

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 BOD¹ (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 ONEE² 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.

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

² 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 issue³.

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

³ 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"> - "Sewage System Development Project (I)" (2005) - "Sewage System Development Project (III)" (2013) <p>[Other International Organizations, Aid Agencies, etc.]</p> <ul style="list-style-type: none"> - "Grant and Loan Aid to 22 Cities" (Kreditanstalt für Wiederaufbau (hereinafter referred to as "KfW")) - "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")) - "Grant Assistance to 22 Cities Including Co-Financing with AFD and European Investment Bank" (EU), etc. 	

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: B⁴)

3.1 Relevance (Rating: ③⁵)

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 objectives⁶. 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

⁴ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

⁵ ③: High, ②: Fair, ①: Low

⁶ 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 m³/day, providing a sewerage service to approximately 5.8 million people⁷. 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

⁷ 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 ³ /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 ³ /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 m³/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 m³/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 m³/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 m³/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 project⁸. 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

⁸ 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 canceled⁹. 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

⁹ 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)¹⁰. 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 contractor¹¹.

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:

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

¹¹ 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"> - El Kelaa des Sraghna City: April 2012–June 2017 - Ben Guerir City: October 2009–February 2019¹² - Ait Aourir City: February 2010–June 2012¹³ - Amizmiz City: December 2010–June 2018
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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

¹² 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.

¹³ 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 Impacts¹⁴ (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

¹⁴ 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 ³ /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 City¹⁵ 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,

¹⁵ 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 above¹⁶. 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/L¹⁷. As a matter of fact, the developed sewage treatment plant adopts a trickling filter method (anaerobic pond, secondary settling tanks, etc.)¹⁸, 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)¹⁹. 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 work²⁰. 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 plant²¹. It is estimated that the BOD (discharge of sewage treatment plant) will improve in the future, provided that sufficient time is

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

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

¹⁸ 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.

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

²⁰ 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.

²¹ 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 communes²² 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

²² 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 developed²³. 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*²⁴, and it was classified as Category B, as the undesired impact on the

²³ 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.

²⁴ 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 compensation²⁵. 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 conclusion²⁶. 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 ²	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 ²	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 ²	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.

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

²⁶ 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 City²⁷. 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 companies²⁸.

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

²⁷As 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.

²⁸ 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 collected²⁹ 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

²⁹ 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/m³ for 0–6 m³, 3.51 Moroccan dirham/m³ for 6–20 m³, 4.71 Moroccan dirham/m³ for 20 m³ and above. For government/government agencies/public facilities, the basic charge is 72 Moroccan dirham per year, plus 4.21 Moroccan dirham/m³. As for industrial/commercial premises, the basic charge is 144 Moroccan dirham per year, plus 4.71 Moroccan dirham/m³.

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 m³/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 m³/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 m³/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 m³/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 m³/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 m³/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	