	9,575 million yen
ODA Loan Portion	6,961 million yen	6,154 million yen
Exchange rate	1 rupee = 2.52 yen (As of September 2006)	1 rupee = 1.59 yen (Average between July 2008 and July 2018)
Final Disbursement	July 2018	

End