# Ex-Post Project Evaluation 2022

# Package Ⅳ-1 (Morocco, Iraq, Indonesia, Paraguay)

# Evaluation Reports

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JAPAN INTERNATIONAL COOPERATION AGENCY

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Kingdom of Morocco

FY2022 Ex-Post Evaluation Report of Japanese ODA Loan

"Rural Road Improvement Project (II)"

External Evaluator: Hisae Takahashi, Global Group 21 Japan, Inc.

## 0. Summary

This project was implemented to improve the road access of residents along the target roads by improving the rural roads in the five provinces in northern, central, and inland Morocco, thereby contributing to the improvement of rural residents' standard of living and remedying the regional disparities. This project has been relevant to Morocco's development policy and needs. The project, along with "Rural Road Improvement Project" (Phase I of the project), which was supported by JICA, and other development partners, facilitated the implementation of the Moroccan government's rural road improvement program, and the outputs have been confirmed to a certain extent. Therefore, the relevance and coherence are high. By utilizing the unused funds generated due to exchange rate fluctuations and bids lower than anticipated, the output increased; however, the project cost was within the plan. Meanwhile, the project period largely exceeded the plan, therefore the efficiency is moderately low. After the road improvement, the increase in traffic volume and the reduction in the number of days of impassability due to natural disasters in the target sections mostly achieved the target values, and the travel time and road access rate in the area have been also improved. Although the impact on the local economy is considered limited, impacts such as improved convenience for local residents, improved school enrolment (especially for girls), and access to medical services have been confirmed in the target section. Therefore, the effectiveness and impact are high. While the operation and maintenance of regional and provincial roads in the project do not face major concerns in terms of policy and system, technical aspects, and operation and maintenance status, there are minor concerns related to financial aspects and personnel shortages in institutional/organizational aspects. On the other hand, concerning the Non-classified Roads (NC roads), there are concerns regarding the policy and system, institutional/organizational structure, technology, and financial aspects including risk management, and its specific actions for the future are also undecided. Therefore, sustainability of the project effects is moderately low. In light of the above, this project is evaluated to be satisfactory.

## 1. Project Description

Improved Rural Road (Left: The Safi Province) (Right: The Essaouira Province)
(Source: taken by the evaluator)

### 1.1 Background

Morocco's transportation sector accounted for approximately 6% of the GDP and 10% of the urban employment population. Furthermore, taxes related to transportation comprised around 15% of the national income, highlighting the sector's vital role in Morocco's economic and social activities. The country's public road network, managed by the Directorate of Roads in the Ministry of Equipment and Water (Direction Générale des Routes, Ministère de l'Equipement et de l'Eau (DGR)), includes, national, regional, and provincial roads[1]. Additionally, there are NC roads under the jurisdiction of individual communes[2], playing a crucial role in rural transportation. At the time of the appraisal, while more than 80% of Morocco's major roads, including national roads and regional roads, were paved, the development of rural roads was comparatively delayed as the rate of paving for provincial roads remained at 62% (2009) and the rate of road access[3] for rural populations at 54% (2005). The Moroccan Government formulated the *First National Program of Rural Road (PNRR) (1995)* and developed 11,200 km of rural roads (regional road, provincial road, and NC road) in 10 years. To further increase road access for residents in rural areas to 80%, the *Second National Program of Rural Road (PNRR2)* was developed in 2005 as a goal. This project is a yen loan project that supported the target section of a portion of the rural roads in the *PNRR2*.

### 1.2 Project Outline

The objective of this project is to improve the road access of residents along the target roads by improving the rural roads in the five provinces in northern, central, and inland Morocco, thereby contributing to improvement of rural residents' standard of living and remedying the regional disparities.

| | |
|---|---|
| Loan Approved Amount /Disbursed Amount | 5,981 million yen / 5,789 million yen |
| Exchange of Notes Date /Loan Agreement Signing Date | July 2011 / July 2011 |

[1] Highways are managed by the Autoroutes du Maroc (ADM).
[2] It is a municipality equivalent to a city, town, or village and is under the jurisdiction of the Ministry of the Interior.
[3] The rate of road access is defined as "the number of residents of villages with 50 or more households located within 1 km of a road / the number of local residents".

| | | |
|---|---|---|
| Terms and Conditions | Interest Rate<br>Repayment Period<br>(Grace Period<br>Conditions for Procurement | 1.4%<br>25 years<br>7 years)<br>General untied |
| Borrower /<br>Executing Agency | Road Finance Agency/ Directorate of Road, the Ministry of Equipment and Water | |
| Project Completion | - | |
| Target Area | Al Haouz, Chefchaouen, Essaouira, Safi, and Settat Provinces | |
| Main Contractor (Over 1 billion yen) | - | |
| Main Consultant (Over 100 million yen) | - | |
| Related Studies | "Special Assistance for the Project Formulation" (2008) | |
| Related Projects | [ODA Loan Projects]<br>- Rural Road Improvement Project (2008)<br>[Grant Aid Projects]<br>- The project for construction of Institut de Formation aux Engins et á l'Entretien Routier (IFEER) (1991, 1992)<br>- The Project for the improvement of equipment of IFEER in Morocco (2005)<br>[Other Organizations]<br>- European Investment Bank, World Bank, French Development Agency, African Development Bank, OPEC Fund for International Development, Arab Fund for Economic & Social Development, Kuwait Arab Economic Development Fund: Financing for PNRR2. | |

## 2. Outline of the Evaluation Study

2.1 External Evaluator

Hisae Takahashi (Global Group 21 Japan, Inc.)

2.2 Duration of Evaluation Study

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

Duration of the Study: December 2022-January 2024

Duration of the Field Study: May 7-27, September 2-7, 2023

## 3. Results of the Evaluation (Overall Rating: B[4])

3.1 Relevance/Coherence (Rating: ③[5])

3.1.1. Relevance (Rating: ③)

3.1.1.1 Consistency with the Development Plan of Morocco

In the *Economic and Social Development Plan (2000-2004)*, development plan as of the

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

[5] ④: Very High, ③: High, ②: Moderately Low, ①: Low

appraisal, the Moroccan government at the time of the appraisal had identified the reduction of disparities between urban and rural areas, economic development of rural areas, and ensuring road access for residents in remote and isolated areas through the development of rural roads as important issues. The goal was also to improve 15,500 km of rural roads through the implementation of the *PNRR2* and to increase the access rate of rural residents to all-weather roads[6] to 80%.

The *New Development Model (2021)*, the development plan in Morocco at the time of the ex-post evaluation, has five goals: prosperity, empowerment, inclusiveness, sustainability, and regional leadership, among the four areas of strategy presented for achieving these goals, "local government and sustainability" states the importance of facilitating mobility within and between regions through the improvement of transportation infrastructure. The *Road Plan 2035 (2013)*, a comprehensive plan for road infrastructure for the year 2035, also indicates that one of its strategic axes is to accelerate the completion of the *PNRR2* and address road development in rural areas to support isolated populations.

Based on the above, the project is consistent with Morocco's development policy both at the time of the appraisal and ex-post evaluation.

3.1.1.2 Consistency with the Development Needs of Morocco

At the time of the appraisal, 57,334 km of public roads (2010) were classified as highways (1.6%), national roads (18.3%), regional roads (17.6%), and provincial roads (62.5%) in Morocco. Moreover, NC roads accounted for 38.5% of all roads and played an important role in traffic in rural areas. While the pavement rate for major roads (highways, national and regional roads) exceeded 80%, the pavement rate for provincial roads was 62% (2009), and the road access rate for rural residents was only 54% (2005), showing a marked disparity between urban and rural areas. At the time of the ex-post evaluation, rural roads have continued to play an important role in the country's transportation, accounting for 73% of the total road network. Improvements have been made since the time of the appraisal, however, the pavement rate of rural roads remains at 72% for provincial roads and 51% for NC roads, and there is still room for improvement[7]. The high utilization of the target section (see "3.4.7 Status of Operation and Maintenance") also indicates that the need for the improvement of rural roads is maintained at the time of the ex-post evaluation.

3.1.1.3 Appropriateness of the Project Plan and Approach

The project output, the total length of the target road, exceeded the plan by 1.6 times. This increase resulted from utilizing the unused funds and adding sections to the project, and it can be said that this change contributed to the improvement of transportation access for the residents

[6] Roads that allow smooth traffic throughout the year, including the rainy season.
[7] Source: Questionnaire answers

along the road, which is the purpose of both this project and the *PNRR2*, of which this project is a part. Therefore, it was an appropriate change. In the *PNRR2* agreements, it was stipulated that communes were responsible for maintaining the NC roads. Additionally, based on the past experiences in the "Rural Road Development Project", phase 1 of this project, the importance of establishing a maintenance system, especially for NC roads, after the project completion was emphasized. Following these circumstances, at the time of the appraisal, it was expected that the Road Finance Agency[8] (Caisse pour le Financement Routier (CFR)) and DGR would coordinate with other aid agencies to support efforts to establish a maintenance system for Communes in charge of NC road maintenance and to follow up on operations after establishment[9]. However, the above efforts were not implemented during the implementation of this project. Therefore, the maintenance system of NC roads by Communes remains as unestablished as it was at the time of the appraisal.

3.1.2 Coherence (Rating: ③)

3.1.2.1 Consistency with Japan's ODA Policy

At the time of the appraisal, the *Overseas Economic Cooperation Operations (2005)* had identified "support for poverty reduction" and "infrastructure development for sustainable growth" as priority areas. For Morocco, "reducing regional disparities" was prioritized and the need to improve economic and social infrastructure, including transportation, was raised. This project is consistent with Japan's aid policy, as it aimed to contribute to improving local residents' road access, living standards, and reducing regional disparities through the improvement of rural roads in provinces with a high poverty rate.

3.1.2.2 Internal Coherence

Rural Road Improvement Project was a project that supported a part of the sections covered by the *PNRR2* as well as this project, and the implementation of both projects contributed to the improvement of road access rates through the improvement of rural roads. As for "the project for the construction of IFEER" and "the project for the improvement of equipment of IFEER" (Grant aid projects), no collaboration and others were planned at the time of the appraisal, and collaboration was not made during implementation. On the other hand, the staff of the executing agency regularly participate in the training programs conducted by the IFEER, and IFEER has provided opportunities for the staff involved in maintenance to maintain and update their maintenance and management skills.

3.1.2.3 External Coherence

The *PNRR2*, implemented by the Government of Morocco, was financed by several donors,

[8] The organization was established in 2004 and plays a treasury-like role in financing and managing funds for rural road development.

[9] Source: Documents provided by JICA and ex-post evaluation report of "Rural Road Improvement Project".

including JICA, with the goal of developing 15,500 km of rural roads and improving the road access rate to 80%. During the implementation, the management unit set up in the DGR coordinated to avoid duplication, and it is reported that the road access rate in the country has reached 79.3% as a result of the *PNRR2*. Of the 15,500 km covered by the *PNRR2*, phase I of "Rural Road Improvement Project" and this project together supported approximately 1,717 km, which means that they contributed approximately 11% of the *PNRR2*. In relation to the international framework, from the perspective of ensuring residents' access to markets and promoting and facilitating logistics by improving rural roads, this project is considered to be consistent with the SDG's several goals, including "1. End poverty in all its forms everywhere," "9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation," and "11. Make cities and human settlements inclusive, safe, resilient and sustainable."

In light of the above, it was confirmed that the project was consistent with Morocco's development plans and needs both at the time of appraisal and post-evaluation, as well as with Japan's development aid policy, support by JICA and other development partners, and international frameworks. Therefore, its relevance and coherence are high.

### 3.2 Efficiency (Rating: ②)

#### 3.2.1 Project Outputs

This project was planned to improve approximately 530 km of rural roads in 30 sections in the five target provinces. The actual outputs are as shown in the table below, with the improvement of 57 sections, totalling approximately 840 km.

Table1 Planned and Actual Outputs

| Provinces | Plan | | Actual | |
|---|---|---|---|---|
| | Sections | Km | Sections [Note] | Km |
| Al Haouz | 9 | 117 | 10 | 99 |
| Chefchaouen | 2 | 102 | 2 (1) | 156 |
| Essaouira | 2 | 25 | 13 | 154 |
| Safi | 3 | 43 | 16 (1) | 187 |
| Settat | 14 | 243 | 14 (1) | 245 |
| Total | 30 | 530 | 55 (3) | 840 |

Source: Documents provided by JICA, questionnaire answers

Note: The number in parentheses is the number of sections not yet completed at the time of the ex-post evaluation. The status of those sections is described below. Although there was a slight discrepancy between the information provided in the PCR and the information obtained during the site survey at the sites regarding the actual number of sections (4 sections for Chefchaouen and 15 sections for Settat in the PCR), the number of sections in the table is presented based on the information obtained at the sites.

In this project, the DGR was delegated project management from the CFR. The Direction Régionale De l'Equipement du transport et de la logistique (DRETL) and the Direction Provinciale De l'Equipement, du transport et de la logistique (DPETL), to which the DGR has delegated the authority to implement the project, were in charge of planning and management, procurement procedures and construction management for the main construction. The work

consisted of simple pavement and gravel road improvements. At the time of the appraisal, the plan was (1) simple pavement: 21 sections, totalling 391 km with a width of 6 m (including 2 x 1m shoulders) and (2) gravel road improvement: 9 sections, totalling 139 km with a width of 6 m (including 2 x 1m shoulders). However, at the time of ex-post evaluation, it was (1) simple pavement: 35 sections, totalling 474 km, and (2) gravel road improvement: 22 sections, totalling 334 (both with the same specifications as those at the time of the appraisal). Consulting services were not set in this project because the executing agency had sufficient staff, technology, experience, and past records in the design and development of rural roads.

The increase in output resulted from incorporating additional target sections and total length by utilizing the unused funds generated through competitive bidding, which was approximately 30% below the planned amount, as well as currency fluctuations[10]. The additional sections were selected from a list of sections that met the selection criteria[11], and there was no problem with the validity of the selection. The revision of the plan prepared at the time of the appraisal, which was based on the rough estimate, during the detailed design also contributed to the increase in outputs. While the change did not affect the project cost, it affected the extension of the project period (see 3.2.2.2 Project Period).

It was confirmed during the ex-post evaluation that three sections[12] remained uncompleted. However, even excluding these three sections, the project has achieved outputs that exceeded the plan set at the time of the appraisal. In all three sections, constructions were cancelled midway due to financial issues of the contractors[13]. According to the executing agency, once the prospects for budget acquisition are determined at each DPETL, they will proceed to conduct a re-bidding process and resume construction. However, as of now, no clear timeline is known, and the completion date has not yet been determined.

### 3.2.2 Project Inputs

#### 3.2.2.1 Project Cost

The total project cost was planned at 7,740 million yen (5,981 million yen in yen loans)[14]. The actual project cost was 7,621 million yen (5,789 million yen in yen loans)[15], which was within the plan (98% of the plan). The reason the project cost was lower than planned was due to contracted amounts being lower than anticipated and currency fluctuations. Furthermore, as for the additional section's expenses, the unused portion of the yen loan was utilized as mentioned above.

[10] At the time of the appraisal: 1 euro=112.4 yen; 1 euro=106.3 yen in April 2012, when the utilization of the outstanding balance was examined.
[11] The list is a document that contains a summary of the agreements reached with the executing agency of the partner country during the planning stage regarding the content of cooperation. Source: Documents provided by JICA
[12] RN2-Bni Mansour-RN16 section in Chefchaouen, Ain Saerni a la RP 3606 section in Settat, Douar Lamsaadia-P2323 section in Safi.
[13] According to the executing agency, it is not uncommon in Morocco for construction to be halted due to the financial problems of contractors. In many cases, due to the highly competitive bidding process, a bidder wins the contract at a low price and is forced to suspend the construction work due to financial difficulties during the implementation phase.
[14] Source: Documents provided by JICA
[15] Source: Documents provided by JICA, questionnaire answers

However, any construction costs exceeding the yen loan repayment amount were covered by the Moroccan side. As a result of the increased outputs, the value-added tax also increased, which led to a slight excess over the planned Moroccan portion.

3.2.2.2 Project Period

The project was planned to be implemented in 27 months, from March 2011 to May 2013. In fact, as stated in 3.1.1 Outputs, as the construction of three sections remains incomplete, it cannot be said that the project has ended at the time of the ex-post evaluation. Therefore, the project period cannot be accurately ascertained, however, as of the second field survey of the ex-post evaluation (September 2023), 147 months have already passed, which significantly exceeded the plan (544% of the plan).

Table 2 Plan and Actual of the Project Period

| | Plan | Actual |
|---|---|---|
| L/A signing | March 2011 | July 2011 |
| Bidding and contracts | March – May 2011 | May 2011- December 2015 |
| Construction | May 2011 – May 2013 | September 2011- uncompleted Note |
| Project completion | December 2013 | Uncompleted as some sections remain incomplete |

Source: Documents provided by JICA, questionnaire answers

Note: The sections, excluding the three uncompleted sections, were completed in August 2018.

The other factors contributing to delays were as follows:

1) Increase in output: As explained in "3.2.1 Output", the target sections and total length were increased by utilizing the unused funds generated through competitive bidding and currency fluctuations. This expansion also led to an extension of the project period.
2) Change in construction method: Due to landslide-prone soil conditions, a two-stage paving method was adopted, extending the construction period by approximately 34 months. (Chefchaouen Province)
3) Adverse weather conditions: Due to adverse weather conditions in 2012 and 2013, there was an approximately 5-month delay. (Chefchaouen Province)
4) Additional survey before the two-stage pavement: Damages to the road surface caused by heavy rain in 2015 necessitated a re-examination of the second-stage construction method, requiring approximately 11 months for the additional survey. (Chefchaouen Province)
5) Delays due to re-biddings and changes of the contracted contractors, resulting in re-procurement. (Approximately 49 months in Essaouira Province and 52 months in Settat Province[16])

[16] In the Settat Province, construction was cancelled due to financial issues with the contractor, leading to a lengthy process of contract termination, re-bidding, and the resumption of construction. As for the Essaouira Province, although confirmation was sought from the DPETL (Essaouira), detailed information could not be obtained.

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 12.5%, assuming that the reduction of total travel time for car users was considered benefit, and the project cost and operation and maintenance cost were regarded as the cost with a project life of 10 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 27.8%, which was higher than what was assumed at the time of appraisal. The reason for this was that the project cost per unit of road length was lower than planned. Additionally, it can be noted that the extended project period has reduced the negative impact of the initial cash flow, resulting in a higher EIRR[17].

In light of the above, the project cost was within the plan, however, the project period largely exceeded the plan. Therefore, efficiency of the project is moderately low.

3.3 Effectiveness and Impacts[18] (Rating: ③)

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

In this project, the indicators including increased traffic volume, shortened travel time, and reduced impassability days due to natural disasters of the target sections, were set at the time of the appraisal. The table below shows a summary of the achievement status of the selected sections as representative routes during the appraisal among all the target sections (see Appendix for the results for all target sections).

[17] Generally, the IRR decreases as benefits are delayed due to the extended project period. However, in this project, the benefits were realized even before the entire project was completed because each section was completed. Therefore, the delay in benefits has not been a factor in lowering the IRR.

[18] When providing the sub-rating, Effectiveness and Impacts are to be considered together.

Table 3 Planned and Actual Operation and Effect Indicators (Representative Sections)

| | Baseline value | Target value | Actual value | | |
|---|---|---|---|---|---|
| | 2010 | 2 Years After Completion | 2020 | 2021 | 2022 |
| 1) Annual average daily traffic volume (vehicle/day) Note1 | | | | | |
| - NR2 Bni Mansour-RN16 (a) | 50 | 64 | 40 | 62 | 66 |
| - HAD HARARA-RR204 (b) | 200 | 255 | 865 | 900 | 935 |
| - Mediouna a la RP3305 (b) | 120 | 153 | 209 | 250 | 283 |
| - Settat-Rasain (b) | 250 | 319 | 375 | 416 | 449 |
| - Smimou Barrage-Imin Elhad | 0 | 60 | 65 | 68 | 70 |
| 2) Travel time (minutes) (necessary time for passing) Note3 | | | | | |
| - NR2 Bni Mansour-RN16 (a) | 170 | 85 | 100 | 100 | 100 |
| - HAD HARARA-RR204 (b) | N.A. | 15 | 15 | 15 | 15 |
| - Mediouna a la RP3305 (b) | 35 | - | 24 | 24 | 24 |
| - Settat-Rasain (b) | 44 | - | 29 | 29 | 29 |
| - Smimou Barrage-Imin Elhad | 120 | 10 | 15 | 15 | 20 |
| 3) Impassability days due to natural disasters (day/year) | | | | | |
| - NR2 Bni Mansour-RN16 (a) | 120 | | 0 | 0 | 0 |
| - HAD HARARA-RR204 (b) | 0 | | 0 | 0 | 0 |
| - Mediouna a la RP3305 (b) | 30 | All sections | 0 | 0 | 0 |
| - Settat-Rasain (b) | 30 | 0 | 0 | 0 | 0 |
| - Smimou Barrage-Imin Elhad | 365Note4 | | 5 | 5 | 5 |

Source: Documents provided by JICA, documents provided by DPETL

Note 1: The actual values for (a) are estimated values based on observations during inspections conducted by the DPETL, and the actual values for (b) are counted.

Note 2: Although two years after completion should be the target year for each section, the year of completion for the 57 sections varied from section to section, some sections remain incomplete, and although some sections were completed in 2013, traffic volume data as of 2015 was not available. Therefore, the achievement status of traffic volume increase was analyzed based on the most recent year's information.

Note 3: Travel time for the target sections (in minutes)

Note 4: The road was impassable at the time of the appraisal, therefore the baseline value was set as 365 days.

1) Annual average daily traffic volume

The annual average traffic volumes in all representative sections met the target goals. Additionally, all but two non-representative sections also achieved their target values. (see Attachment 1). Although the data includes information for sections that are not actually counted, all respondents in the interviews with residents and drivers[19] along the target sections indicated that traffic volume increased after the road improvement, indicating that traffic volume increased in the target section as a result of the road improvement.

2) Reduction of travel time

Initially, travel time was defined as the cumulative travel time of all vehicle users on each section during the appraisal. However, maintenance staff in each province found this definition to

[19] Through the first field survey and follow-up survey conducted by the local assistant, group interviews were conducted with a total of 197 drivers and local residents along the target route (66 in the Settat province, 26 in the Al Haouz province, 42 in the Essaouira province, 50 in the Safi province, and 13 in the Chefchaouen province).

be complex and challenging for obtaining accurate results. Consequently, in this ex-post evaluation, it was focused on assessing the changes in travel time for each section before and after the project's implementation. As a result, it was confirmed that the travel time was shortened in each section as shown in the table (see Attachment 2 for the actual value of all targeted sections). This was attributed to the fact that many sections are now accessible to vehicles, which was difficult before the project was implemented. In interviews with residents and drivers, all respondents also indicated that the time required for travel had been reduced after the road was improved. Due to the use of alternative indicators, determining the exact status of target achievement is challenging. Hence, this indicator is considered as a reference.

3) Reduction in the number of impassable numbers of days due to natural disasters

The implementation of this project has solved the situation where the unpaved road was blocked by floods and the road was muddy and impassable due to heavy rain, the number of days when the road was impassable was reduced to 0 for all but one section, meeting the target objective. However, it has been observed that some parts of all target sections still experience up to three days of impassability annually, primarily due to floods and similar factors (refer to Attachment 3).

3.3.1.2 Qualitative Effects (Other Effects)

As a qualitative effect, it was expected that road access for residents along the road would be improved through the development of the targeted sections. The *PNRR2*, of which the project was a part of the implementation, also had the goal of achieving a road access rate of 80%. Although the project did not set a target value for each area, the same value after the project was implemented was improved in all areas compared to before the project was implemented, thus, it is considered that the road improvement through the project contributed to the improvement of road access rate.

Table 4 Rate of Road Access

| | Before implementation (2012) | After implementation (2022) |
|---|---|---|
| Al Haouz | 62% | 70% |
| Chefchaouen | 53% | 69% |
| Essaouira | 65% | 74% |
| Safi | 65% | 85% |
| Settat | 56% | 70% |

Source: Questionnaire answers

3.3.2 Impacts

3.3.2.1 Intended Impacts

As for the impact of the project, it was expected to contribute to the "revitalization of the local economy" and "improvement of the living environment for local residents". Through interviews with the executing agency and residents living along the target roads mentioned above (see

footnote 19), the following effects were confirmed.

(1) Revitalization of the local economy

In interviews with local residents, about 60% of respondents reported a change in local economic activity. Specific examples include the opening of stores and coffee shops due to the increased traffic and the construction of new factories and houses due to the easier and cheaper transportation of materials. In areas where agriculture is a major industry, it was also reported that the transportation of agricultural products has become easier. However, a large increase in harvest volumes has not been confirmed in recent years due to weather changes, and the economic impact of the project was considered limited[20].

(2) Improvement of the living environment for local residents

- Reduced travel time and improved accessibility

All interviewed respondents reported a reduction in travel time to their destinations (such as markets, government offices, hospitals, etc.) after the road improvements. Before the project's implementation, the majority of the target sections was not in a condition suitable for vehicle traffic, and the fact that vehicles, buses, and carriages became accessible significantly improved access for local residents to their destinations.

**【BOX】Case 1: Shortened travel time and improved accessibility**

Target section: Smimou Barrage-Imin Elhad section (Gravel road improvement), the Essaouira Province

Before the road was improved by the project, this section was an unpaved road. Because vehicles could not travel on the road, the major agricultural products in the area, such as argan, olives, gas used daily, and daily necessities, were mainly transported on foot or by horseback. Residents of Edhraouine, a community along the section, used to take half a day to go to the main nearby market to buy and sell goods and return to Edhraouine, but now that vehicles and horse-drawn carriages can travel, the time required for the above tasks has been reduced to about one hour.

Rural road improved by the project
(Source: taken by the evaluator)

- Increase in the school enrolment rate of girls[21]

In interviews with the local residents in the target sections, all respondents indicated that girls' access to education improved after the road was improved. In some areas of Morocco, families are more likely to avoid having girls walk long distances to schools or send them to boarding

[20] The impact evaluation of this project conducted in 2019 reported that while employment and income in the agricultural and self-employment sectors were declining overall, it was smaller in areas where the roads were improved. (Source: Impact Evaluation of Rural Road Improvement Project in Morocco (2019))

[21] The impact evaluation mentioned above also explained that the effect on girls' secondary education was particularly pronounced. While there was no change in girls' secondary school enrollment in 2011 and 2017 in the Control Group (without intervention), there was an improvement in the same enrollment rate in the Treatment Group (with intervention). (However, the rate remained very low and the degree of improvement was modest.) (Source: Impact Evaluation of Rural Road Improvement Project in Morocco (2019))

schools. Through road improvement, roads have become accessible to vehicles, and communities in many areas have purchased school buses to transport children to and from schools. This has contributed to an increase in enrolment in secondary schools and colleges, especially for girls, as they can now attend schools by bus, whereas previously they had to stay in boarding schools when attending secondary schools and colleges[22].

**【BOX】Case 2: Improvement in enrolment**

Target section: P3034: Médiouna - RP3305 section (Simple pavement) in the Settat Province

Before the implementation of the project, the town of Ouled Zidane had only a primary school, and it was difficult for the children to go to secondary schools in a neighboring town (Médiouna), therefore they had to live in a boarding house and return home on weekends to study at the secondary schools. After the road was improved, the secondary school was constructed in Ouled Zidane, and the community also purchased 6 school buses. In some areas, there is often a tendency to discourage girls from walking long distance to school. Therefore, in these areas, the introduction of school bus services has improved girls' enrolment rates by providing transportation for students. Furthermore, the improved road has facilitated vehicle travel, allowing teachers who previously faced commuting challenges to be assigned, thereby enhancing the educational environment in the area.

Community bus travelling on improved rural road (Source: taken by the evaluator)

- Improved access to health services

96% of the respondents interviewed answered that access to health services has improved compared to before the project was implemented. Some of the contributing factors include improved road, which has made it easier and faster to access hospitals and clinics. Additionally, the availability of ambulances to reach the community has enabled the transportation of critically ill patients.

[22]While primary schools are often located in local communities, secondary schools and colleges in many areas require students to commute to nearby cities. In areas where students were forced to live in boarding schools to attend secondary schools and colleges, school bus transportation makes it possible for students to commute from their homes.

**【BOX】Case 3: Improved access to health services and others**

Target section: NC road, Douar Agaiouar-Amerzouart section (Gravel road improvement), the Al Haouz Province

The Douar Agaiouar-Amerzouart section was unpaved before the project was implemented, and the community had no residents who owned cars. Therefore, walking and domestic animals were the primary means of transportation, and access to Ourika, where the market and hospital are located, required 4-5 hours. Pregnant women who were about to give birth also used to travel by horseback or other means, and it was not uncommon for the delivery to be timed before they reached the hospital. After the implementation of this project, two vehicles started being used for transportation between the community and Ourika. This significantly improved residents' access to essential services. The improved roads also allow ambulances to access the village.

Vehicles connecting the community with neighboring cities
(Source: taken by the evaluator)

- Improved logistics and people networking

Although only 62% of respondents reported that the roads have increased economic activity in the area, residents reported that they have facilitated the transportation of building materials and increased the number of homes in the region. Furthermore, families and residents who had left the town for employment or further education have been utilizing taxis and other means of transportation to return to the town, especially during Eid (Islamic holiday) and other occasions, leading to an increase in opportunities for family reunions.

**【BOX】Case 4: Promotion of family reunions and enhancement of logistics networks**

Target section: Tighdouine - Ait Anzal jbel section (Simple pavement), the Al Haouz Province

The village of Ait Oughdine is located approximately 10 km from an area where gas and other daily necessities can be purchased. Before the road was improved, the main means of transportation were horses, which made it difficult to transport construction materials. It was also not easy for families who left for higher education or work to return home frequently. After the road improvement, it became possible for trucks and taxis to travel, facilitating the transportation of construction materials. Consequently, transportation costs have also decreased, leading to an increase in the construction of buildings in the area. Furthermore, Former residents from the same area who had moved to the city have also increased opportunities to return to their hometown by utilizing taxis and other means of transportation. In addition, it has become easier to transport onions and other agricultural products grown in the same area to the market, leading to an increase in cultivated land.

Vehicles traveling with equipped local roads (Source: taken by the evaluator)

3.3.2.2 Other Positive and Negative Impacts

1) Impacts on the Environment

This project was judged to fall into Category B under the *JBIC Guidelines for Confirmation*

*of Environmental and Social Considerations* (established in April 2002) as it did not fall under the category of large-scale road projects, and it has been judged that the adverse environmental impacts are not significant, and it does not correspond to the characteristics and regions susceptible to the impacts as outlined in the guidelines. The preparation of an Environmental Impact Assessment report was not mandated under domestic law, and it was not prepared in this project. However, simplified environmental management plans have been created by the DRETLs and DPETLs. Measures identified in the simplified environmental management plan, such as dust control (water sprinkling), noise control (limitation of construction hours), transport and disposal of waste to approved locations, and restoration of the construction site to its original condition, were complied with by the contractor during project implementation. Although monitoring records could not be verified on-site, interviews with the executing agency and local residents answered that there were no negative impacts, and it was confirmed that there were no complaints from the residents.

2) Resettlement and Land Acquisition

Resettlement and land acquisition were not assumed in this project from the outset and did not actually occur[23].

3) Gender Equality

The project expected impacts such as the improvement of the enrolment rate of girls in primary schools and a reduction in female labor associated with firewood collection (due to increased access to distribution vehicles for gas and water), among others. According to interviews with the executing agency and residents, it was found that prior to the implementation of this project, the target area was already using gas, and firewood collection by women was not a common practice. On the other hand, the improvement of roads has led to an increase in the enrolment rate of girls who had limited access to educational opportunities due to travel constraints (refer to the "Increase in the school enrolment rate of girls" mentioned above).

4) Marginalized People

Through the road improvement of the project, the project contributed to the improvement of the environment for people who had limited access to medical services, education, and markets along the targeted section, as described in "3.3.2.1 Intended Impacts." Furthermore, when determining the target sections, the selection criteria included "population with no access to rural roads,"[24] and the development of the project's target section is considered to have provided an equitable opportunity for social participation to people who previously had no access to roads or faced restrictions in this regard.

[23] Source: Questionnaire answers, interviews with the executing agency
[24] Source: Documents provided by JICA, questionnaire answers

5) Social Systems and Norms, Human Well-being and Human Rights

No specific or direct initiatives from the perspective of social systems, norms, human well-being, or human rights were articulated at the time of the appraisal, and no related impacts occurred during or after implementation or completion.

6) Unintended Positive / Negative Impacts

- Shortening the time involved in gas purchases

In the target area, the time required to purchase household goods, especially gas, has been reduced after the road improvements, contributing to a decrease in the amount of workload. Interviews with the residents revealed that all respondents reported a reduction in workload due to the road improvements. One of the contributing factors was the reduction in the time spent for purchasing various goods, especially gas in all the areas. Previously, most communities transported gas on foot or by domestic animals from areas where it could be purchased. After the road improvements, it has been observed that various goods could be transported by vehicles, leading to the opening of shops in the area that deal with gas, making the purchase of gas more convenient.

Vehicle transporting gas (Chefchaouen province) (Source: taken by evaluator)

In the target sections, an increase in traffic volume and a reduction in the number of impassable days due to natural disasters generally met the target values. Travel times for travel were shortened, and the road access rates in the target areas also improved. After the road improvements, the availability of vehicles and horse-drawn carriages has made it easier for local residents to travel to markets and other destinations, and to obtain daily necessities. Moreover, girls' school enrolment and access to health services have also improved. While the impact on the revitalization of the local economy was considered limited, impacts such as an increase in the construction of buildings due to the decrease in transportation costs of materials and the opportunities for families to gather more frequently due to the improved environment for easy travel back from urban areas have also been observed.

In light of the above, this project has mostly achieved its objectives. Therefore, effectiveness and impacts of the project are high.

3.4 Sustainability (Rating: ②)

3.4.1 Policy and System

The maintenance of regional and provincial roads in Morocco is carried out in accordance with the *Road Maintenance Program*. The program is a common maintenance plan formulated by the

DGR that includes 1 year, 3 years, and 5 years action plans. On the other hand, the maintenance of NC roads is handled by Communes and is not included in this plan. Furthermore, no plan that corresponds to the Plan has been prepared for NC roads, and the institutional structure is not fully developed.

### 3.4.2 Institutional/Organizational Aspect

The operation and maintenance (O&M) of regional and provincial roads are carried out by the DRETLs and DPETLs. Communes are responsible for the maintenance of NC roads. The number of O&M staff and their adequacy or shortage of the DPETLs, which is mainly responsible for the target of this project, are as follows. According to the DPETLs, which is experiencing a shortage of staff, the workload on each person in charge is high and delays occur due to the inability to allocate the necessary staff to carry out required maintenance activities. DPETLs directly manage simple repair work, while complex repairs and those requiring equipment not owned by DPETLs are outsourced. In cases where issues arise that cannot be addressed through common responses, it is also possible with the DRETLs, and support can be obtained from the DGR as needed.

Table 5 Number of O&M Staff in the Target Area

| Provinces | Engineers [Note] | Technicians | Staff shortage |
|---|---|---|---|
| Al Haouz | 4 | 12 | |
| Chefchaouen | 3 | 7 | ✓ |
| Essaouira | 1 | 4 | ✓ |
| Safi | 2 | 3 | |
| Settat | 2 | 5 | |

Source: Questionnaire answers, hearing to each DPETL
Note: University graduate, national qualification

While each commune responsible for the O&M of NC roads basically has one engineer in place, the maintenance of NC roads is solely entrusted to communes. According to the DPETLs and local residents, in many cases, the O&M system is not adequately established. Moreover, specific actions planned at the time of the appraisal to establish and strengthen the O&M system for NC roads have not yet been addressed.

As mentioned above, a shortage of staff has become a minor issue for some DPETLs, and a challenge lies in the lack of established O&M systems for NC roads under the jurisdiction of communes since the time of the appraisal.

### 3.4.3 Technical Aspect

DPETLs responsible for O&M of national, regional and provincial roads have engineers and technicians in place, and there are no technical issues. In addition to training at the regional level, staff have regular opportunities to participate in training at the IFEER. The training aims to maintain and update technical capabilities in maintenance and includes various aspects such as

pavement construction techniques and geotechnical engineering[25]. Manuals for road repair and reinforcement have also been developed. DPETLs have also outsourced repair work to private companies, all of which possess the necessary technical expertise, and there are no concerns. On the other hand, regarding NC roads, most communes do not have specialized departments, and the O&M manuals are not provided.

In light of the above, there are no technical competence issues for the DPETL staff, however, technical challenges remain for O&M of NC roads that the commune is responsible for.

### 3.4.4 Financial Aspect

The DRETLs/DPETLs are financed by the general budget and budget distributions from the Special Road Fund. The maintenance budget for each DPETL is shown in the table below. The allocation and fluctuations in budget amounts vary from one province to another based on the level of need. According to the DPETLs, the amount needed for proper maintenance of all target sections is large and beyond the financial capacity of each area. The primary reason for the lack of appropriate response to the necessary repairs in the target sections is insufficient budget allocation, as each DPETL does not receive a sufficient budget. Financial sources could not be ascertained for NC roads managed by communes.

The target sections of the project include many sections that were completed in 2013. With a decade having passed since completion, many sections now require maintenance, and budgetary insufficiency remains a significant concern for maintenance.

Table 6 Maintenance Budget of Each DPETL

(Unit: millions of Morocco Dirham(MAD) )

| | 2020 | 2021 | 2022 | 2023[Note] |
|---|---|---|---|---|
| Al Haouz | 24 | 69 | 32 | 80 |
| Chefchaouen | 20 | 25 | 10 | 5 |
| Essaouira | 26 | 17 | 31 | 48 |
| Safi | 71 | 132 | 152 | 103 |
| Settat | 104 | 87 | 92 | 7 |

Source: Questionnaire answers

Note: The budget for 2023 is the projected amount.

### 3.4.5 Environmental and Social Aspects

No negative environmental and social impacts were reported as described in “3.3.2.2. Other Positive and Negative Impacts 1) Impacts on Environment. However, some residents have reported concerns regarding the trend of increasing vehicle travel speeds. The need for the installation of travel speed limit signs was mentioned as a measure to prevent traffic accidents[26].

[25] According to the DGR, training budgets were decreased in FY2022 and regional-level training has not been implemented.

[26] According to the local residents and executing agency, despite the installation of an appropriate number of road signs to ensure the safety in the project, some may have been reduced due to vandalism.

3.4.6 Preventative Measures to Risks

Disaster occurrences present a notable risk to road maintenance, as outlined in each DPETL. Despite this, DPETLs have historically managed to carry out necessary repairs after disasters. The DPETLs also recognize the importance, even considering support from DRETLs for future responses. Regarding NC roads, it is expected that repair work may not be necessary for approximately 5 to 10 years after completion. On the other hand, as previously mentioned, the maintenance systems of the commune have not been established as of now, and there are no apparent activities of appropriate maintenance of NC roads. Therefore, concerns remain regarding the implementation structure for the future maintenance of NC roads[27].

3.4.7 Status of Operation and Maintenance

Among the target sections, 27 sections (50%) are in good maintenance condition, 21 sections (39%) have some damage, and 5 sections (9%) have serious damage. There are no sections that are not in use[28]. The factors leading to damage were mainly disasters such as heavy rainfall and flooding, as well as the high volume of heavy vehicle traffic. During the site inspection, it was also observed that in areas with heavy rainfall and high traffic volumes of large vehicles, uneven road surfaces were observed. For regional and provincial roads, inspections and repairs were carried out in some sections to address these issues. However, for NC roads, cleaning and repairs were insufficiently maintained.

Table 7 Maintenance Status of the Target Sections

(Unit: number of the road section)

| | Good | | Some damages | | Serious damages | | Not in used | |
|---|---|---|---|---|---|---|---|---|
| | Regional/ Provincial roads | NC Road | Regional/ Provincial roads | NC Road | Regional/ Provincial roads | NC Road | Regional/ Provincial roads | NC Road |
| Al Haouz | 2 | 1 | 2 | 5 | 0 | 0 | 0 | 0 |
| Chefchaouen | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| Essaouira | 0 | 2 | 5 | 4 | 0 | 2 | 0 | 0 |
| Safi | 4 | 7 | 1 | 3 | 0 | 0 | 0 | 0 |
| Settat | 11 | 0 | 0 | 0 | 2 | 0 | 0 | 0 |
| Subtotal | 17 | 10 | 9 | 12 | 2 | 3 | 0 | 0 |
| **Total** | **27 (50%)** | | **21 (39%)** | | **5 (9%)** | | **0** | |

Source: Questionnaire answers

Note: Safi and Settat do not include the uncompleted sections.

Regarding the maintenance plan, it is as explained in (1) the Policy and System. Plan has been utilized for regional and provincial roads, and the data for repair has been also recorded and managed. For regional and provincial roads, the DPETLs are expected to continue implementing

[27] While specific actions were not taken during the project implementation, it is worth noting the Ministry of Equipment and Water has initiated a priority maintenance program for NC roads in 2023, named “the Pilot Program for the Protection of Unclassified Rural Roads (Programme Pilote de Sauvegarde des Routes Non Classées).” This program aims to ensure the maintenance of approximately 500 km of roads nationwide.

[28] Source: Questionnaire answers

the necessary maintenance with communication to the DRETLs and, if necessary, the DGR. On the other hand, there is no maintenance plan for NC roads, and even for roads that currently do not require repair, there is concern about future response.

Moreover, the sections developed in this project were uniformly designed with a width of 4 m (6 m including shoulders) in line with the standard of Morocco. The project targeted rural roads, and while there is no problem on sections where small vehicles, horse-drawn carriages, and pedestrians are the main users, the width is narrow on sections where relatively heavy vehicles are traveling, and the DPETLs, drivers, and residents have expressed many requests for widening. At the time of design, it would have been an idea to examine whether different widths could be applied to areas where heavy vehicles are expected to travel, based on the conditions of the target sections[29].

As described above, at the time of the ex-post evaluation, there are no major issues on policy and systems, technical aspects, and status of operation and maintenance for regional and provincial roads. However, there are minor issues on institutional and financial aspects as staffing and budget shortfalls that were reported in a few provinces. Regarding the sustainability of NC roads, some issues have been observed in the policy/system, institutional/organizational, technical, and financial aspects. Moreover, as risk mitigation measures, efforts to establish a maintenance system by the communes with jurisdiction over NC roads have not yet been initiated, and specific measures for the future have not yet been determined. Therefore, sustainability of the project effects is moderately low.

## 4. Conclusion, Lessons Learned and Recommendations

### 4.1 Conclusion

This project was implemented to improve the road access of residents along the target roads by improving the rural roads in the five provinces in northern, central, and inland Morocco, thereby contributing to the improvement of rural residents' standard of living and remedying the regional disparities. This project has been relevant to Morocco's development policy and needs. The project, along with "Rural Road Improvement Project" (Phase I of the project), which was supported by JICA, and other development partners, facilitated the implementation of the Moroccan government's rural road improvement program, and the outputs have been confirmed to a certain extent. Therefore, the relevance and coherence are high. By utilizing the unused funds generated due to exchange rate fluctuations and bids lower than anticipated, the output increased; however, the project cost was within the plan. Meanwhile, the project period largely exceeded the plan, therefore the efficiency is moderately low. After the road improvement, the increase in traffic volume and the reduction in the number of days of impassability due to natural disasters in the target sections mostly achieved the target values, and the travel time and road access rate in the

[29] According to the CFR, despite the standardized design of rural roads, DGR may widen or reinforce the relevant sections if the surveys reveal heavy traffic volumes and depending on the available budget.

area have been also improved. Although the impact on the local economy is considered limited, impacts such as improved convenience for local residents, improved school enrolment (especially for girls), and access to medical services have been confirmed in the target section. Therefore, the effectiveness and impact are high. While the operation and maintenance of regional and provincial roads in the project do not face major concerns in terms of policy and system, technical aspects, and operation and maintenance status, there are minor concerns related to financial aspects and personnel shortages in institutional/organizational aspects. On the other hand, concerning the NC roads, there are concerns regarding the policy and system, institutional/organizational structure, technology, and financial aspects including risk management, and its specific actions for the future are also undecided. Therefore, sustainability of the project effects is moderately low. In light of the above, this project is evaluated to be satisfactory.

## 4.2 Recommendations

### 4.2.1 Recommendations to the Executing Agency

Installation of traffic signs to prevent traffic accidents

In the target section where the roads have been improved, there is a noticeable trend toward increased vehicle travel speeds, which is a concern for local residents as it leads to the occurrence of traffic accidents. On the other hand, it is reported that the number of road signs installed in the target sections is limited under the current circumstances. In the future, it is recommended that the DGR formulates and executes a plan to install additional road signs indicating maximum speed limits to prevent traffic accidents. Additionally, it is advisable to encourage the National Road Safety Agency[30] to set up educational opportunities for drivers, communities, and local schools to promote adherence to traffic rules.

Reinforcement of maintenance system for NC road

(This recommendation is directed not only to the Executing Agency but also to the Ministry of Interior.)

At the time of the appraisal, it was planned that the CFR and DGR would support efforts by each commune to establish maintenance, as well as supervise and guide operations once established. However, throughout the project implementation, support or encouragement has not been provided to communes, and the maintenance system of NC roads by communes has remained the same as at the time of the appraisal. As a result, the majority of NC roads have not been properly repaired. In order to ensure that NC roads are properly maintained in the future, it is crucial that the CFR and DGR collaborate with the Ministry of Interior at the earliest to offer necessary advice on maintenance plans for NC roads. Additionally, Ministry of Interior is required to aim to strengthen the maintenance system, considering the involvement of the

[30] In Morocco, road user awareness is supported by the National Road Safety Agency (NARSA), which conducts awareness, communication, and training programs in both urban and rural areas.

DPETLs as needed.

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

Design at the time of planning for safe and effective road utilization

In this project, the width of the target section was initially designed to be a uniform 4 meters with an additional 1 meter on each side for road shoulders. However, feedback from the DPETLs, drivers, and residents during site surveys highlighted the road's narrowness. This width is not problematic in sections with low vehicle traffic, but it becomes hazardous when larger vehicles pass, leaving very little clearance. The need for vehicles to use the road shoulders not only endangers pedestrians but also damages the shoulders. In large scale projects involving numerous target sections like this one, during the planning stage, it is advisable for executing agencies and consultants involved in design not to uniformly apply the design. Instead, it is desirable to involve local authorities and understand the needs for each section, setting multiple design patterns. This approach allows for the application of designs that are more user-friendly and can be better utilized.

Follow-up system for projects where consulting services are not involved

At the time of the project appraisal, the importance of establishing a maintenance system, especially for NC roads, after the project completion was emphasized. Therefore, it was planned to support communes in establishing a maintenance system for NC roads, as well as supervise and guide their operations once established. However, such support was not implemented in this project, which left challenges in the O&M system of NC roads. One of the reasons for the lack of this support can be attributed to the fact that consulting services were not set in this project. In cases of projects where consulting services are not anticipated, and there is a need for certain technical support, at the appraisal stage, it is essential for JICA and executing agencies to agree on the entity responsible for providing that support and its associated responsibilities, and JICA needs to provide continuous follow-up to ensure the support is carried out and fulfilled effectively.

Setting an ongoing system with consideration for post-project maintenance

The target sections of this project consist of regional and provincial roads, as well as NC roads, which are under the jurisdiction of communes, a sub-organization of the Ministry of Interior. During the implementation of this project, the DGR was involved as an executing agency and subsequently conducted monitoring of the target sections. However, after the completion of the project, the maintenance of NC roads has been almost non-existent. The Ministry of the Interior’s low involvement in the project likely contributed to the lack of awareness of its responsibility for

the maintenance of NC roads after the completion of the project, which may have contributed to the lack of implementation of maintenance after the project completion. In cases where multiple agencies are envisioned to be responsible for the maintenance of facilities or equipment, it is necessary to have these agencies actively involved in the project during the implementation stage or clearly define the responsibility for maintenance. By doing so, a commitment to involvement can be established, ensuring the establishment of a system where maintenance is carried out effectively.

## 5. Non-Score Criteria

5.1 Performance

5.1.1 Objective Perspective

None

5.2 Additionality

None

(End)

Comparison of the Original and Actual Scope of the Project

| Item | Plan | Actual |
|---|---|---|
| 1. Project Outputs | Target provinces: Five provinces<br>Total length: 530 km<br>Number of sections: 30 sections<br>1) Simple pavement<br>391 km, 21 sections<br>2) Gravel road improvement<br>139 km, 9 sections<br>(a width of 6 m, including 2 x 1 m shoulders) | Target provinces: Five provinces<br>Total length: 840 km<br>Number of sections: 55 sections<br>1) Simple pavement<br>529 km, 35 sections<br>2) Gravel road improvement<br>312 km, 22 sections<br>(a width of 6 m, including 2 x 1 m shoulders) |
| 2. Project Period | March 2011-May 2013<br>(27 months) | July 2011-September 2023<br>(147 months) |
| 3. Project Cost<br>Amount Paid in Foreign Currency<br>Amount Paid in Local Currency<br><br>Total<br>ODA Loan Portion<br>Exchange Rate | <br>311 million yen<br><br>7,429 million yen<br><br>(761 million MAD)<br>7,740 million yen<br>5,981 million yen<br>1MAD = 9.75 yen<br>(As of October 2010) | <br>5,789 million yen[31]<br><br>1,882 million yen<br><br>(164 million MAD)<br>7,621 million yen<br>5,789 million yen<br>1MAD = 11.44 yen<br>(Average during the project period) |
| 4. Final Disbursement | November 2018 | |

[31] The ratio of foreign and local currency is significantly different from that at the time of the appraisal. This is because the special account method was applied for this project. Under this method, JICA disburses the funds to the account of the executing agency in the partner country, and the executing agency pays the suppliers and contractors from this account. Since the transaction of funds is basically restricted to Japanese yen, even if the contract currency between the executing agency and the contractor in Morocco is the local currency, the loan execution is treated as foreign currency.

[Appendix 1: Annual Average Daily Traffic for the All-Target Sections (vehicles/day)]

| Province | Route | Liaison | Baseline | Target | Actual | | |
|---|---|---|---|---|---|---|---|
| | | | 2010 | 2 years after project completion | 2020 | 2021 | 2022 |
| Al Haouz | NC | Douar Agaiouar-Amerzouart | - | 100 | N.A. | N.A. | 20 |
| | NC | Tidili-Tighdouine | 50 | 64 | N.A. | N.A. | 87 |
| | NC | Tighdouine-Ait Anzal jbel | 50 | 64 | N.A. | N.A. | 200 |
| | NC | Ijoukak-Ounein | 50 | 64 | N.A. | N.A. | 84 |
| | P2009 | Azegour-Adassil (C) | 50 | 64 | N.A. | N.A. | 145 |
| | P2009 | Azegour-Adassil (A) | 50 | 64 | N.A. | N.A. | 145 |
| | P2014 | Tamesloht - SYBA | - | 300 | N.A. | N.A. | 554 |
| | NC | OA Type dalot Oued Agoundis | 50 | 64 | N.A. | N.A. | 84 |
| | NC | OURIKA /S.A GHIAT | 100 | 128 | N.A. | N.A. | 590 |
| | P2036 | Ighil-Azgour | - | 250 | N.A. | N.A. | 98 |
| Chefchaouen | P | B.Berred-Jbel Azri | 50 | 64 | 35 | 60 | 65 |
| | **NC** | **RN2-Bni Mansour-RN16** | **50** | **64** | **40** | **62** | **66** |
| Safi | NC | RR301-RP2309 | 50 | 64 | 88 | 92 | 96 |
| | NC | RR201 (PK42)-Ouled Bouzid | 50 | 64 | 102 | 110 | 114 |
| | **P** | **HAD HARARA-RR204** | **200** | **255** | **865** | **900** | **935** |
| | RP2302 | Labkhati -RP2306 | 10 | 60 | 70 | 73 | 76 |
| | NC | Ras EI Ain-Sidi Ahmed | 20 | 70 | 80 | 84 | 88 |
| | RP2325 | Barakat khail - Laamamra | 5 | 30 | 40 | 50 | 55 |
| | RP2318 | Tnine ghiate-khmiss oulad Lhaj | 5 | 120 | 120 | 130 | 133 |
| | RP2005 | Sidi Chiker-RR201 | 5 | 30 | 30 | 32 | 36 |
| | NC | RR201-Dhamna | 5 | 20 | 30 | 32 | 36 |
| | NC | Guaguen-RP2321 | 10 | 30 | 40 | 45 | 50 |
| | NC | Guaguen-RP2321 | 10 | 30 | 40 | 45 | 50 |
| | NC | Tlet Ighoud-Lamtahra | 5 | 40 | 60 | 65 | 70 |
| | NC | RR201-Ouled Bouzid | 50 | 64 | 102 | 110 | 114 |
| | NC | Douar Lamssaadia-P2323 | 5 | 10 | 15 | 20 | 20 |
| | NC | P2321( Nga)-P2319 (laaroussiyine) | 5 | 20 | 25 | 30 | 30 |
| Settat | P3610 | RR318-a Ouled fatima | 120 | 153 | 209 | 250 | 283 |
| | P3607 | Sidi rahal Chatii-RP3606 | 150 | 191 | 247 | 288 | 321 |
| | P3620 | Ouled said a Gdana | 120 | 153 | 209 | 250 | 283 |
| | P3614 | RR318 a Dar Toudi | 150 | 191 | 247 | 288 | 321 |
| | P3607 | Sidi rahal Chatii-RP3606 | 120 | 153 | 209 | 250 | 283 |
| | P3629 | Ras EI Ain a Guisser | 150 | 191 | 247 | 288 | 321 |
| | P3014 | Oulfa a sidi Abdellah Chrif | 200 | 255 | 311 | 352 | 385 |
| | P3007 | RN1 a la RP3011 | 200 | 255 | 311 | 352 | 385 |
| | P3305 | Sidi Hajjaj a Mgarto | 120 | 153 | 209 | 250 | 283 |
| | **P3034** | **Mediouna a la RP3305** | **120** | **153** | **209** | **250** | **283** |
| | P3601 | RN9 a Tnine Toualet | 150 | 191 | 247 | 288 | 321 |
| | *P3609* | Ain Saemi a la RP 3606 | 150 | 191 | *247* | *288* | *321* |
| | P3628 | SIDI BOUMEHDI-MESTOURA | 130 | 166 | 222 | 263 | 296 |
| | **RP3616** | **Settat-Ras ain** | **250** | **319** | **375** | **416** | **449** |
| Essaouria | **NC** | **Smimou Barrage Imin Elhad** | **-** | **60** | **65** | **68** | **70** |
| | NC | Ounagha-Ait Hamou | 20 | 26 | 30 | 40 | 50 |
| | P2210 | Had dra -RR301 | - | 10 | 15 | 20 | 25 |
| | NC | Had dra -Ait Elhoucine | - | 10 | 15 | 20 | 25 |
| | P2213 | Lagdadra - Sidi Aissa Regragui | 5 | 20 | 25 | 30 | 40 |
| | NC | Takoucht - Sidi Ghanem | 5 | 10 | 15 | 20 | 30 |
| | NC | Adaghass - Adrar | - | 5 | 15 | 20 | 30 |
| | NC | Sidi Ishak - Sidi Ali kourati | 10 | 20 | 30 | 35 | 40 |
| | P2216 | Aeroport Essaouira - Sidi Eljazouli | 5 | 20 | 30 | 40 | 50 |
| | NC | Takoucht - Aglif | - | 5 | 10 | 20 | 30 |
| | P2216 | Sidi Eljazouli - Imintlit | 5 | 10 | 20 | 25 | 30 |
| | P2209 | Ounagha - Ait Said | 10 | 20 | 30 | 40 | 50 |
| | NC | Smimou Barrage Imin Elhad | - | 10 | 15 | 20 | 30 |

Source: Documents provided by DPETL

Note: The bold text indicates the representative sections.

[Appendix 2: Travel Time (Elapsed Time) for the All-Target Sections (minutes)]

| Province | Route | Liaison | Baseline | Target | Actual | | |
|---|---|---|---|---|---|---|---|
| | | | 2010 | 2 years after project completion | 2020 | 2021 | 2022 |
| Al Haouz | NC | Douar Agaiouar-Amerzouart | — | 6 | 7 | 7 | 7 |
| | NC | Tidili-Tighdouine | 30 | 12 | 13 | 13 | 13 |
| | NC | Tighdouine-Ait Anzal jbel | 35 | 12 | 15 | 15 | 15 |
| | NC | Ijoukak-Ounein | 35 | 14 | 15 | 15 | 15 |
| | P2009 | Azegour-Adassil (C) | 25 | 7 | 10 | 10 | 10 |
| | P2009 | Azegour-Adassil (A) | 30 | 15 | 17 | 17 | 15 |
| | P2014 | Tamesloht - SYBA | 18 | 7 | 8 | 8 | 8 |
| | NC | OA Type dalot Oued Agoundis | 60 | 20 | 20 | 20 | 20 |
| | NC | OURIKA /S.A GHIAT | 15 | 8 | 9 | 9 | 9 |
| | P2036 | Ighil-Azgour | 70 | 37 | 40 | 40 | 40 |
| Chefchaouen | P | B.Berred-Jbel Azri | 120 | 60 | 75 | 75 | 75 |
| | **NC** | **RN2-Bni Mansour-RN16** | **170** | **85** | **100** | **100** | **100** |
| Safi | NC | RR301-RP2309 | N.A. | 10 | 10 | 10 | 10 |
| | NC | RR201 (PK42)-Ouled Bouzid | N.A. | 10 | 10 | 10 | 10 |
| | **P** | **HAD HARARA-RR204** | **N.A.** | **15** | **15** | **15** | **15** |
| | RP2302 | Labkhati -RP2306 | N.A. | 15 | 15 | 15 | 15 |
| | NC | Ras EI Ain-Sidi Ahmed | N.A. | 25 | 25 | 25 | 25 |
| | RP2325 | Barakat khail - Laamamra | N.A. | 10 | 10 | 10 | 10 |
| | RP2318 | Tnine ghiate-khmiss oulad Lhaj | N.A. | 20 | 20 | 20 | 20 |
| | RP2005 | Sidi Chiker-RR201 | N.A. | 20 | 20 | 20 | 20 |
| | NC | RR201-Dhamna | N.A. | 20 | 20 | 20 | 20 |
| | NC | Guaguen-RP2321 | N.A. | 10 | 10 | 10 | 10 |
| | NC | Guaguen-RP2321 | N.A. | 20 | 20 | 20 | 20 |
| | NC | Tlet Ighoud-Lamtahra | N.A. | 20 | 20 | 20 | 20 |
| | NC | RR201-Ouled Bouzid | N.A. | 15 | 15 | 15 | 15 |
| | NC | Douar Lamssaadia-P2323 | N.A. | 10 | 10 | 10 | 10 |
| | NC | P2321( Nga)-P2319 | N.A. | 30 | 30 | 30 | 30 |
| Settat | P | RR318-a Ouled fatima | 64 | N.A. | 43 | 43 | 43 |
| | P | Sidi rahal Chatii-RP3606 | 35 | N.A. | 24 | 24 | 24 |
| | P | Ouled said a Gdana | 20 | N.A. | 13 | 13 | 13 |
| | P | RR318 a Dar Toudi | 20 | N.A. | 13 | 13 | 13 |
| | P | Sidi rahal Chatii-RP3606 | 39 | N.A. | 26 | 26 | 26 |
| | P | Ras EI Ain a Guisser | 30 | N.A. | 20 | 20 | 20 |
| | P | Oulfa a sidi Abdellah Chrif | 20 | N.A. | 13 | 13 | 13 |
| | P | RN1 a la RP3011 | 16 | N.A. | 11 | 11 | 11 |
| | P | Sidi Hajjaj a Mgarto | 20 | N.A. | 13 | 13 | 13 |
| | **P** | **Mediouna a la RP3305** | **35** | **N.A.** | **24** | **24** | **24** |
| | P | RN9 a Tnine Toualet | 22 | N.A. | 15 | 15 | 15 |
| | P | Ain Saemi a la RP 3606 | 115 | N.A. | 77 | 77 | 77 |
| | P | SIDI BOUMEHDI-MESTOURA | 56 | N.A. | 37 | 37 | 37 |
| | **P** | **Settat-Ras ain** | **44** | **N.A.** | **29** | **29** | **29** |
| Essaouria | **NC** | **Smimou Barrage Imin Elhad** | **120** | **10** | **15** | **15** | **20** |
| | NC | Ounagha-Ait Hamou | 32 | 11 | 16 | 16 | 11 |
| | P2210 | Had dra -RR301 | 93 | 16 | 23 | 23 | 31 |
| | NC | Had dra -Ait Elhoucine | 41 | 7 | 10 | 10 | 14 |
| | P2213 | Lagdadra - Sidi Aissa Regragui | 50 | 17 | 25 | 25 | 25 |
| | NC | Takoucht - Sidi Ghanem | 127 | 21 | 32 | 32 | 32 |
| | NC | Adaghass - Adrar | 156 | 13 | 20 | 20 | 20 |
| | NC | Sidi Ishak - Sidi Ali kourati | 25 | 8 | 13 | 13 | 6 |
| | P2216 | Aeroport Essaouira - Sidi Eljazouli | 89 | 15 | 22 | 22 | 22 |
| | NC | Takoucht - Aglif | - | 7 | 11 | 11 | 7 |
| | P2216 | Sidi Eljazouli - Imintlit | 121 | 10 | 15 | 15 | 10 |
| | P2209 | Ounagha - Ait Said | 38 | 13 | 19 | 19 | 13 |
| | NC | Smimou Barrage Imin Elhad | 69 | 6 | 9 | 9 | 9 |

Source: Documents provided by DPETL

Note: The bold text indicates the representative sections.

[Appendix 3: Number of Impassable days Due to Natural Disasters for the All-Target Sections (days/year)]

| Province | Route | Liaison | Baseline | Target | Actual | | |
|---|---|---|---|---|---|---|---|
| | | | 2010 | 2 years after project completion | 2020 | 2021 | 2022 |
| Al Haouz | NC | Douar Agaiouar-Amerzouart | 360 | 0 | 3 | 3 | 3 |
| | NC | Tidili-Tighdouine | 30 | 0 | 3 | 3 | 3 |
| | NC | Tighdouine-Ait Anzal jbel | 15 | 0 | 2 | 2 | 2 |
| | NC | Ijoukak-Ounein | 20 | 0 | 0 | 0 | 0 |
| | P2009 | Azegour-Adassil (C) | 20 | 0 | 0 | 0 | 0 |
| | P2009 | Azegour-Adassil (A) | 20 | 0 | 0 | 0 | 0 |
| | P2014 | Tamesloht - SYBA | - | 0 | 0 | 0 | 0 |
| | NC | OA Type dalot Oued Agoundis | 90 | 0 | 0 | 0 | 0 |
| | NC | OURIKA /S.A GHIAT | - | 0 | 0 | 0 | 0 |
| | P2036 | Ighil-Azgour | 120 | 0 | 0 | 0 | 2 |
| Chefchaouen | P | B.Berred-Jbel Azri | - | 0 | 0 | 0 | 0 |
| | **NC** | **RN2-Bni Mansour-RN16** | **120** | **0** | **0** | **0** | **0** |
| Safi | NC | RR301-RP2309 | - | 0 | 0 | 1 | 0 |
| | NC | RR201 (PK42)-Ouled Bouzid | 30 | 0 | 0 | 0 | 0 |
| | **P** | **HAD HARARA-RR204** | **0** | **0** | **0** | **0** | **0** |
| | RP2302 | Labkhati -RP2306 | 20 | 0 | 0 | 0 | 0 |
| | NC | Ras EI Ain-Sidi Ahmed | 15 | 0 | 2 | 2 | 2 |
| | RP2325 | Barakat khail - Laamamra | 10 | 0 | 2 | 2 | 2 |
| | RP2318 | Tnine ghiate-khmiss oulad Lhaj | 15 | 0 | 0 | 0 | 0 |
| | RP2005 | Sidi Chiker-RR201 | 30 | 0 | 2 | 2 | 2 |
| | NC | RR201-Dhamna | 20 | 0 | 0 | 0 | 0 |
| | NC | Guaguen-RP2321 | 15 | 0 | 0 | 0 | 0 |
| | NC | Guaguen-RP2321 | 15 | 0 | 0 | 0 | 0 |
| | NC | Tlet Ighoud-Lamtahra | 20 | 0 | 0 | 0 | 0 |
| | NC | RR201-Ouled Bouzid | 20 | 0 | 2 | 2 | 2 |
| | NC | Douar Lamssaadia-P2323 | 20 | 0 | 3 | 3 | 3 |
| | NC | P2321( Nga)-P2319 (laaroussiyine) | 20 | 0 | 0 | 0 | 0 |
| Settat | P | RR318-a Ouled fatima | 30 | 0 | 0 | 0 | 0 |
| | P | Sidi rahal Chatii-RP3606 | 30 | 0 | 0 | 0 | - |
| | P | Ouled said a Gdana | 30 | 0 | 0 | 0 | 0 |
| | P | RR318 a Dar Toudi | 30 | 0 | 0 | 0 | 0 |
| | P | Sidi rahal Chatii-RP3606 | 30 | 0 | 0 | 0 | 0 |
| | P | Ras EI Ain a Guisser | 30 | 0 | 0 | 0 | 0 |
| | P | Oulfa a sidi Abdellah Chrif | 30 | 0 | 0 | 0 | 0 |
| | P | RN1 a la RP3011 | 30 | 0 | 0 | 0 | 0 |
| | P | Sidi Hajjaj a Mgarto | 30 | 0 | 0 | 0 | 0 |
| | **P** | **Mediouna a la RP3305** | **30** | **0** | **0** | **0** | **0** |
| | P | RN9 a Tnine Toualet | 30 | 0 | 0 | 0 | 0 |
| | P | Ain Saemi a la RP 3606 | 30 | 0 | 0 | 0 | 0 |
| | P | SIDI BOUMEHDI-MESTOURA | 30 | 0 | 0 | 0 | 0 |
| | **P** | **Settat-Ras ain** | **30** | **0** | **0** | **0** | **0** |
| Essaouria | **NC** | **Smimou Barrage Imin Elhad** | **365** | **0** | **5** | **5** | **5** |
| | NC | Ounagha-Ait Hamou | 30 | 0 | 3 | 3 | 3 |
| | P2210 | Had dra -RR301 | 30 | 0 | 3 | 3 | 3 |
| | NC | Had dra -Ait Elhoucine | 60 | 0 | 3 | 3 | 3 |
| | P2213 | Lagdadra - Sidi Aissa Regragui | 20 | 0 | 5 | 5 | 5 |
| | NC | Takoucht - Sidi Ghanem | 60 | 0 | 5 | 5 | 5 |
| | NC | Adaghass - Adrar | 30 | 0 | 3 | 3 | 3 |
| | NC | Sidi Ishak - Sidi Ali kourati | 10 | 0 | 1 | 1 | 1 |
| | P2216 | Aeroport Essaouira - Sidi Eljazouli | 10 | 0 | 2 | 2 | 2 |
| | NC | Takoucht - Aglif | 365 | 0 | 2 | 2 | 2 |
| | P2216 | Sidi Eljazouli - Imintlit | 30 | 0 | 3 | 3 | 3 |
| | P2209 | Ounagha - Ait Said | 20 | 0 | 3 | 3 | 3 |
| | NC | Smimou Barrage Imin Elhad | 60 | 0 | 3 | 3 | 3 |

Source: Documents provided by DPETL

Note: The bold text indicates the representative sections.

Republic of Iraq

FY2022 Ex-post-Evaluation Report of Japanese ODA Loan Project

"Electricity Sector Reconstruction Project"

External Evaluator: Hajime Sonoda, Global Group 21 Japan, Inc.

## 0. Summary

The "Electricity Sector Reconstruction Project" (hereinafter referred to as "the Project") was implemented to stabilize the electricity supply in the Republic of Iraq (hereinafter referred to as "Iraq") through procurement and rehabilitation of substation facilities throughout Iraq, thereby contributing to the country's economic and social reconstruction. The Project is consistent with Iraq's development plans and needs at the time of planning and ex-post evaluation, and with Japan's development cooperation policy at the time of planning. Its relevance and coherence are high as there are linkages with JICA's several emergency grant projects, ODA loan projects, and training programs in electricity sector. The output exceeded the plan with the addition of the 400 kV substation near Baghdad, and the project cost considering this increase was within the plan. However, as the project period was much longer than planned, the efficiency of the Project is moderately low. Since the Project functions as a crucial part of the Iraqi power system's substation facilities, contributing to the upkeep and improvement of electricity services, it is considered that the objectives of the Project have been largely achieved. Prolonged power outages due to severe electricity shortages that had persisted in Iraq have shown improvement in recent years, and the Project is considered to have made a certain contribution to the stabilization of the lives of citizens and the revitalization of the economy and industry. Therefore, the effectiveness and impact of the Project is high. Although financial constraints have affected the maintenance of some of the substation facilities and equipment, the overall operation and maintenance of the substation facilities and equipment of the Project are good. There are no policy, institutional, organizational, or technical issues regarding the sustainability of the Project. Therefore, the sustainability of the effects of the Project is high. In light of the above, the Project is evaluated to be highly satisfactory.

## 1. Project Description


Project location (all of Iraq)
(Source: The World Fact Book, CIA)

Newly constructed substation
(suburb of Baghdad)[1]

### 1.1 Background

Iraq, whose economy and society had been severely damaged by years of economic sanctions and conflict, had been advancing national reconstruction with the support of the international community since the end of the Iraq War in 2003. At the Donor Conference in October 2003, the Government of Japan announced its support for emergency reconstruction, as well as for medium-term reconstruction through ODA loans.

In the electric power sector, the lack of new investment and maintenance over the years and the destruction caused by fighting and looting had significantly degraded the functions of power generation, transmission, transformation, and distribution, therefore, restoration of these functions was one of the most important issues for reconstruction of the country. At that time, the power supply to civilian life and to the basic infrastructure such as water supply, hospitals, etc. remained unstable, with power outages lasting more than 10 hours a day in most areas of Iraq. It was necessary to provide support not only for power generation facilities but also for the restoration of power transmission, substation, and distribution facilities. Japan has provided support for power generation through several emergency grant aid projects since 2004, and started human resource development for the Ministry of Electricity (hereinafter referred to as "MOE") in Iraq through training by JICA, and a loan agreement for the Project to support substations was signed in January 2008.

[1] All photographs in this report were taken by the external evaluator (either himself or a local assistant) during the field survey, unless otherwise noted.

### 1.2 Project Outline

The Project aims to stabilize the electricity supply in Iraq by procuring and rehabilitating substation facilities throughout Iraq, thereby contributing to the country's economic and social reconstruction.

| | |
|---|---|
| Loan Approved Amount / Disbursed Amount | 32,590 million / 31,839 million |
| Exchange of Notes Date / Loan Agreement Signing Date | April 2007 / January 2008 |
| Terms and Conditions | Interest Rates: 0.75%<br>(0.75% for consultants)<br>Repayment: 40 years<br>(Grace period: 10 years)<br>Conditions for Procurement: General untied |
| Borrower / Executing Agency | Government of the Republic of Iraq / Ministry of Electricity (MOE) |
| Project Completion | September 2019 |
| Target Area | All of Iraq |
| Main Contractor (Over 1 billion yen) | Toyota Tsusho (Japan), Alstom Grids SAS (France), Toyota Tsusho (Japan) / Meidensha (Japan), Siemens Sanayi ve Ticaret AS (Turkey), Siemens S.P.A (Italy) / Sumitomo Corporation (Japan) |
| Main Consultant (Over 100 million yen) | TEPCO Design (Japan) |
| Related Studies (Feasibility Studies, etc.) | None |
| Related Projects | <Emergency Grant Aid><br>"Mobile Substation Improvement Plan" (2004), "Taj Gas Turbine Power Station Emergency Rehabilitation Plan" (2004), "Mosul Gas Turbine Power Station Emergency Rehabilitation Plan" (2004), "Mosul Hydroelectric Power Station Emergency Rehabilitation Plan" (2004), "Samawah Large Power Plant Construction Plan" (2005)<br><ODA Loan Projects><br>"Al-Musayeb Thermal Power Plant Rehabilitation Project" (2008-), "Deralok Hydroelectric Power Plant Construction Project" (2009-), "Al-Akkaz Thermal Power Plant Construction Project" (2009-), "Haltha Power Plant Rehabilitation Project" (2015-), "Power Sector Reconstruction Project (Phase 2)" (2015-), "Power Sector Reconstruction Project (Phase 3)" (2017-), "Fiscal Reform Development Policy Loan (II)" (2017-) |

## 2. Outline of the Evaluation Study

### 2.1 External Evaluator

Hajime Sonoda (Global Group 21 Japan, Inc.)

### 2.2 Duration of Evaluation Study

The following survey was conducted for this ex-post evaluation.

Study period: December 2022 - March 2024

Field survey: March 16 - 23, 2023

### 2.3 Constraints During the Evaluation Study

Due to the security situation in Iraq, the external evaluator made only one trip to Baghdad, and his visit was limited to MOE headquarters, the Baghdad Chamber of Commerce, and three substations in the Baghdad area. The local consultant visited five substations in and around Baghdad and Basrah to gather additional information. The substations visited accounted for less than 10% of the total number of substations and mobile substations covered by the Project. In addition, up-to-date operational data could be obtained for only one-third of the total number of transformers installed by the Project. Furthermore, it took a long time before the information available in the MOE was provided in response to the post-evaluation questionnaire, and the latest performance data for the operation and effectiveness indicators established for the Project was provided near the end of the study period. In this ex-post evaluation, the possible analysis was carried out under the above information constraints.

## 3. Results of the Evaluation (Overall Rating: A[2])

### 3.1 Relevance / Coherence (Rating: ③[3])

#### 3.1.1 Relevance (Rating: ③)

##### 3.1.1.1 Consistency with the Development Plan of Iraq

At the time of planning of the Project (2006), Iraq's National Development Plan (2005-2007) set development goals for the electricity sector, such as reducing power outage and meeting electricity demand, and positioned improving power generation capacity and increasing transmission and transformation capacity as important development issues. MOE's "Electricity Sector Development Master Plan" (2006-2015) also showed the same recognition as above.

The Integrated National Energy Strategy, prepared by the Government of Iraq in 2012 with support from the World Bank, aims to (1) increase reliability, efficiency, and

[2] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

[3] ④: Very High, ③: High, ②: Moderately Low, ①: Low

accountability of electricity service delivery; (2) reduce the financial burden on the energy sector; (3) promote private sector participation in power generation and distribution to bridge the gap between investment capital and implementation capacity (4) to improve the sector's management and performance and restructure the tariff system for a gradual transition toward full cost recovery. The following year, 2013, the Electricity Law (Decree No. 53) was enacted accordingly.

The National Development Plan (2018-2022) sets goals for the electricity sector to increase generation capacity, increase per capita electricity consumption, and improve the efficiency of the electricity system. At the time of the ex-post evaluation, the Iraqi government has been working to strengthen its electricity system, including the introduction of solar power, and importing electricity by connecting its power grid with Saudi Arabia, Kuwait, Jordan, Egypt, and other countries to compensate for electricity shortages.[4] In addition, Iraq relies on natural gas imports from Iran for much of its electricity, but imports are unstable due in part to U.S. economic sanctions, and to compensate for this, Iraq is trying to utilize associated gas obtained from oil fields.[5]

Based on the above, the Project is consistent with Iraq's development policy at the time of planning and post-evaluation.

3.1.1.2 Consistency with the Development Needs of Iraq

Much of Iraq's electricity infrastructure was destroyed during the 1991 Gulf War and the 2003 Iraq War. Iraq's power generation capacity fell from 9,300 MW before the Gulf War to 1,280 MW immediately after the Iraq War, and by June 2004, the capacity had been restored to 4,500 MW, the level before the Iraq War, through the subsequent rehabilitation works . However, the electricity infrastructure had deteriorated due to inadequate maintenance since the Gulf War, and the power transmission and distribution facilities were also failing one after another due to aging and overloading, requiring urgent repair and maintenance of the facilities. While peak demand for electricity reached 9,600 MW in 2006, power generation capacity was only 5,000 MW[6], resulting in power outages of more than 10 hours a day in most areas of the country, affecting the lives of citizens and basic infrastructure such as water supply and hospitals.

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[4] According to the following websites:
https://www.mees.com/2023/2/10/news-in-brief/kuwait-iraq-power-link-deal/d3ab4960-a953-11ed-9a37-bda361e062de
https://www.arabnews.com/node/2327481/business-economy
https://www.jordannews.jo/Section-109/News/Jordan-Iraq-electricity-connection-project-to-be-completed-by-end-of-2024-27395
https://energy-utilities.com/egypt-agrees-to-supply-700mw-of-electricity-to-news113054.html

[5] In June 2023, the government concluded a contract with the French oil company Total Energies for an oil, gas, and solar project, where the associated gas will be utilized.

[6] The total installed capacity was 11,120 MW, but more than half of it was inoperable due to aging and other factors.

Iraq's electricity shortage has not been resolved until the time of the ex-post evaluation, due to the rapid growth of electricity demand in Iraq and delays in power generation projects.[7] Peak demand reached 29,260 MW in 2020, but maximum electricity production that year remained at 19,365 MW, resulting in a supply shortfall of about 10,000 MW, equivalent to 34% of the peak demand. To compensate for this, citizens rely on expensive private diesel generation.[8] On the other hand, the Iraqi government is working to strengthen the electricity infrastructure through subsequent ODA loans and other donor projects, and power outage hours have been decreasing in recent years. While, as discussed in the effectiveness section, the substation facilities of the Project are fully utilized.

Based on the above, the Project is consistent with Iraq's development needs at the time of planning and ex-post evaluation.

#### 3.1.1.3 Appropriateness of the Project Plan and Approach

As discussed under "Effectiveness and Impacts" and "Sustainability," the Project's substation facilities are generally in good operating condition and are utilized as an important part of the power system. While there has been improvement in the long power outages due to electricity shortages power services, no visible impact on economic and social recovery was confirmed, as there still persist an average of 4-5 hours of power outages per day nationwide as of 2023.

This is mainly due to external conditions, including an increase in electricity demand that exceeded expectations at the time[9], and delays in the power generation projects due to changes in the security situation and other factors caused by the invasion of "The Islamic State of Iraq and the Levant" (hereinafter referred to as "ISIL").[10] Such changes in external conditions were not necessarily foreseeable at the time of planning the Project.

The fact that the target sites of the Project were scattered across the country (see Figure 1) was another reason why it was difficult to see the specific effects and impact of the Project. Considering the security situation in Iraq, the targets of the Project were limited to

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[7] See Table 7 and the main text in "3.3.1 Effectiveness".

[8] Country Climate and Development Report (World Bank, November 2022)

[9] For example, Iraq's National Development Plan (2013-2017) projected a peak electricity demand of 19.8 GW in 2017, when in fact it reached 25.1 GW. The Electricity Sector Development Master Plan (2006-2015), which may have been referenced during the project planning, was not available for this ex-post evaluation.

[10] ISIL, a Sunni extremist organization based in Iraq and Syria, declared its allegiance to the supreme leader of al-Qaeda in October 2004 and began its activities as "al-Qaeda in Iraq". After the death of its leader, Zarqawi, in a cleanup operation conducted by U.S. forces and Iraqi security forces, its activities temporarily stalled, but it has revitalized its activities as the "Islamic State of Iraq" by integrating several Islamic extremist organizations, and in April 2013, it announced its expansion into Syria, where the conflict is intensifying, and renamed its organization as the "Islamic State of Iraq and the Levant (ISIL)." In June 2014, ISIL invaded northern Iraq and seized control of Mosul, Iraq's second largest city, and other northern cities, and on June 29, the establishment of the Islamic State (IS) was proclaimed with Abu Bakr al-Baghdadi, the self-proclaimed "caliph (leader of all Muslims)," as its leader. Iraq's Abadi government made progress in the ISIL sweep in late 2015 by opening up major cities in provinces overrun by ISIL, and in December 2017, it declared the entire country of Iraq open.

substations where safety measures could be easily taken during construction, and selected from substations scattered across the country with high urgency, which is why the targets were scattered throughout Iraq. This was unavoidable due to the background of the formation of the Project.

As described above, there are no serious problems with the project's planning, and it cannot be said that the absence of confirmed and visibly manifested impact undermines the Project's relevance.

### 3.1.2 Coherence (Rating: ③)

#### 3.1.2.1 Consistency with Japan's ODA Policy

At the Donor Conference in October 2003, Japan announced a grant of $1.5 billion for Iraq's emergency reconstruction needs and up to $3.5 billion in ODA loans for medium-term reconstruction needs after 2005. "Support for peacebuilding" was a priority area in JICA's (then JBIC) Overseas Economic Cooperation Operations Implementation Policy (April 2005). The policy for assistance to the Middle East region targeted medium- to long-term assistance for social stability and the consolidation of peace in Iraq. Therefore, support for the reconstruction of Iraq's economic infrastructure was consistent with JICA's aid policy. Thus, the Project is consistent with Japan's development cooperation policy at the time of planning.

#### 3.1.2.2 Internal Coherence

In the Iraqi electricity sector, five emergency grant aid projects were implemented for the electricity system operated by MOE from 2004 until the start of the Project. After the Project, six ODA loan projects were implemented. Eight of these projects provided assistance for power generation, while the other three, including the Project, focused on substations.[11] Since the power system is electrically operated as an integrated unit, the Project was planned as part of MOE's overall plan, assuming that the preceding emergency grant aid projects would be implemented. Similarly, the projects after the Project were also planned on the assumption that the Project would be implemented as part of the overall plan of MOE. Therefore, the 12 projects, including the Project, are considered to be electrically operated in unison, and synergistic effects are considered to have emerged.

Since 2004, JICA has provided training for Iraq in a variety of fields; JICA records show that in the electricity sector, 270 trainees received training for an average of about one month over the 15-year period from 2004-2018. The number of trainees by theme is shown

[11] For concrete related projects, see the table (Related Projects) in "1.2 Project Outline." In the Kurdish Autonomous Region of Iraq, an electricity system other than MOE system is in operation, and JICA implemented the "Kurdish Regional Electricity Sector Reconstruction Project" (2008), an ODA loan to support this system.

in Table 1. In the transmission sub-sector, which operates substation facilities, 47 MOE officials also participated in training. According to MOE, these trainings have contributed to the planning and implementation of MOE's investment projects, including the Project, as well as their operation and maintenance.

Table 1: JICA Training in the Iraqi Electricity Sector
(2004-2018)

| Training Topics | Number of Trainees |
|---|---|
| Thermal power generation | 57 |
| Hydroelectric power generation | 23 |
| Solar power generation | 23 |
| Electric supply<br>(of which mobile substation equipment) | 47<br>(18) |
| Distribution of electricity | 20 |
| Other (training management, etc.) | 100 |
| Total | 270 |

Source: Materials provided by JICA

In addition, JICA is helping to promote energy efficiency improvements through the Fiscal Reform Development Policy Loan (II) (from 2017), a development policy loan co-financed with the World Bank, through the use of associated gas and enhanced tariff collection.

3.1.2.3 External Coherence

After the Iraq War, the United States, the United Nations Development Programme (UNDP), the United Kingdom's Department for International Development (DFID) and others provided assistance to the Iraqi electricity sector for reconstruction. JICA (then JBIC) conducted a three-year study of the Iraqi electricity sector, and in the course of that study, and in coordination with other donors, the Project was prepared. Since the electricity system is operated in an integrated manner, synergistic effects between the Project and other donor projects are considered to have emerged, but specific cases could not be confirmed.

Thus, the Project is consistent with Iraq's development plans and needs at both the planning and ex-post evaluation stages, as well as with Japan's development cooperation policy at the time of planning. Coordination and collaboration with other Japanese projects and other donor projects were also observed. Based on the above, the appropriateness and consistency of the Project are high.

### 3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

The procurement of materials and equipment for substation and distribution of electricity and the construction of facilities under the Project were carried out in a total of six contract lots at project sites throughout Iraq. The planned and implemented outputs are shown in Table 2.

Table 2: Planned and Actual Outputs

| Planned Outputs | Actual Outputs | Contract Lot |
|---|---|---|
| Rehabilitation of 132 kV mobile substation (approx. 8 transformers, 16 circuit breakers, 8 grounding transformers, etc.) | Rehabilitation of 132 kV mobile substation (8 transformers, 25 circuit breakers, 13 grounding transformers, others) | Lot 1 |
| Procurement of new 132 kV mobile substation equipment (approx. 24 units) | Procurement of new 132 kV mobile substation equipment (28 units) | |
| Procurement of transformer (approx. 15 units) | Procurement of transformer (15 units) | Lot 2 |
| New 132 kV substation (approx. 2 substations) | New 132 kV substation (2 substations) | Lot 3 |
| Rehabilitation of 33 / 11 kV substation for distribution (approx. 18 locations) | Rehabilitation of 33 / 11 kV substation for distribution (Lot 4 total 25 locations) | Lot 4 |
| Expansion of 33 / 11 kV substation for distribution (approx. 6 locations) | Expansion of 33 / 11 kV substation for distribution (Lot 4 total 25 locations) | |
| Procurement of new 33 / 11 kV mobile substation equipment (approx. 4 units) | Procurement of new 33 / 11 kV mobile substation equipment (8 units) | Lot 5 |
| (No plan) | Construction of 400 kV substation (1 substation) | Lot 6 |
| Consulting Services<br>Business plan preparation support, procurement support, construction management, training, etc. | Consulting Services<br>(As planned) | |

Source: Prepared by materials provided by JICA and MOE

Considering the unstable situation in Iraq, the Project was implemented as a sector loan consisting of multiple sub-projects to allow for flexible changes in the scope after the start of the Project. The specific scope of the Project was determined after MOE prepared an

Implementation Plan for each project site and obtained JICA's consent. The major changes from the plan at the time of the appraisal are as follows.

- After the contracts for Lot 1 through Lot 5 were concluded, Lot 6, a 400 kV substation to be built near Baghdad, was added at the proposal of MOE to use surplus funds generated by the reduction of project costs resulting from price competition. However, subsequent fluctuations in the exchange rate resulted in a shortage of ODA loan funds, and the shortage was paid for with Iraqi funds.
- In 2014, ISIL invaded northern and western Iraq and was unable to continue construction at five of the 33 / 11 kV distribution substation rehabilitation (Lot 4) sites in northern Iraq, so the target substations were changed to another five sites near Baghdad. Subsequently, mobile substation facilities procured in Lot 5 were installed in three of the five northern locations as security improved.

The Project included training of MOE staff by consultants and contractors. According to MOE, this training was highly advanced, dealing with the latest technology of the time, and was an important output that contributed to raising MOE's technical standards. The consultants conducted training mainly in Jordan (Amman) on finance and auditing (74 participants) and project management (85 participants). Contractors provided training in assembly, operation and maintenance, and repair of facilities and equipment at their home factories in Korea, Sweden, and Turkey. In total 60 participants took part in the contractor training.

Newly constructed 400 kV substation (near Baghdad)


Newly constructed 400 kV substation

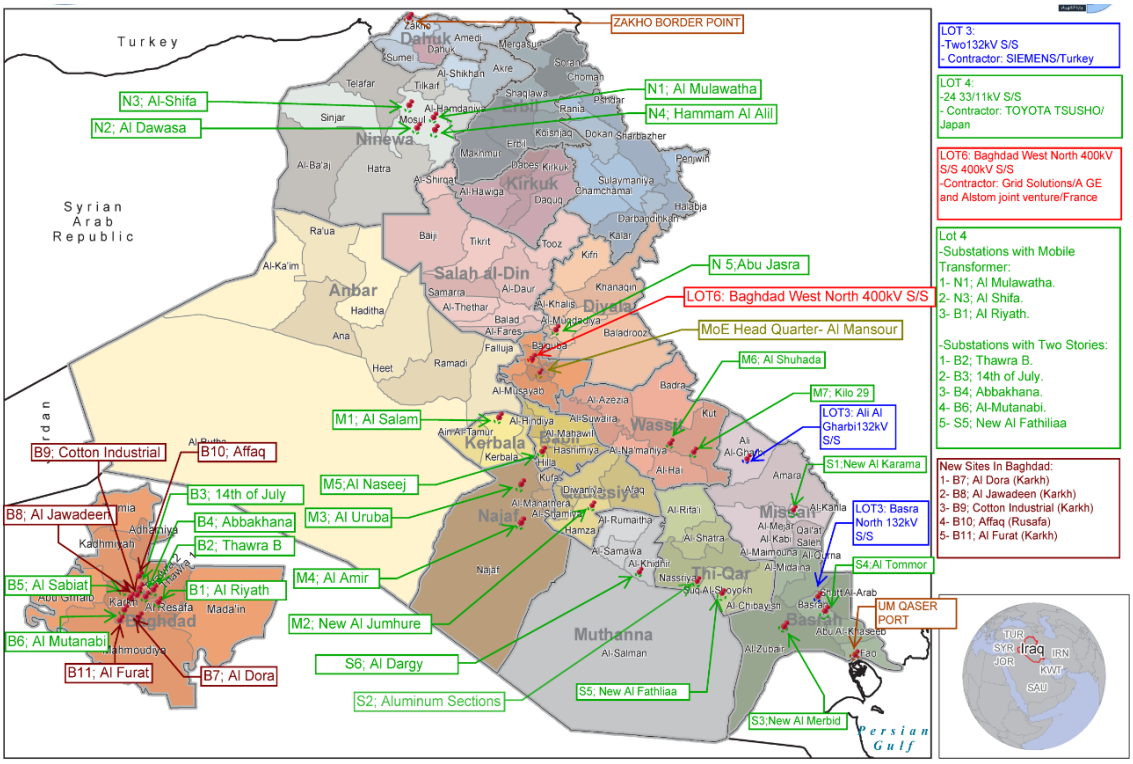
(near Baghdad; left: control unit under inspection; right: control room display)



Newly constructed 33 kV substation (in Baghdad, left: transformer, right: control unit)

Mobile substation

Spare parts provided by the Project




Source: Materials provided by MOE

Note: Blue letters indicate locations of new substations by Lot 3, green letters indicate rehabilitated and expanded substations by Lot 4, and red letters indicate locations of new 400 kV substations by Lot 6. However, four new substations in the north (N1-4) and one substation north of Baghdad (N5) were cancelled due to the ISIL invasion, and five new substations near Baghdad (brown letters: B 7-11) were added.

Figure 1: Locations of substations targeted for rehabilitation, expansion, and new construction

**<Implementation system according to the security situation in Iraq[12]>**

The consultant for the Project (a Japanese firm) set up an office in Amman, Jordan, and Japanese engineers did not enter Iraq, but used Jordanian and Iraqi consultants who had received training beforehand. MOE executives and engineers were invited to Amman on a regular basis for project supervision and problem-solving. At the time of the ISIL invasion, the route for bringing in equipment from Europe was no longer available, so the alternative route was used to bring it in from Basra in the south. Partial replacement of the target substation was also necessary. As the contractors had to shorten the period they were on site, they conducted quality control by carefully preparing before entering the site.

JICA's Japanese staff of Iraq Office had been working for project administration in

[12] Based on interviews with JICA Iraq Office Director (at the time), consultants (Japanese engineers), MOE, etc.

Iraq for a certain period of time and then leaving the country for a while, with the Iraqi staff, and the United Nations Development Programme (UNDP) with whom JICA had concluded a contract of services. However, in June 2014, when the ISIL invasion began, the Japanese staff evacuated Baghdad for about a year until April 2015, and continued project administration using a decentralized system from safe locations. They supported the implementation of the project, together with consultants, by discussing with MOE and contractors in Amman and Istanbul regarding alternative routes for materials and equipment transportation, alternative substations, and other issues.

In MOE, the deputy minister was the project manager for the Project, and the various decisions required due to changes in the security situation were made quickly at the ministerial and deputy ministerial levels, which led to quick problem solving through flexible responses.

3.2.2 Project Inputs

3.2.2.1 Project Cost

The total planned cost for the Project was 43,948 million yen (including 32,590 million yen in the ODA loan), and all costs for procurement of materials and equipment, excluding taxes on consulting services, were to be covered by the ODA loan. Although the actual cost of some items on the Iraqi side are not known, the total project cost excluding the unknown portion was 39,653 million yen (Table 3). This was 122% of the total planned project cost of 32,590 million yen for the relevant portions (procurement of materials and equipment, price escalation, contingency, consulting services, and others), or approximately 7.1 billion yen more than the planned amount. Since the excess project cost of approximately 7.1 billion yen is less than the actual project cost of approximately 8.3 billion yen for the added substation construction (Lot 6), it is judged that the actual project cost was within the planned amount, considering that the output of the Project increased from the original plan.

The addition of the substation construction (Lot 6) using surplus funds from the ODA loan expected at the exchange rate at the time, and the subsequent increase in the contract amount in foreign currency due to exchange rate fluctuations, led to the increase in project cost. When MOE proposed the addition of the substation construction (Lot 6) in September 2011, the estimated contract amount of Lot 6 was approximately 7.6 billion yen, of which approximately 6.3 billion yen was to be funded by the ODA loan and approximately 1.3 billion yen was to be funded by the Iraqi side. This plan was based on an estimate assuming a ±10% change in the exchange rate from the rate at the time, but in reality the exchange rate fluctuated much more than expected, resulting in an increase in the foreign currency

portion of the project cost.[13] As a result of the above, approximately 90% of the total amount of Lot 6, equivalent to approximately 7.9 billion yen, was ultimately borne by Iraqi funds. In addition, approximately 30% of the contract amount for procurement of materials and equipment for the Project was denominated in yen, and the rest in euros or dollars, which was similarly affected by the exchange rate fluctuation.

Table 3: Planned and Actual Project Costs

(Millions of yen)

| | Plan | | | Actual | | |
|---|---|---|---|---|---|---|
| | Total | ODA Loan | Iraqi Fund | Total | ODA Loan | Iraqi Fund |
| Procurement of materials and equipment | 22,549 | 22,549 | 0 | 34,202 | 26,346 | 7,856 |
| Price escalation | 2,159 | 2,159 | 0 | - | - | - |
| Contingency | 4,942 | 4,942 | 0 | - | - | - |
| Consulting Services | 2,394 | 2,394 | 0 | 4,655 | 4,665 | 0 |
| Administration | 5,091 | 0 | 5,091 | unknown | 0 | unknown |
| Land acquisition | 4,434 | 0 | 4,434 | unknown | 0 | unknown |
| Tax | 1,833 | 0 | 1,833 | unknown | 0 | unknown |
| Others* | 546 | 546 | 0 | 796 | 796 | 0 |
| Total | 43,948 | 32,590 | 11,358 | 39,653** | 31,807** | 7,856** |

Source: Prepared by materials provided by JICA and MOE
Notes: * Interest during construction, service charge
** Total amount excluding unknown portions
Exchange rate
Plan: $1 = 112 yen
Actual: $1 = 107.8 yen, 1 euro = 117.8 yen (average of JICA official rates from 2010 to 2019)

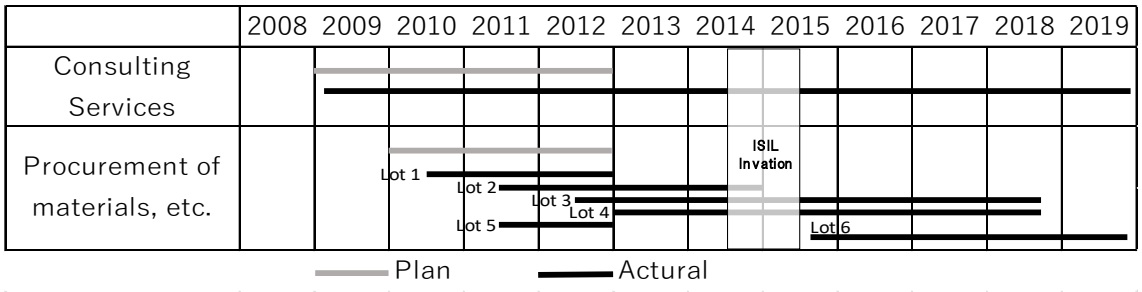
3.2.2.2 Project Period

The project was planned to be implemented over 58 months (4 years and 10 months) from the signing of the loan agreement in January 2008 to the completion of materials and equipment procurement in February 2012. In fact, the loan agreement was signed in January 2008 as planned, and the last contracted substation construction (Lot 6) was completed in September 2019, with the project duration of 141 months (243% of the plan) (see Figure 2). Even after subtracting the impact of the ISIL invasion (about 11 months) and the delay due to the addition of Lot 6 (about 5 months)[14], the actual project period was 125 months (216%

[13] Estimates were made assuming a 10% increase in the 2011 JICA cumulated rate of 85.75 yen to the dollar and 114.36 yen to the euro, but in April 2019 the rates were 110.42 yen to the dollar and 124.41 yen to the euro.
[14] Excluding the approximately 11 months in which contract execution was postponed due to the ISIL invasion from the approximately 16 months from the end of Lot 3 and 4 to the end of Lot 6, the net delay due to Lot 6 is considered to be approximately 5 months.

of the plan), which significantly exceeded the plan.[15]

Figure 2: Planned and Actual Project Period




Lot 1 and Lot 5, which procured mobile substations, were generally completed as planned, but other contract lots experienced delays due to the following reasons.

- In Lot 2, some equipment was resent from a factory outside of Japan due to damages during transportation and discrepancies with the contract specifications for the equipment.
- Lot 3 required time for MOE approval of the contractor's design drawings. In addition, implementation was interrupted by force majeure due to the ISIL invasion (June 2014 - April 2015) and it was necessary to change the route of equipment delivery from Europe to the southbound route.
- Lot 4 required time for field work (survey) and design work by the contractor. In addition, implementation was suspended due to force majeure caused by the ISIL invasion, and some of the sub-project sites and equipment transportation routes were changed.
- Lot 6 was contracted waiting the ISIL invasion to subside. Government finances deteriorated in 2016 on the back of falling oil prices and increasing security costs, and construction was temporarily suspended due to MOE's lack of funds. An armed assault on the site occurred in February 2016. In 2017, foundation construction according to geology required time for technical studies.

The implementation system for the Project took into account the security situation in Iraq, but in the event of the ISIL invasion, MOE and other related parties communicated closely with each other under various constraints, and quickly decided to change the sub-project sites and the equipment transportation route to ensure smooth implementation (for

[15] Since the period to final disbursement for the Project was set at 10 years, taking into account the unstable national situation in Iraq, no extension of the final disbursement date was necessary.

details, see "5.1 Objective Perspective").

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

At the time of planning, the internal rate of return of the project was supposed to be calculated as much as possible after the signing of the loan agreement, but it was not actually calculated. At the time of the ex-post evaluation, it was determined that the calculation could not be executed due to the unavailability of essential information required for the process.

Thus, the output exceeded the plan, and the project cost, taking into account the increased output, was within the plan, while the project period was much longer than planned. Based on the above, the efficiency of the Project is moderately low.

### 3.3 Effectiveness and Impacts[16] (Rating: ③)

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

The indicators set for the Project were "availability factor[17]" and "annual outage hours per customer".[18] As shown below, the achievement of these indicators is high.

(1) Availability Factor

The availability factor is an indicator used to evaluate whether the facility is being operated properly, and the goal is to stay within certain operational limits. In order to ensure a stable power supply, MOE normally sets a target of the availability factor at 80% or less[19].

In 2019, the year of the Project's completion, targets were achieved for the Project as a whole (Table 4). Availability factor exceeded the target for Lots 1 and 2. According to MOE, this is because the increase in substation capacity did not keep pace with the rapid increase in electricity demand in those areas, which may had overloaded the facilities of the Project. Subsequently, the overloading of Lots 1 and 2 was eliminated in 2023, and the load is now balanced throughout. It is presumed that the situation has improved due to MOE's systematic and continuous efforts in constructing and expanding substations to prevent overloading.

[16] Sub-rating for Effectiveness is to be put with consideration of Impacts.
[17] Availability Factor = Maximum load (MW) / {Rated capacity of the facility (MVA) x power factor}
[18] The indicators are for transformers newly procured and installed by the Project, and no standard values were set.
[19] Although the project completion report presents 2019 targets by contract lot (34%-88%), considering that the basis for these targets is unclear, this ex-post evaluation judged the achievement status based on the MOE's general target (80%).

Table 4: Targets and Results of Availability Factor

| Output | Availability Factor (%) | | |
|---|---|---|---|
| | Target (upper limit) | Results (Year of completion) 2019 | Results (3 years after completion) 2023 |
| Lot 1 132 kV mobile substations | 80 | 88 | 70 |
| Lot 2 400 / 132 kV transformer procurement | 80 | 89 | 69 |
| Lot 3 Construction of 132 kV substations | 80 | 25 | 72 |
| Lot 4 Rehabilitation/expansion of 33 kV substation | 80 | 42 | 71 |
| Lot 5 33 kV mobile substations | 80 | 80 | 65 |
| Lot 6 Construction of a 400 kV substation | 80 | 20 | 66 |
| Entire Project | 80 | 61 | 68 |

Source: 2019 results are based on Project Completion Report (MOE) and 2023 results are based on materials provided by MOE.
Note: Shaded figures are actual results where targets were not achieved.

Table 5: Targets and Results of Annual Outage Hours

| Output | Annual Power Outage Hours per Consumer (hr) | | |
|---|---|---|---|
| | Target (upper limit) | Results (Year of completion) 2019 | Results (3 years after completion) 2023 |
| Lot 1 132 kV mobile substations | 1,357 | 423 | 561 |
| Lot 2 400 / 132 kV transformer procurement | 804 | 955 | 1,544 |
| Lot 3 Construction of 132 kV substations | 1,316 | 734 | 784 |
| Lot 4 Rehabilitation/expansion of 33 kV substation | 5,788 | 6,732 | 1,544 |
| Lot 5 33 kV mobile substations | 5,364 | 6,984 | 1,604 |
| Lot 6 Construction of a 400 kV substation | 3,000 | 2,000 | 1,596 |
| Entire Project | 3,763 | 4,101 | 1,264 |

Source: 2019 results are based on Project Completion Report (MOE) and 2023 results are based on materials provided by MOE.
Note: Shaded figures are actual results where targets were not achieved.

(2) Annual outage hours per consumer

While some contract lots met their targets for 2019, the year of Project's completion, the Project as a whole did not, slightly exceeding the target (Table 5). Overall, each customer experienced 4,101 hours of outages per year (an average of 11.2 hours per day). However, in 2023, with the exception of Lot 2, outage hours decreased to 1,264 hours (average 3.5 hours per day) for the entire project, well below the target of 3,763 hours

(average 10.3 hours per day)[20]. Nevertheless, power outages due to electricity shortages still continues at the time of the post-evaluation. The 33 kV substations visited during the field survey are conducting rolling blackouts by disconnecting and restoring connections to the distribution grid in accordance with power supply orders.

3.3.1.2 Qualitative Effects (Other Effects)

The qualitative effect of the Project was to improve the stability of the Iraqi power system (the power system operated by MOE).

Table 5 shows the number of substations and substation capacity of the Iraqi power system, which in 2020 totaled 1,160 substations with a total installed capacity of 103,901 MVA. The substation capacity added by the Project accounts for about 6% of the total capacity and is an important part of Iraq's substation facilities. Based on the current operational status of the substation facilities from the Project (see Sustainability), it is considered that about 80% of the additional substation capacity is operating within the Iraqi electricity system and contributing to the upkeep and improvement of electricity service.

Table 6: Number of Substations and Substation Capacity of the Iraqi Power System

| Voltage Levels at Substations | 2019 | | 2020 | | Substation Capacity of the Project (% of total in 2020) (MVA) |
|---|---|---|---|---|---|
| | Number of Substations | Transformer Capacity (MVA) | Number of Substations | Transformer Capacity (MVA) | |
| 400 kV | 20 | 20,250 | 26 | 22,250 | 2,000 (9.0%) |
| 132 kV | 237 | 37,691 | 223 | 40,396 | 2,713 (6.7%) |
| 33 kV | 863 | 39,169 | 911 | 41,255 | 1,987 (4.8%) |
| Total | 1,120 | 97,110 | 1,160 | 103,901 | 6,700 (6.4%) |

Source: Prepared by the material provided by MOE.

The Project's facilities are considered to have contributed to the stabilization of electricity supply by preventing overloading of substations in the MOE's power grid and by securing spare transformers. The field inspections of the substations confirmed that the Project has resulted in the construction of new substations and expansion of existing substations to meet the increasing demand for electricity in residential, commercial, industrial facilities, and agricultural irrigation. In addition, the high-voltage (400 kV and 132 kV) substations constructed and strengthened under the Project have contributed to ensuring redundancy in the power grid based on the N-1 standard, thereby contributing to

[20] The data for 2023 was provided by MOE just before the end of the study period for the ex-post evaluation, and it was not possible to determine the reason for the increase in outage hours of Lot 2.

the stabilization of the power supply.[21] For example, the 400 kV substation on the outskirts of Baghdad, newly constructed under the Project, will serve as the starting point for a new 400 kV transmission line to southern Iraq, and is considered to contribute to ensuring redundancy in the high-voltage transmission capacity.

On the other hand, Iraq has been experiencing severe power shortages. Table 7 shows the maximum power and electricity production of the Iraqi electricity system. Total electricity production increased by 76% during the eight-year period from 2013 (70,624 GWh) to 2020 (124,190 GWh). During this period, the share of imported electricity increased significantly from 13% in 2013 (9,243 GWh / 70,624 GWh) to 31% in 2020 (38,814 GWh / 124,190 GWh), indicating a growing reliance on imported electricity. Peak electricity demand increased by 68% during the eight-year period from 2013 (17,454 MW) to 2020 (29,260 MW), but only about two-thirds of peak electricity demand was met at any time during this period. It has been noted that about one-third of the design capacity of power plants has been lost due to aging, use of low-quality fuels, and overheating of generators.[22] According to MOE, the waste of electricity due to politically suppressed low electricity prices is behind the rapid increase in electricity demand.[23] It should be noted that, according to MOE, there has been improvement in power shortages in recent years, with the annual maximum power in 2023 being 77% of peak demand.

Table 7: Maximum Power and Electricity Consumption of the Iraqi Electricity System

| | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|
| Peak Demand (MW)(a) | 17,454 | 18,653 | 21,221 | 24,020 | 25,100 | 25,650 | 27,346* | 29,260* |
| Annual Maximum Power (MW)(b) | 10,659 | 11,505 | 12,685 | 13,699 | 15,140 | 16,210 | 19,170* | 19,365* |
| Ratio (b)/(a) | 61% | 62% | 60% | 57% | 60% | 63% | 70%* | 66%* |
| Electricity Generated (GWh) | 61,381 | 67,768 | 68,688 | 80,030 | 85,508 | 82,130 | 87,900 | 85,376 |
| Imported Electricity (GWh) | 9,243 | 12,251 | 13,104 | 11,965 | 13,644 | 21,793 | 34,396 | 38,814 |
| Total Electric Energy (GWh) | 70,624 | 80,019 | 81,792 | 91,995 | 99,152 | 103,923 | 122,296 | 124,190 |

Source: MOE data, * is based on IMF data

[21] The failure of one unit out of a number (N) of facilities is called an N-1 failure, and the concept of providing redundancy in facilities so that the power supply will not be disrupted even if an N-1 failure occurs is called the "N-1 standard." This concept is widely used internationally to ensure a stable supply of electric power, and MOE is also planning its transmission system based on the N-1 standard. For example, by constructing new substations, multiple transmission routes can be secured to provide alternative routes in the event of a breakdown.

[22] Iraq Selected Issues (February 2023, IMF).

[23] See "3.4.4 Financial Aspect."

According to a hearing with the Baghdad Chamber of Commerce[24], electricity supply has not improved since 2003. No opinion was expressed that electricity service had improved. Planned power outages are mainly more frequent in the summer when demand for electricity for cooling increases. In Baghdad, power is supplied for 12-16 hours in winter and only 6-8 hours in summer. Many citizens buy expensive electricity from private local generators.[25]

On the other hand, there has been an improvement in the power supply hours in recent years. According to MOE, annual outage hours per customer in the Project have decreased significantly since 2019 (Table 5). In addition, the average hours of electricity supply in Baghdad increased from 16 hours in 2021 to 20 hours in 2023, and increases in average hours of electricity supply were realized nationwide.[26]

Thus, there is a discrepancy between the electricity users' perceptions obtained in this ex-post evaluation and the MOE data regarding the extent of improvement in electricity service.at the time of the ex-post evaluation. However, in any case, the situation could have been even worse without the Project, and the Project's contribution to the upkeep and improvement of electricity service remains unchanged.

### 3.3.2 Impacts

#### 3.3.2.1 Intended Impacts

The construction of substation facilities through the Project was expected to contribute to the country's economic and social reconstruction through the stabilization of Iraq's electricity supply.

However, as mentioned above, Iraq has been facing a constant shortage of electricity, and citizens are still dependent on expensive private diesel power generation. According to the interview at the Baghdad Chamber of Commerce, work is often interrupted when computers suddenly go down because they do not know when the power will go out. In summers, when power outages increase and there is a frequent reliance on expensive electricity from private providers, it is not uncommon for the entire family to gather in one room to endure the situation. The market in the Old City of Baghdad can also be dangerous, with fires caused by the complicated power distribution network of private power generators. Thus, electricity shortages are having a major impact on the lives of citizens. In Iraq, there are frequent demonstrations demanding, among other things, an improved electricity supply,

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[24] Founded in 1926, it is a non-governmental organization with a membership of more than 30,000 companies in Baghdad. During the field survey, a group interview was conducted in March 2023 with the chamber's executive entrepreneurs (three men and two women).

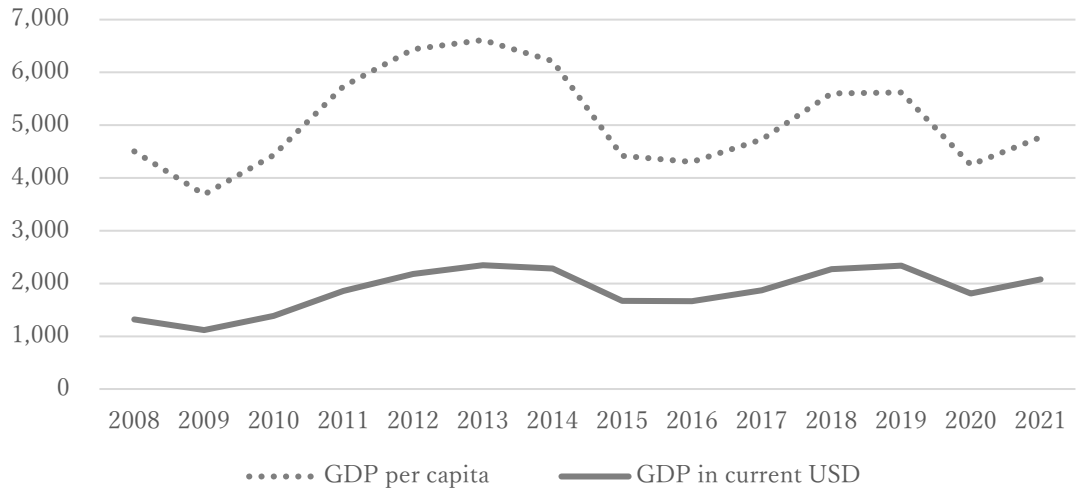
[25] According to the Baghdad Chamber of Commerce, there are about 49,000 private power generators in Iraq, each with their own diesel generators and independent distribution networks, supplying power to around 100 households.

26 This information was provided by MOE just prior to the end of the study period of this ex-post evaluation. Therefore, it was not possible to obtain the electricity users' views on this through interviews with the Baghdad Chamber of Commerce and Industry.

which had become politicized.[27]

As described above, from the interview with electricity users, no tangible impact of the Project, such as increased convenience in daily life due to reduced power outage times, improved public services, more efficient and increased production activities, and reduced use of private diesel power, has been confirmed with regard to stabilization of the lives of citizens and revitalization of the economy and industry. However, it is possible that the situation of electricity service would have been even worse without the Project, and the Project is considered to have made a certain contribution in relation to the expected impact. In addition, in northern Iraq, which was damaged by the ISIL invasion, the installation of three mobile substations is considered to have contributed to the acceleration of reconstruction through electricity supply. In the future, when electricity shortages are further alleviated, the substation facilities of the Project will be able to make a greater contribution to stabilizing the lives of citizens and revitalizing the economy and industry through the improvement of electricity services.

It should be noted that Iraq's GDP has remained at around US$200 billion for the decade since 2011, with no growth (Figure 3). Although the Project is considered to have made a certain contribution to the upkeep and improvement of electricity service, it is difficult to analyze the specific contribution to the country's economic growth.




Source: Compiled by World Bank Data

Figure 3: Iraq's GDP and GDP per capita

[27] In 2015, demonstrations calling for improved public services occurred in Baghdad and the Southern Iraq as dissatisfaction with electricity shortages built up. In 2018, demonstrations calling for improvements in electricity, water, etc., occurred mainly in Basra, the Southern Iraq. In October 2019, demonstrations calling for jobs and improved public services in government institutions and state-owned enterprises occurred in Baghdad and spread across the country. The demonstrations continued as protests demanding changes in the political system, and were suppressed after the October 2021 parliamentary elections resulting in rioting and casualties.

3.3.2.2 Other Positive and Negative Impacts

(1) Environmental impact

The Project was determined to fall under Category B because the Project did not fall into any of the sensitive sectors / characteristics and sensitive areas listed in the "JBIC Guidelines for Confirmation of Environmental and Social Considerations" (April 2002), and the undesirable environmental impacts were not considered significant. The Environmental Impact Assessment (EIA) for the project was not required to be prepared under Iraqi domestic law. Appropriate pollution prevention measures were implemented during construction in accordance with Iraqi construction guidelines and JICA Guidelines for Environmental and Social Considerations. No significant impact of the Project on the natural environment nor complaints from residents living near the facility was identified.

(2) Resettlement and land acquisition

Resettlement was not planned for the Project and was not implemented. No specific land acquisition issues were identified.

(3) Other positive and negative impacts

According to MOE, the training of MOE staff under the Project has greatly improved MOE's project management capacity. One example of this is that, in the subsequent project of the Project, MOE was able to revise the specifications and procurement of the mobile substation without the assistance of the consultant. In addition, the specifications prepared for the Project with the assistance of the consultant became MOE's standard and are now used in other substation projects. In particular, detailed specifications were obtained for the civil works and building facilities, which eliminated the frequent occurrence of civil engineering problems that had occurred in the past.

No notable impacts on gender, social systems and norms, or human rights were identified.

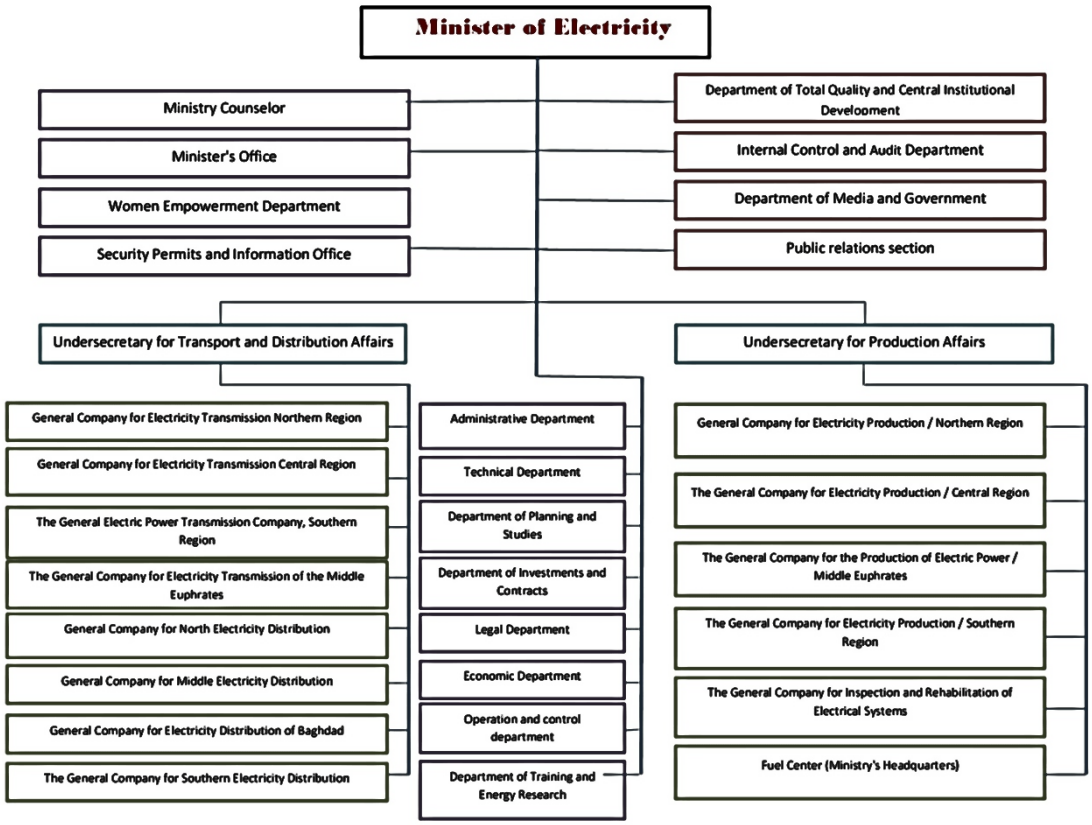
To summarize the effectiveness and impact, the Project functions as an important part of the substation facilities of the Iraqi electricity system and contributes to the upkeep and improvement of electricity service. While the problems such as long hours of power outage and dependence on private power producers persists, considering that many of the Project's facilities are being utilized and that the electricity service situation could have been even worse without the Project, it is considered that the objectives of the Project have been largely achieved. On the other hand, the Project is considered to have made a certain contribution to the stabilization of the lives of citizens and the revitalization of the economy and industry. From the above, the Project has mostly achieved its objectives. Therefore, effectiveness and

impacts of the Project are high.

### 3.4 Sustainability (Rating: ③)

#### 3.4.1 Policy and System

As discussed under "Relevance," the stabilization of electricity supply is an urgent issue in Iraq, and therefore, the utilization of existing electricity infrastructure, including the Project, is considered important, and various efforts are ongoing to compensate for electricity shortages. Therefore, there are no policy / system issues regarding the sustainability of the Project.




Source: Materials provided by MOE

Figure 4: Organization of MOE

#### 3.4.2 Institutional / Organizational Aspect

MOE is a huge organization with approximately 100,000 employees (as of 2017), including participating affiliates. In 2018, its generation, transmission, and distribution divisions were unbundled. The organizational structure at the time of the ex-post evaluation is shown in Figure 4. The transmission and distribution divisions of the MOE were separated into four regions nationwide, each under a deputy minister in charge of transmission and

distribution.

Substations are operated according to instructions communicated by telephone from the Central Load Dispatch Control Center in Baghdad and the local load dispatch control center of each transmission and distribution company. When it is necessary to shut down operations due to overload, high temperature, etc., the substations report the situation to the load dispatch center and follow the instructions. Each substation is staffed by two to six operators in three shifts, depending on the size of the substation. Larger substations are staffed by senior operators.

Each transmission company is responsible for the operation and maintenance of high-voltage (400 kV and 132 kV) substations, while each distribution company is responsible for the operation and maintenance of low-voltage (33 kV) substations that are connected to the distribution network. Maintenance engineers belonging to the maintenance section of each company visit each substation on a regular basis or as needed to perform maintenance work. Each company's maintenance section has several teams for periodic inspection and repair of facilities by type of facility, etc.

Based on the above, the organizational structure for the operation and maintenance of the substation is clear, and there are no problems with the personnel structure. There are no institutional / organizational issues regarding the sustainability of the Project.

### 3.4.3 Technical Aspect

At the time of the planning of the Project, MOE was considered to have a high level of technical expertise, with approximately 15% of the staff in the transmission and distribution departments being engineers. Training was provided by consultants and contractors to MOE staff on the operation and maintenance of the Project, and MOE highly values these trainings (see "3.2.1 Project Outputs"). In addition, as mentioned in "3.1.2.2 Internal Coherence," continuous training by JICA since 2004 is considered to have contributed to the improvement of technical capacity.

MOE has a training department that provides training on a regular basis. Participation in training is considered a condition for promotion. New employees receive one year of intensive training and on-the-job training by senior employees. Substation operators receive mainly on-the-job training. According to interviews conducted during the field survey, half of the operators were high school graduates, and the others had bachelor's degrees in science fields. Manuals and other information on the Project's facilities are kept at the office of the maintenance and management section and are referred to as necessary, but there was no opportunity to visit the office during the field survey and it was unable to confirm this.

According to the opinions of the consultant for the Project and the consultant for the subsequent project, MOE's engineers are sufficiently competent. During the field survey, it

was apparent that MOE's engineers have sufficient knowledge and experience, as evidenced by the way they have overcome equipment failures through various innovations.

Based on the above, there are no particular technical issues regarding the sustainability of the Project.

### 3.4.4 Financial Aspect

At the time of planning, the Ministry of Finance's national budget plan called for MOE to receive a budget allocation of just over 200 billion yen annually from 2007 to 2010, with no particular financial concerns regarding operation and maintenance. According to MOE, the amount of budget disbursements to MOE by the Ministry of Finance for the three-year period 2020-2022 is shown in Table 8; the allocation for 2022 amounted to 13 trillion Iraqi dinars, or 3.4% of the country's GDP (approximately 380 trillion Iraqi dinars in 2022). The MOE's electricity tariffs have been kept low due to political decisions, and the tariff structure is not profitable. In addition, power losses in the distribution network are high, theft of electricity is widespread, and the lack of an efficient collection system means that a large amount of electricity is not subject to tariff collection.[28] The above forces MOE to rely on government subsidies for much of its revenue.

Table 8: Budget Allocations (Disbursements) from the Ministry of Finance to MOE

(Million Dinars)

| | 2020 | 2021 | 2022 |
|---|---|---|---|
| Expenditures of the budget allocated to MOE Headquarters | 24,571 | 27,121 | 26,599 |
| Budget expenditures allocated to generation and transmission/distribution companies | 603,489 | 945,088 | 1,465,026 |
| Fuel import expenses | 585,500 | 2,774,346 | 6,724,346 |
| Electricity import expenses | 806,642 | 979,867 | 1,029,867 |
| Expenditures financed by revenues from electricity charges from government agencies | 546,722 | 1,266,508 | 1,263,781 |
| Cost of electricity purchased from private power companies | 1,009,183 | 2,721,112 | 2,721,112 |
| Total | 3,576,107 | 8,714,042 | 13,230,731 |

Source: Response to MOE questionnaire

[28] "White Paper, Final Report, Emergency Cells for Financial Reforms, October 2020," shows that the power loss rate in 2018 reached 58%, with nearly one-third of the losses coming from power distribution network The power loss rate reached 58% in 2018, and nearly one-third of the losses were due to power theft in the power distribution network. Electricity tariff revenues only accounted for about 15% of costs, and the shortfall was covered by budget allocations from the Ministry of Finance and borrowing from the Ministry of Petroleum and other sources.

The operation and maintenance budgets for the transmission and distribution sectors of MOE (2014-2018) are shown in Table 9. There is a significant variation from year to year, but there is an increasing trend for transmission, which is used for the maintenance of the Project's facilities. While there are no serious financial constraints on the operation and maintenance of the Project's substation facilities, there are reported situations where appropriate spare parts are not readily available in the event of breakdowns.

As mentioned above, although MOE's finances are sustained by a large subsidy from the government, it partially affects the operation and maintenance of the Project.

Table 9: Operation and Maintenance Budget for the Transmission and Distribution Sector of the MOE

(Billion Dinars)

| | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|
| Transmission | 129.7 | 60.3 | 150.3 | 319.3 |
| Distribution | 281.0 | 151.3 | 16.5 | 120.0 |

Source: Material provided by MOE (PCR)

### 3.4.5 Environmental and Social Aspect, Preventative Measures to Risks

MOE has a procedure for operators to contact the transmission and distribution companies when environmental and social concerns or safety issues arise at each substation, and to respond to them. During the field survey, it was confirmed that the operators were engaged in their work, paying attention to safety and wearing helmets. In the event that equipment is affected by fire or natural disaster, the equipment is electrically disconnected from the system and rehabilitation work is performed. However, some newly constructed substations were observed where fire alarms were not in operation. In addition, a case was reported in which a transformer was damaged by stray bullets from a tribal war, but no human casualties were reported.

### 3.4.6 Status of Operation and Maintenance

At each substation, operators perform daily cleaning and visual inspection of equipment, checking for abnormal heat generation or sparks, and report any abnormalities to the maintenance engineer for action. Once a year, or as needed, maintenance engineers visit the facility to inspect and test transformers, protective devices, batteries, and other equipment, and perform preventive maintenance. Monthly checks of the energization status and any abnormalities using a thermal imaging camera are conducted. However, it was reported that sometimes maintenance work cannot be carried out in a timely manner due to a lack of

measuring equipment necessary for inspections, etc. or due to the deteriorating security situation.

For the ex-post evaluation, information was obtained on the operational status of 45 transformers, representing about one-third of the transformers installed by the project; 37 (82%) of the 45 transformers were operational, while the remaining 8 (18%) were not. Five of the eight inoperable transformers were mobile substations, all of which had major components stolen or destroyed during the ISIL invasion. Of the other three, one was destroyed during the ISIL invasion, one had parts stolen during peacetime, and one was inoperable due to damage to the transformer coils. From the above, only two of the 45 transformers for which information was collected were out of service during peacetime operation and maintenance by MOE. Both of these transformers have been replaced by other transformers owned by MOE.

Most of the transformers installed by the Project were in good working order at the substations where field inspections were conducted (four around Baghdad and four around Basrah); one transformer was replaced with another repaired old transformer due to a transformer coil failure, but the cause of the failure could not be identified. Operators and maintenance technicians on site reported switchgear failures due to frequent on/off at the direction of the feeder command center, deterioration of capacitors and other components due to high summer temperatures, and frequent malfunctions in protective relays. Many of the failures were caused by the harsh local operating environment, but some pointed to manufacturing problems with the protective relays. Although MOE sometimes procures (imports) necessary spare parts, it is widely practiced to purchase them in the domestic market or to take parts for repair from old transformers stored in MOE's warehouse. All defects were repaired at the substations subject to field inspections, and the basic functions of the substations were maintained.

Based on the above, the status of operation and maintenance of the Project is judged to be good overall, although there are minor issues.

In summary, the operation and maintenance of the Project's substation facilities and equipment are generally in good condition, although financial constraints have affected some of the maintenance. No issues have been observed in the policy / system, institutional / organizational, or technical aspects regarding the sustainability of the Project. Therefore, the sustainability of the project effect is high.

## 4. Conclusions, Lessons Learned and Recommendations

### 4.1 Conclusion

The Project was implemented to stabilize the electricity supply in Iraq through procurement and rehabilitation of substation facilities throughout Iraq, thereby contributing to the country's economic and social reconstruction. The Project is consistent with Iraq's development plans and needs at the time of planning and ex-post evaluation, and with Japan's development cooperation policy at the time of planning. Its relevance and coherence are high as there are linkages with JICA's several emergency grant projects, ODA loan projects, and training programs in electricity sector. The output exceeded the plan with the addition of the 400 kV substation near Baghdad, and the project cost considering this increase was within the plan. However, as the project period was much longer than planned, the efficiency of the Project is moderately low. Since the Project functions as a crucial part of the Iraqi power system's substation facilities, contributing to the upkeep and improvement of electricity services, it is considered that the objectives of the Project have been largely achieved. Prolonged power outages due to severe electricity shortages that have persisted in Iraq have shown improvement in recent years, and the Project is considered to have made a certain contribution to the stabilization of the lives of citizens and the revitalization of the economy and industry. Therefore, the effectiveness and impact of the Project is high. Although financial constraints have affected the maintenance of some of the substation facilities and equipment, the overall operation and maintenance of the substation facilities and equipment of the Project are good. There are no policy, institutional, organizational, or technical issues regarding the sustainability of the Project. Therefore, the sustainability of the effects of the Project is high. In light of the above, the Project is evaluated to be highly satisfactory.

### 4.2 Recommendations

#### 4.2.1 Recommendations to the Executing Agency

MOE's financial situation, which relies heavily on the national budget allocated by the Ministry of Finance, has affected the maintenance of the Project's substation facilities. In addition, severe electricity shortages are preventing the Project from having an tangible impact. Therefore, the Government of Iraq and MOE need to revise the electricity tariff system to improve the financial sustainability of electricity, and to urgently resolve the electricity shortage by making capital investments in power generation, utilizing associated gas, and developing the international power grid.

#### 4.2.2 Recommendations to JICA

JICA should monitor and encourage the implementation of the above recommendation by the Iraqi government and MOE.

### 4.3 Lessons Learned

Support for balanced investment and demand control

Although the substation facilities of the Project are fully utilized, no tangible impact has been manifested against a backdrop of power shortages that have not improved sufficiently. The reasons for this may include delays in power generation projects due to changes in the security situation and an unexpected increase in electricity demand due to low tariff levels and other factors. These were not necessarily foreseeable at the time of planning the Project. In addition, JICA has cooperated in the power generation sector through emergency grants and ODA loans, and has also provided support for important issues such as associated gas and tariff collection. Therefore, it should be noted that the power sector requires balanced investment in power generation, transmission, and distribution while keeping demand under control, and the executing agencies and JICA need to make continuous efforts to realize this goal.

Project management in response to the security situation

Due to the security situation in Iraq, the consultants and contractors for the Project were based out of the country, and trained local consultants were used to implement the work. JICA supervised the projects through its field offices under strict security control and always looked for opportunities to meet with the executing agency officials to build sufficient trust with them. At the time of the ISIL invasion, JICA, together with the consultants and contractors, held repeated discussions with the executing agency outside of the country, and were able to quickly examine and decide on response measures. Therefore, when supervising projects in areas where the security situation is unstable, it is important to devise an appropriate project management system and to make efforts to build a relationship of trust with the executing agency officials on a regular basis.

## 5. Non-Score Criteria

### 5.1 Performance

5.1.1 Objective Perspective

Considering the security situation in Iraq, the implementation system of the Project was designed to avoid the entry of Japanese engineers of consultants and contractors into Iraq as much as possible (see box "3.2.1 Project Outputs"). On the other hand, JICA office staff made the most of the limited opportunities to build a relationship of trust with MOE and maintained a good cooperative relationship, even though their activities were restricted under strict security controls. When ISIL invaded Iraq, Japanese staff of the JICA office had to leave the country for about a year and supervise the Project from abroad, and various

measures were required, such as changing the sub-project sites in the combat area in northern and western Iraq, and changing the transporting route of materials and equipment through these areas. Through close communication, including a series of face-to-face discussions outside of Iraq (in Amman, Jordan, Istanbul, Turkey, etc.) and telephone conferences, the MOE, JICA, consultants, and contractors quickly decided on a course of action as described above and worked to ensure smooth implementation.

5.1.2 Subjective Perspective (retrospective)

The JICA office director at the time was pleased with the fact that JICA did not give up in the difficult environment, but continued to communicate with relevant parties, used wisdom and flexibility, and that everyone, including the implementing agency, consultants, and contractors, continued to look forward to the task ahead. The fact that they did not interrupt their work even during the ISIL invasion can be considered to have strengthened Japan's presence in Iraq and the relationship of trust with the Iraqi side. On the other hand, the Japanese staff involved in the Project felt frustrated by the situation in which they had no choice but to act according to the thinking of the Tokyo side, which emphasized security measures, and could not control activities in the field alone.

**5.2 Additionality** (none in particular)

(End)

**Comparison of the Original and Actual Scope of the Project**

| Item | Plan | Actual |
|---|---|---|
| 0. Output<br>Procurement of materials and equipment, etc.<br>(1) Rehabilitation of 132 kV mobile substation<br>(2) Procurement of 132 kV mobile substation equipment<br>(3) Transformer Procurement<br>(4) New 132 kV substation<br>(5) Substation rehabilitation for 33 / 11 kV distribution<br>(6) Expansion of substation for 33 / 11 kV distribution<br>(7) Procurement of 33 / 11 kV mobile substation equipment<br>(8) Construction of 400 kV substation<br>Consulting Services | (1) Approx. 8 transformers, 16 circuit breakers, 8 grounding transformers, etc.<br>(2) Approx. 24 units<br>(3) Approx. 15 units<br>(4) Approx. 2 locations<br>(5) Approx. 18 locations<br>(6) Approx. 6 locations<br>(7) Approx. 4 units<br>(8) (No plan)<br>Support for implementation plan, procurement support, construction supervision, etc. | (1) 8 transformers, 25 circuit breakers, 13 grounding transformers, others<br>(2) 28 units<br>(3) 15 units<br>(4) 2 locations<br>(5) and (6) 25 locations in total<br>(7) 8 units<br>(8) 1 location<br>As planned |
| 1. Project Period | January 2008 - February 2012 (58 months) | January 2008 - September 2019 (141 months) |
| 2. Project Cost<br>Total<br>ODA loan<br>Exchange rate | 43,948 million yen<br>32,590 million yen<br>1 USD = 112 yen (July 2009) | 39,653 million yen (Note)<br>31,807 million yen<br>1 USD = 107.8 yen<br>1 Euro = 117.8 yen<br>(2010-2019 average)<br>(Note) Total amount excluding general administrative expenses, land acquisition costs, and taxes |
| 3. Final Disbursement | July 2018 | |

Indonesia

FY2022 Ex-Post Evaluation Report of Technical Cooperation Project

"KPPIP Support Facility"

External Evaluator: Keiko Watanabe, Mitsubishi UFJ Research and Consulting Co., Ltd.

## 0. Summary

This project aimed to promote the preparation of the bankable infrastructure projects in Indonesia by establishing a management structure for a Committee for Acceleration of Priority Infrastructure Delivery (hereinafter referred to as "KPPIP") and providing support for the improvement of regulations and policies related to infrastructure development through strengthening the capacity of the KPPIP Project Management Office and related institutions. By doing so, the project intended to improve investment climate in Indonesia. The objectives of the project were consistent with the development policy and development needs in the country, and the project plan and approach were appropriate. The specific coordination was not planned with the other JICA projects nor non-JICA projects. But the project was consistent with Japan's development cooperation policy. Based on the above, the relevance and coherence of the project are high. The project purpose of promoting preparation of bankable projects was achieved. On the other hand, the extent to which this project to the overall goal of improving the investment environment in Indonesia was unclear, as there were many external factors other than this project. However, the project contributed to a certain extent to the improvement of the investment environment, as it supported the functionalization of the system to promote public-private partnership (hereinafter referred to as "PPP") projects and confirmed that problem-solving activities by the KPPIP have led to the promotion of National Strategic Projects[1]. In addition, other impacts were observed. For example, the project has enabled bilateral aid organizations such as JICA to provide support services for procurement procedures in PPP project. This has led to JICA actually providing support services for the Legok Nangka Waste to Energy Project in West Java (PPP project). Other example was that the regulation for land issues proposed for improvement in this project was formalized. Therefore, the effectiveness and impact of the project are high. The project costs exceed the plan, and the project period slightly exceeded the plan. Thus, the efficiency is moderately low. Regarding the sustainability of the project, there are some minor problems with the financial aspects, but the prospects for improvement and resolution are high, and sustainability is high.

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

[1] National Strategic Projects are large infrastructure projects designated by Presidential Decree in 2016. Initially 225 projects and 1 program were designated. It is reviewed annually, and as of the ex-post evaluation, it consists of 210 projects and 12 programs with a total size of 5,746 trillion rupiah (about ¥55.34 trillion).

## 1. Project Description


Project Location

MRT North-South Line Project promoted by the project (under construction, August 2017)
Source: KPPIP

### 1.1 Background

In Indonesia, the development of hard infrastructure has not kept pace with the country's rapid economic growth, creating a bottleneck to growth. Therefore, infrastructure development was a top priority in the Indonesian government's development plan. Against the backdrop of enormous infrastructure demand, the government had high expectations for mobilizing private-sector funds through PPPs in addition to conventional public works projects. Although the government had significantly strengthened PPP-related regulations and measures, there was a lack of track record of large-scale projects utilizing these regulations and measures, and the preparation of projects in which the private sector could invest was an issue.

Since 2010, Indonesia and Japan have been jointly promoting the Jakarta Metropolitan Area (hereinafter referred to as "MPA") Development Initiative, and the use of PPPs was planned for the implementation of priority infrastructure projects within the MPA framework. This project was to implement mainly through KPPIP, which had just been established in response to a request from the Indonesian government, as the main counterpart agency, to formulate and promote national priority projects, including MPA projects, and to promote PPP.

### 1.2 Project Outline

| | |
|---|---|
| Overall Goal | To promote priority infrastructure development including selected projects from Indonesia-Japan framework through sustainable operation of KPPIP PMO with favorable government policy, thus leading to improvement of investment climate in Indonesia. |
| Project Purpose | To accelerate sustainable operationalization of KPPIP and bankable project preparation, including selected projects from Indonesia-Japan framework. |

| | | |
|---|---|---|
| Output(s) | Output 1 | Standard procedure of KPPIP is operationalized. |
| | Output 2 | The implementing capability of the function of KPPIP PMO and others related to PMO transaction for regulatory and policy stipulation is enhanced.[2] |
| | Output 3 | The preparation for bankable projects is enhanced. |
| | Output 4 | The capability of the function of KPPIP PMO for debottlenecking problems that hinder preparation and implementation of KPPIP priority projects and selected projects from Indonesia- Japan framework is enhanced. |
| Total cost (Japanese Side) | | 1,172 million yen |
| Period of Cooperation | | May 2014–December 2019<br>(Extension period: June 2017–December 2019) |
| Target Area | | All over Indonesia |
| Implementing Agency | | The Committee for Acceleration of Priority Infrastructure Delivery (KPPIP), Coordinating Minister for Economic Affairs |
| Other Relevant Agencies/ Organizations | | PPP Unit of the Ministry of Finance, Ministry of Interior, Indonesia Investment Coordinating Board, Ministry of Agrarian Affairs and Spatial Planning/National Land Agency, Indonesia Infrastructure Guarantee Fund (IIGF), Infrastructure Financial Organizations |
| Consultant/ Organization in Japan | | None |
| Related Projects | | <Technical Cooperation><br>・ Jabodetabek MPA strategic plan: Master plan for establishing metropolitan priority area for investment and industry in Jabodetabek area in the Republic of Indonesia (2011–2012)<br>・ The Project for PPP Network Enhancement (2011–2014) |

As described in "1.1 Background," this project was initiated primarily to support the framework of the MPA program, but the MPA framework was not followed under the Jokowi administration that came into power in October 2014. However, there was no change in the government's policy of basically promoting infrastructure development, and the fact that the newly established implementing agency, KPPIP, was in charge of National Strategic Projects nationwide, did not change the need to clarify its functions and strengthen the capacity of its staff. Therefore, the basic objective of the project remained the same, but the outputs focused more on strengthening the capacity of KPPIP and related institutions, as shown in Figure 1, with the aim of promoting infrastructure investment not only in MPA projects but also in Indonesia as a whole. Therefore, the project name was changed from the original "MPA Support Facility" to "KPPIP Support Facility." This change in the PDM was formalized

[2] Japanese text of Output 2 is an intentional translation of the English text.

through the Joint Coordination Committee meeting held in October 2015 and with the exchange of minutes on December 17, 2015. This evaluation is based on the revised PDM 2.

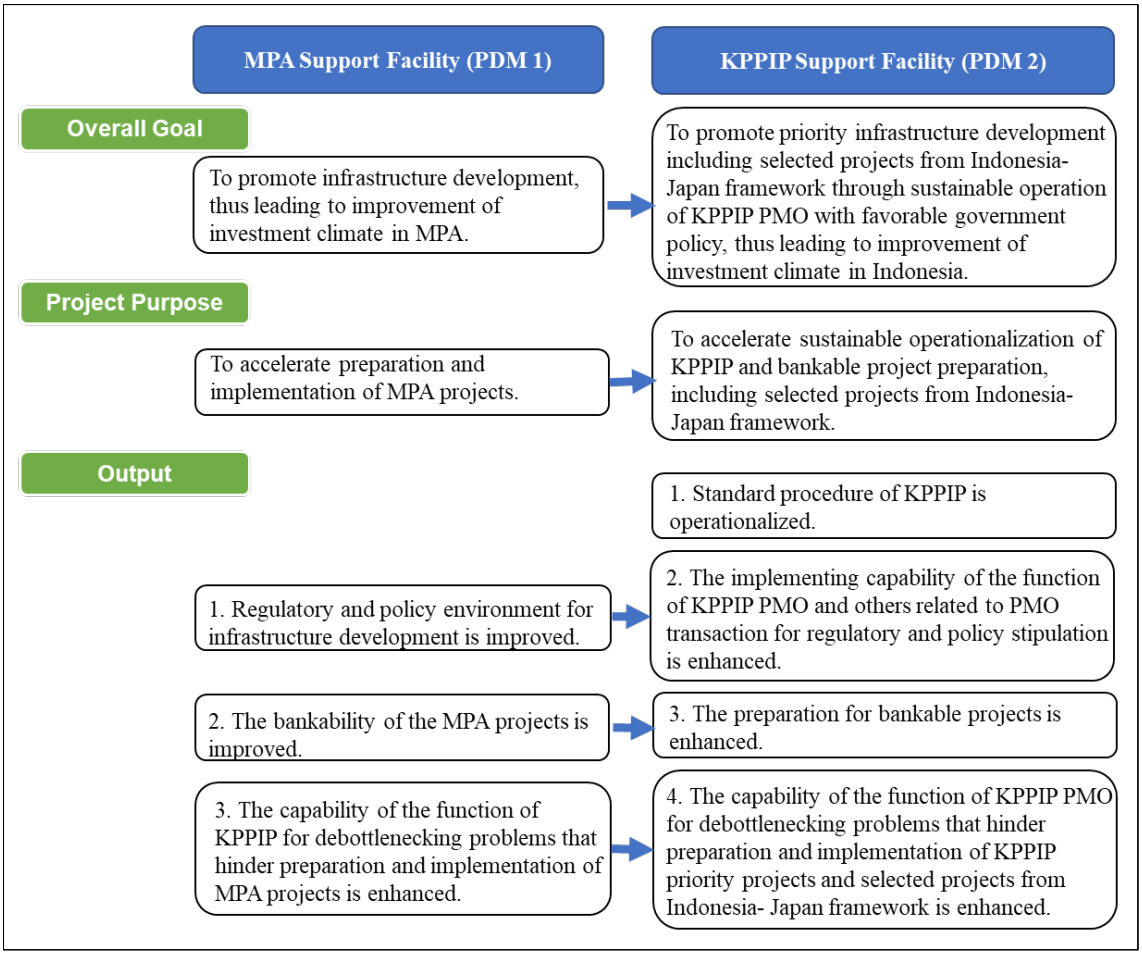
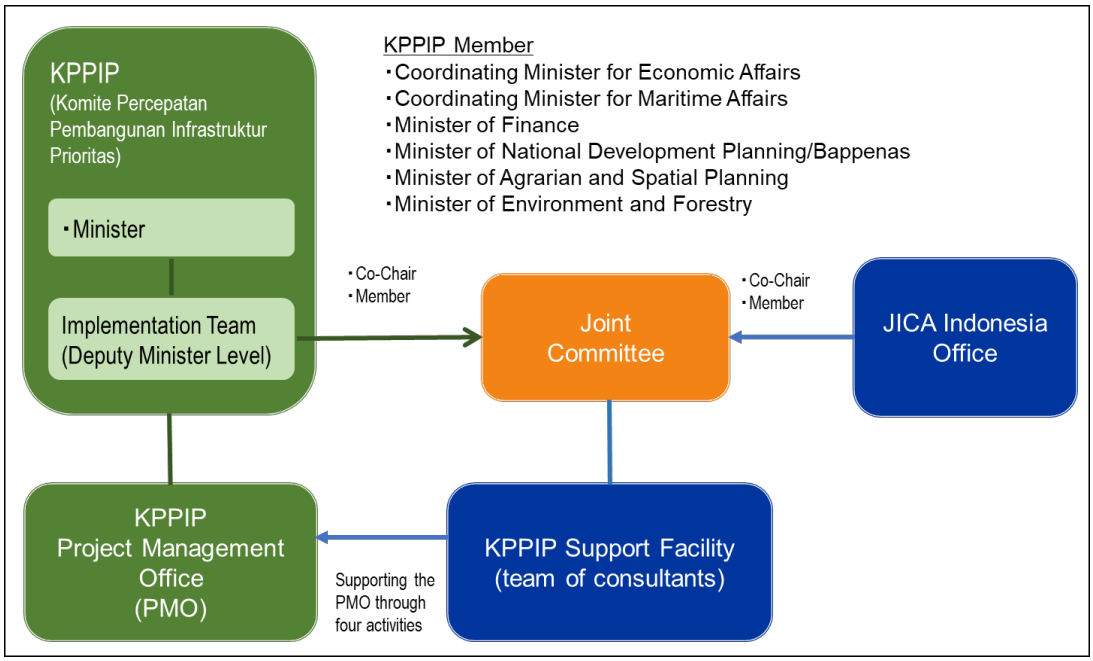



Figure 1: Transition of PDM

The implementation structure of the project is shown in Figure 2. The implementing agency, KPPIP, is a high-level decision-making body with six ministers as members, including ministers and vice-ministers. The actual implementation is handled by the Secretariat (Project Management Office (PMO)) under the jurisdiction of the Coordinating Ministry for Economic Affairs, and this project was implemented mainly by providing support to the PMO. At the same time, since infrastructure development and PPPs cover a wide range of sectors and implementing agencies, capacity strengthening was also targeted at related ministries and agencies that are members of the KPPIP.




Source: Information provided by JICA

Figure 2: Implementation Structure of the Project

## 1.3 Outline of the Terminal Evaluation

### 1.3.1 Achievement Status of Project Purpose at the Terminal Evaluation

Since priority projects were selected by KPPIP and funding arrangements were determined for almost all of them, it was judged that the indicator for the project purpose, "the number of KPPIP priority projects for which funding arrangements were determined or commenced construction works," was achieved. However, as shown in the recommendations below, there were still some issues in each output, and it was evaluated that resolving these issues would increase the likelihood of achieving the project purpose.

### 1.3.2 Achievement Status of Overall Goal at the Terminal Evaluation

(Including other impacts.)

Although challenges remained for each output to achieve the project purpose, the analysis showed that if the project purpose were achieved and more successful bankable projects were implemented, the overall goal would be achieved.

### 1.3.3 Recommendations from the Terminal Evaluation

The Terminal evaluation showed tangible results toward the project purpose and overall goal, but recommended that the need to address new needs from the Indonesia government in order to further promote infrastructure development to meet the growing demand for

infrastructure development in the country. A two-year extension from the originally planned end date of 2017 was recommended to address these new needs. The extension period was mainly used to (1) strengthen capacity for decision-making on financial schemes[3], and (2) support for the preparation of guidelines and training necessary for the application of the Availability Payment (hereinafter referred to as "AP") scheme[4], one of the main issues in promoting PPP infrastructure implementation, which had been strongly requested by the host government, (3) to introduce innovative land development methods, (4) support for the preparation for PPP projects, and (5) ongoing support for debottlenecking activities. The status of implementation is described in "3.2 Effectiveness and Impact."

## 2. Outline of the Evaluation Study

2.1 External Evaluator

Keiko Watanabe, Mitsubishi UFJ Research and Consulting Co., Ltd.

2.2 Duration of Evaluation Study

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

Duration of the Study: December, 2022–March, 2024

Duration of the Field Study: July 1-16, 2023 and September 30, 2023–October 8, 2023

## 3. Results of the Evaluation (Overall Rating: A[5])

3.1 Relevance/Coherence (Rating: ③[6])

3.1.1 Relevance (Rating: ③)

3.1.1.1 Consistency with the Development Plan of Indonesia

At the time of planning, Indonesia's *Medium-term National Development Plan* (2010–2014) had identified "infrastructure development" as a national priority development issue, and PPP was expected to accelerate infrastructure development. The *MPA Master Plan*, prepared in 2012 in collaboration between Japan and Indonesia, was positioned as a complement to the long-term and medium-term national development plans, which is the upper policy, and the major projects in the MPA framework were to be completed by 2020.

*The Medium-Term National Development Plan* (2015–2019) at the time of

[3] A financial plan for an infrastructure project developed after analyzing financial feasibility, Value for Money (value of services for money), and elements. The plan includes funding sources (public, private, PPP, ODA, etc.) and various conditions including the need for financial support such as long-term loans and guarantees, the amount and the period, and so on.

[4] Under this system, a government contracting agency promises to pay a fixed amount to a private operator in exchange for the provision of infrastructure services based on indicators set by the private company entrusted with the operation of the infrastructure based on a PPP contract.

[5] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

[6] ④: Very High, ③: High, ②: Moderately Low, ①: Low

completion, which was prepared by the new Jokowi administration, continues to focus on infrastructure development, with policies to increase international competitiveness, improve infrastructure, and reduce regional disparities.

Therefore, the project is consistent with Indonesia's development policy at the time of planning and at the time of completion.

#### 3.1.1.2 Consistency with the Development Needs of Indonesia

At the time of planning, approximately 10% of the total population (about 237.6 million (Indonesian government statistics (2010)) lived in the Jakarta metropolitan area, where 25% of GDP and 40% of foreign direct investment were concentrated. Although Indonesia boasted solid economic growth (growth rate: 6.2% (2011), 6.0% (2012)[7]), infrastructure development was not keeping pace with rapid economic growth, which was a bottleneck to further economic growth. To meet the enormous demand for infrastructure, the government had high expectations for mobilizing private-sector funds through PPPs in addition to conventional public works projects. Although the Indonesian government had established measures to implement PPPs, including a public guarantee system, a public financing system, and Viability Gap Funding (VGF)[8], there was a lack of experience with large-scale projects that took advantage of these measures. This was largely due to the lack of quality of project preparation and implementation capacity of government officials, and there was a need to strengthen this capacity.

At the time of completion, Indonesia maintained a high economic growth rate in the 5% range and continued to have high infrastructure needs. The government expected infrastructure investment demand of approximately 4,796 trillion rupiah (about 43 trillion yen[9]) over the five-year period from 2015 to 2019, and expected private investment to provide about 40% of the funds needed[10].

Based on the above, the objectives of this project, which aim to formulate and implement bankable projects that attract private financing, are consistent with the development needs of the project from the time of planning to the completion.

#### 3.1.1.3 Appropriateness of the Project Plan and Approach

Lessons were raised from the similar project implemented prior to this project that since the Indonesian government was in the midst discussion about establishing a

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[7] World Bank Open Data.

[8] A mechanism to support the establishment of PPP projects by providing partial support for construction costs from the Ministry of Finance to the private sector. It is applied to projects with high social benefits but low project profitability. (PPP Handbook of the Republic of Indonesia, JICA, May 2017 (in Japanese))

[9] Estimated by the IMF using the 2015 Indonesian rupiah and dollar average (Rp 13,389.41 per dollar) and the yen-dollar annual average (¥121.044 per dollar).

[10] "Public Private Partnership Book 2018," National Development Planning Agency.

system for infrastructure development, the project should work closely with the government, utilizing local consultants, and be flexible to match the policy as the discussions progress in the future. Taking this advantage of these lessons learned, the project has employed nine specialized local consultants. For example, the local consultant was assigned to the ministry in charge of a project that had problem in project preparation, and they worked closely with KPPIP to conduct debottlenecking activities, and the local consultants took the lead in strengthening the capacity of the staff in the ministries in charge of the project.

As described in "1.2 Project Outline," due to the change in policy by the new President, the project was shifted from promoting the preparation and implementation of MPA projects, as originally envisioned, to promoting the preparation of bankable projects by establishing an operational structure for the newly established KPPIP and strengthening the implementation capacity of relevant institutions involved in the institutional and policy framework for infrastructure development. Therefore, an output to strengthen the functioning of KPPIP (Output 1) was added and the wording of each objective was changed to promote priority projects from all of Indonesia, instead of focusing on MPA projects. The change in the PDM was made in response to a policy change on the Indonesian side and did not change the basic objective of the project, which is to promote the preparation of bankable projects. The change in the PDM was agreed upon at the October 2015 Joint Coordinating Committee meeting and decided upon in December 2015 with the exchange of minutes. In addition, following the Terminal evaluation survey conducted in December 2016, a decision was made by exchanging of minutes (February 2017) that the project period would be 2014–2019, a two-year extension of the originally planned 2014–2017 period. In April 2019, a minute was also exchanged to clearly define the period, which was set to be 2014–December 2019. Both changes were made through a formal process as described above, and the process was appropriate. Therefore, it can be concluded that the PDM changes were appropriate.

On the other hand, no quantitative targets were set for the indicators of each output and project purpose. Under the goal of improving the investment environment and promoting bankable infrastructure projects, this project had to deal with infrastructure projects in various sectors, and there were a variety of issues to be addressed. Furthermore, since the infrastructure projects handled were national priorities, it was necessary to pay attention to the trends and intentions of the government. Therefore, the project activities were based on the needs of the government at the time. It was found that because specific activities could not be envisioned at the time of planning, and because there were many external factors that could not be achieved by this project

alone, depending on the themes and projects handled, no target values for indicators were set. Although detailed activities and contents were not defined, and there were no target values in the indicators at the planning stage, it can be said that the project plan and approach were appropriate, as the project implemented flexible activities in accordance with the government's needs, and generally found to produce results compared to the plan.

3.1.2 Coherence (Rating: ②)

3.1.2.1 Consistency with Japan's ODA Policy

In the priority area of "Support for Further Economic Growth" in *the Country Assistance Policy for Indonesia* at the time of the plan (April 2012), "Infrastructure Development for Metropolitan Areas" was positioned as one of the development issues. In *the JICA Country Analysis Paper*, "Support for Further Economic Growth" was identified as a priority issue, and JICA was to provide technical assistance, including promotion of the formation and implementation of PPP projects, and to support the resolution of infrastructure shortages, particularly in the metropolitan area.

The project is consistent with the development cooperation policies of the Japanese government and JICA at the time of planning.

3.1.2.2 Internal Coherence

Internal coherence was not confirmed because specific collaboration and coordination were not envisioned in this project at the time of the ex-ante evaluation, and there were no specific synergistic effects from actual collaboration and coordination.

3.1.2.3 External Coherence

External coherence was not confirmed in this project because there were no specific plans for coordination with activities with other donors, etc., and there were no specific synergistic effects from actual collaboration and coordination.

The implementation of this project was consistent with Indonesia's development policy and development needs, and the project plan and approach were appropriate. It was also consistent with Japan's development cooperation policy. Specific collaboration with JICA's internal and external projects was not envisaged in this project at the time of the ex-ante evaluation. Also, no specific synergistic effects could be confirmed.

Therefore, its relevance and coherence are high.

3.2 Effectiveness and Impacts[11] (Rating: ③)

3.2.1 Effectiveness

3.2.1.1 Project Output

As shown below, Output 1 was generally achieved, and Outcomes 2, 3, and 4 were achieved.

(1) Output 1: Standard procedure of KPPIP is operationalized.

(Indicator 1) Key official documents such as Standard Operating Procedures (SOPs), regulations and guidelines for PMO and stakeholders of priority projects

(Indicator 2) Selection of candidate priority projects by PMO based on selection criteria

For the KPPIP, which was just established in 2014 under the Presidential Regulations, the project prepared Standard Operating Procedures for the implementation of its work and provided administrative support, starting with the hiring of PMO staff. In addition, various guidelines for the main functions of KPPIP were prepared, including selection criteria for priority infrastructure projects, checklists for reviewing preliminary study results (OBC[12]), monitoring guidelines, and guidelines that provide the analytical methods and decision-making process necessary to consider funding schemes. Staff training were also conducted. Furthermore, the selection criteria for priority projects were determined in consultation with government contracting agencies, and 37 projects were selected as KPPIP priority project that were deemed to be of particularly high priority. It was confirmed that at the time of the Terminal evaluation, the PMO had reached the point where it was operating independently while operating the guidelines. Therefore, both Indicators 1 and 2 were achieved. On the other hand, with regard to the decision-making function of the financial scheme, which is one of the most important elements for the success of infrastructure projects, the KPPIP PMO staff and the Ministry of Finance directly involved in the decision-making process were strengthened during the extension period in response to the findings of the Terminal evaluation. The prepared funding scheme guidelines have been simplified in practical terms, and training and consultations have been conducted. It can be said that basic capacity regarding the decision-making framework for funding schemes has been built through this project. However, the project did not sufficiently strengthen the capacity of the decision-making function of the funding scheme, where actual experience was limited at the time of completion. Theoretically, however, analysis of funding scheme was understood, and the basic capacity for practical application was built, as the fact that KPPIP PMO has been providing advice on funding schemes for

[11] When providing the sub-rating, Effectiveness and Impacts are to be considered together.

[12] The results of the preliminary study (Pre-F/S), which includes technical studies, financial analysis, and site and environmental assessment, are referred to as the Outline Business Case (OBC).

National Strategic Projects after the project was completed. Therefore, it was judged that Output 1 was generally achieved.

(2) Output 2: The implementing capability of the function of KPPIP PMO and others related to PMO transaction for regulatory and policy stipulation is enhanced.

(Indicator) The number of recommendations for policy and regulation improvement through workshops, training courses, and guidelines, etc.

<Recommendations and results regarding policy and regulation improvement>

With regard to AP, one of the achievements of the project was the development and implementation of the respective Ministry of Finance and Ministry of the Interior Regulations on AP, based on the technical advice of the project.

In addition, to promote the implementation of the Project Development Facility (PDF)/Transaction Advisory (TA)[13], which are implemented in the preparatory stage of PPP projects, the project made a technical proposal to Ministry of Finance for new funding sources and technical assistance mechanisms. PDF/TA has been assigned by Ministry of Finance to PT Sarana Multi Infrastrukture (Persero) (hereinafter referred to as "PT SMI"[14]), the government-affiliated infrastructure financial institution, or Indonesia Infrastructure Guarantee Fund ("IIGF"[15]), for implementation, but due to the increasing number of PPP projects and the high cost of consulting fees for PDF/TA, a new funding source and mechanism for providing PDF technical assistance were sought. It was confirmed that, partly due to the work of this project, the Ministry of Finance Regulations on PDF/TA for PPP projects have also been revised, allowing the Ministry

[13] In addition to technical studies, financial analysis such as economic and financial internal rate of return, and preliminary feasibility study (Pre-F/S) such as environmental assessment, PPP projects require advanced project formation that cannot be covered by conventional Pre-F/S, such as complex PPP scheme design (e.g., division of roles and risks between public and private sectors), government financial support and government guarantees (guarantees by IIGF to the private sector for contract performance by the government contracting agency). The Project Development Facility (PDF) refers to such project formation work or the expert itself. The output of the Pre-F/S is called the Outline Business Case (OBC), and the output of the Pre-F/S, which is completed through the PDF, is called the Financial Business Case (FBC). After forming a project in the PDF, the services to support private sector project selection and contract conclusion are called Transaction Advisory (TA). The TAs provide assistance in preparing bid documents (Pre-Qualification (PQ) and Request for Proposal (RFP)) and in managing and evaluating the bidding process during the bidding phase. After the selection of a private sector operator through the bidding process, the TA supports the conclusion of a PPP project contract and related agreements with the preferred bidder. Normally, the role of the TA ends with the conclusion of the financing agreement. (JICA (2017) "PPP Handbook for the Republic of Indonesia", mentioned above)

[14] PT SMI provides investment and financing services for PPP projects as a financial institution wholly owned by the Indonesian government; it also provides project development facility (PDF) and transaction advisory (TA) services for PPP projects (see above JICA (2017) "Handbook on PPP in the Republic of Indonesia")

[15] IIGF is a public guarantee agency established at the end of 2009, 100% funded by the Ministry of Finance of Indonesia, which provides government guarantees for PPP projects, guaranteeing the contract performance of the government contracting agency in PPP projects and promising financial guarantees on behalf of the government contracting agency in the unlikely event of default by the government contracting agency. and so on, contributing significantly to risk mitigation for the private sector (see above JICA (2017) "Handbook on PPP in the Republic of Indonesia").

of Finance to directly appoint an international agency to implement PDF/TA. In response, JICA and Ministry of Finance signed an MOU to provide PDF assistance, which led to JICA's implementation of TA for the Legok Nangka Waste to Energy Project in West Java Province as a pilot (see below under "3.2.2.2 Other Positive and Negative Impact").

Furthermore, according to KPPIP, the biggest challenge in infrastructure projects is land issues, and the advisory support on land-related regulations and policies implemented in this project proved to be beneficial. For example, in order to promote urban redevelopment around train stations based on the premise of using public transportation, the project aligned the concept of station area development, which had been defined by each of the agencies involved, for a model district and organized the roles of the agencies involved, which had been ambiguous. The KPPIP also organized issues related to proposed regulations on innovative land development, such as land rights for air and underground space utilization, vertical land consolidation, and land bank, and made proposals for their institutionalization. According to the KPPIP, these findings can now be utilized when bringing stakeholders together for consultations on land-related issues.

<Practical Training on AP>

At the request of the Ministry of Finance, practical training on AP application was provided to Ministry of Finance staff, PT SMI staff, a government-affiliated infrastructure financial institution, and IIGF staff, an infrastructure guarantee fund. Interviews with participants of each organization during the ex-post evaluation confirmed that the AP guidelines and training materials prepared by the project are still being referred to and are being used to prepare PPP projects. In addition, interviews with these related institutions indicated that the introduction of the AP scheme has promoted PPP projects, confirming the usefulness of this activity in supporting the introduction of AP. Furthermore, interviews with KPPIP, Ministry of Finance, PT SMI, and IIGF officials who participated in the training confirmed that the training in Japan, which was conducted in the early stage of this project, was very beneficial for the preparation of PPP projects in Indonesia. The interviews with the KPPIP, Ministry of Finance, PT SMI, and IIGF officials confirmed that while there were still few PPP projects in Indonesia, the actual inspection of PPP/PFI projects[16] in Japan and the exchange of opinions with the parties involved were useful in the formation of

[16] PFI: One of the representative methods of PPP. It refers to the comprehensive outsourcing of part or all of a series of processes such as planning, design, construction, maintenance, and operation of public facilities, etc., to a private operator.

subsequent PPP projects, as the participants learned that PPP projects could be implemented in social infrastructure such as hospitals, that local governments could also become the project entity, and the characteristics of project that apply the AP scheme.

The indicator for this outcome is "the number of recommendations for policy and regulation improvement through workshops, training courses, and guidelines, etc." Although no target value or specific content has been set for this output, it is judged to be an achievement because the project has flexibly responded to requests from the host government as described above and has made policy and regulation improvements that are important for promoting infrastructure development. Therefore, it can be judged that the output has been achieved.

(3) Output 3: The preparation for bankable projects is enhanced.

(Indicator) The number of projects for which OBC was reviewed and funding scheme proposed by PMO

Although no response was received on the number of proposed funding schemes at the time of completion, at least four preliminary OBC or FBC [17] reviews were conducted under the project [18], and the KPPIP PMO has begun to conduct its own supplemental studies on the OBCs. Interviews with the implementing consultant indicated that, based on the checklist developed under the project, the KPPIP PMO had determined that its capacity had been strengthened to the point where it could review the OBC or FBC, identify problems, and provide technical advice and recommendations for funding schemes. As this function was confirmed to be ongoing at the time of the ex-post evaluation, it can be said that the capacity to formulate the implementation of bankable projects has been improved, and the results are judged to be accomplished.

(4) Output 4: The capability of the function of KPPIP PMO for debottlenecking problems that hinder preparation and implementation of KPPIP priority projects and selected projects from Indonesia- Japan framework is enhanced.

(Indicator) PMO's periodical monitoring reports showing the progress of projects and debottlenecking activities for acceleration

Under the new administration, the framework for priority infrastructure projects was not a Japan-Indonesia framework, but National Strategic Projects for all of

[17] See footnote 12 above.

[18] OBC and FBC support was provided for the Jakarta Sewerage Zone 1, Medan Hospital, Bali Sports Complex, and Legok Nangka Waste to Energy Project in West Java. For the Jakarta Sewerage Zone 1 project, the OBC assisted in conducting a complementary OBC study to determine the financial scheme, and facilitated decision-making on how to fund the project with Japanese ODA loans and how to share central and local financial resources.

Indonesia set by the new administration. The project addressed priority projects within the National Strategic Projects. The priority projects under the Japan-Indonesia framework were incorporated into the National Strategic Projects. There are more than 200 national strategy projects, and KPPIP priority projects were a further narrowing down of the national strategy projects.

Under this output, guidelines for monitoring infrastructure projects and debottlenecking were developed. The project monitored actual priority projects with the KPPIP PMO, identified various impediments such as land expropriation issues, funding sources, natural and social environment, negative impacts on existing industries, asset management, and political decisions, and conducted various consultative activities with relevant agencies to resolve the issues [19]. Since the KPPIP is set up under the Presidential Regulations with the function of resolving issues that hinder the promotion of National Strategic Projects, the relevant organizations gathered to hold consultations in response of KPPIP's call. The debottlenecking activities by KPPIP PMO were not only to coordinate with relevant agencies, but also to guide the direction of solutions. Since the Terminal evaluation, the KPPIP PMO has continued to gain experience and has reached the point where it could implement issue resolution activities on its own. In an interview with the Ministry of Finance at the time of ex-post evaluation, there were comments that highly evaluated the KPPIP PMO's efforts toward the debottlenecking activities. Therefore, the output is judged as achieved.

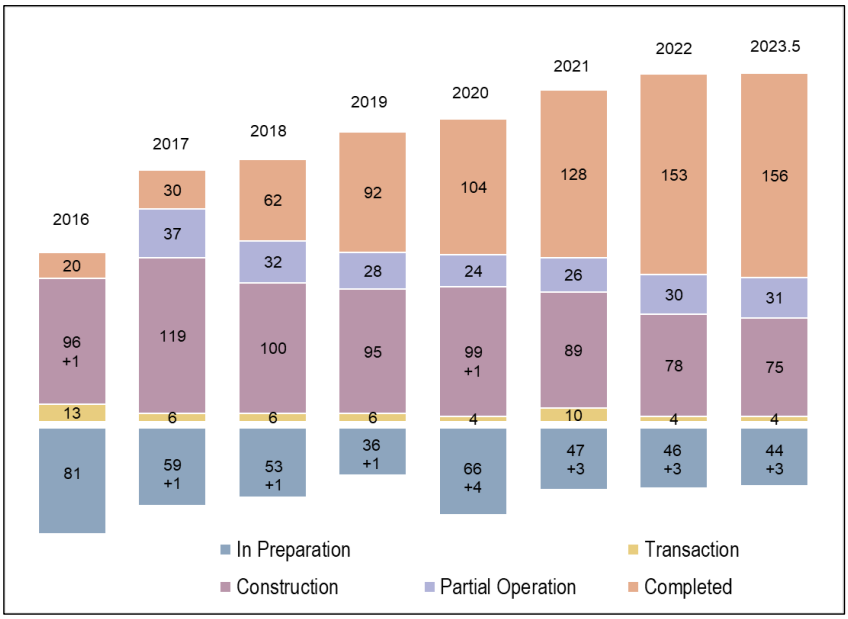
3.2.1.2 Achievement of Project Purpose

As shown in Table 1, at the time of completion, all of the KPPIP priority projects had either received funding or had begun construction. The ex-post evaluation confirmed the status of implementation of the National Strategic Projects, as the Japan-Indonesia framework was not followed. Figure 3 shows the cumulative results of National Strategic Projects up to May 2023. The target status of financial arrangement having accomplished or construction having begun refers to the stage above the "transaction" stage, where the project has been formed and has entered the bidding process. Looking at the cumulative results through 2019, when the project was completed, 221 projects (92 completed, 28 partially operation, 95 construction, and 6 transaction) correspond to approximately 85% of the total (257 projects). Therefore, the indicator can be said to have been achieved.

[19] For example, in the Patimbang International Port project, issues related to the selection of a port terminal operator and the acquisition of abstracts for backup areas and access national roads are being discussed.

Table 1: Achievement of Project Purpose

| Project Purpose | Indicator | Actual |
|---|---|---|
| To accelerate sustainable operationalization of KPPIP and bankable project preparation, including selected projects from Indonesia- Japan framework. | The number of KPPIP priority projects prepared in accordance with the key official documents mentioned in "OUTPUTS" and selected projects from Indonesia-Japan framework that accomplished financial arrangement or commenced construction works | ・As of the completion of this project, all 37 KPPIP priority projects selected under Output 1 had either made financial arrangement or had begun construction.<br>・As shown in Figure 3, by the completion of this project in 2019, 221 of the 257 National Strategy Projects (about 85%) had either been completed financial arrangement or had begun construction. |




Source: Prepared by External Evaluator based on information provided by KPPIP
Note: In preparation: project formation stage; Transaction: starting to enter the bidding stage and fulfillment of financial arrangement; Construction: construction has begun; Partial operation: construction has not been completed, but facility operation has partially begun; Completed: construction has been completed. The "+ number" in the table indicates the number of programs in which multiple projects are combined.

Figure 3: Cumulative Achievements of National Strategic Projects
(unit: Number of projects)

On the other hand, the indicator "number of priority projects that accomplished financial arrangement or commenced construction works" depends on the difficulty level, size, and form of the project, so it is not possible to judge whether bankable projects have been formed simply by the increase or decrease in the number of projects[20].

[20] As a supplementary indicator, "the number of projects for which multiple bids were submitted by short-listed firms after prequalification for bidding (the number of projects for which multiple firms submitted bids instead of one firm submitting a single bid) was considered in ex-post evaluation. However, the implementing agencies do not have information on the bidding stage, and individual inquiries to government contracting agencies and local governments are required for each project, making it difficult to obtain this information, which could not be confirmed in this survey.

In this evaluation, the number of projects for which the IIGF provided performance guarantees to government contracting agencies was confirmed as a reference. Since the IIGF guarantee is a program that guarantees the government contracting agency's contract performance to the private sector operator in PPP projects, the IIGF will provide a financial guarantee on behalf of the government contracting agency in the event that the government contracting agency defaults on its obligations. In other words, the risk is reduced for the private sector, leading to the preparation of bankable projects. As shown in Table 2, since its establishment in 2009, the IIGF had guaranteed only one project before the start of this project. However, after this project was implemented, the number of guaranteed projects has steadily increased. By 2019, when this project was completed, a cumulative total of 20 projects have been guaranteed. The IIGF staff indicated that this project has deepened their understanding of PPPs and provided them with know-how on how to apply new schemes for Indonesia, such as the AP scheme, which has led to the promotion of PPP projects. As of May 2023, a total of 32 projects have been guaranteed, of which 10 projects have applied the AP scheme, confirming that the project has contributed to the formation of bankable projects.

Table 2: Guarantees provided by IIGF (unit: Number of cases)

| | 2011 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | May 2023 |
|---|---|---|---|---|---|---|---|---|---|
| New Guaranteed Projects | 1 | 8 | 6 | 2 | 3 | 4 | 4 | 3 | 1 |
| Cumulative Total | 1 | 9 | 15 | 17 | 20 | 24 | 28 | 31 | 32 |

Source: Interview with IIGF

In light of the above, the project achieved its purpose.

### 3.2.2 Impacts

#### 3.2.2.1 Achievement of Overall Goal

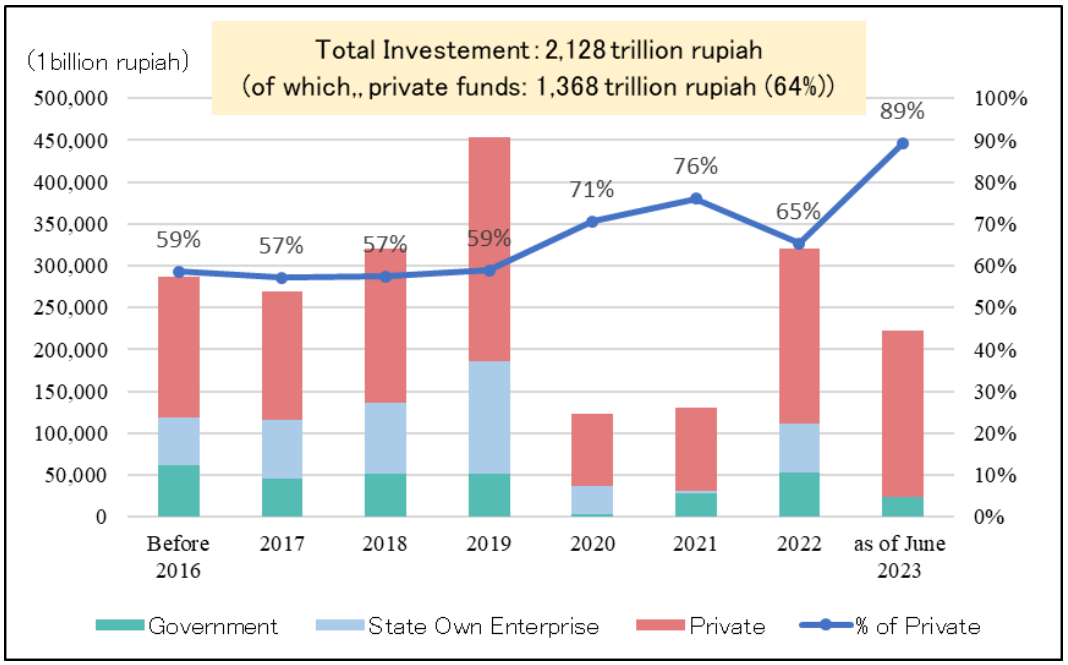
The three indicators set as overall goal were (1) “realization of priority infrastructure projects,” (2) “sustainable operation of the KPPIP PMO,” and (3) “increase in domestic and foreign direct investment in Indonesia and the Jakarta metropolitan area. Indicator (2) is confirmed in “Sustainability” below. Since there are many external factors other than the Project with respect to Indicator (3), and it is difficult to determine the status of achievement of overall goal, supplementary indicators were established as Indicators 2 and 3, as shown in Table 3 and confirmed them. In addition, indicators at the bidding stage, such as the number of unsuccessful or failed bids for priority projects and the number of projects for which multiple firms submitted bids, were also considered in the same manner as the project purpose. However, since the implementing agencies did not

have this information and it was difficult to obtain it. Therefore, the achievement level of overall goal was examined based on the following three indicators.

Table 3: Achievement of Overall Goal

| Overall Goal | Indicator | Actual |
|---|---|---|
| To promote priority infrastructure development including selected projects from Indonesia-Japan framework through sustainable operation of KPPIP PMO with favorable government policy, thus leading to improvement of investment climate in Indonesia. | 1. (PDM Indicator) Realization of priority infrastructure development projects<br><br>*The implementation consultant confirmed that "realized" does not mean the number of construction completions, but rather that the project has been formed into a bid-ready status. In other words, a project is "realized" when it enters the "transaction" stage shown in Figure 3. Therefore, this indicator was confirmed from information provided by the implementing agencies on the progress of national strategy projects. | ・ As of the ex-post evaluation, the National Strategic Projects consisted of 210 projects and 12 programs, and as shown in Figure 3, 156 projects had been completed as of May 2023 (74% of the total number of projects).<br>・ Projects newly identified as National Strategic Projects through the annual selection process are added to the "Preparation" phase shown in Figure 3. From there, they enter the bidding phase (transaction phase) after technical and financial studies and financial schemes are reviewed by KPPIP and related agencies. As shown in Figure 3, the number of projects in the preparation phase has not stagnated except for 2020, the year of the new coronavirus diseases pandemic, and has remained at a certain number. Since National Strategic Projects are added every year, the realization of projects (entering the bidding-ready stage) is considered to be facilitated to some extent. |
| | 2. (Supplementary Indicator) Percentage of private funds invested in the development of priority infrastructure projects. | ・ As shown in Figure 4, the amount of private-sector funds invested in priority infrastructure projects has been steadily increasing, amounting to 1,368 trillion rupiah (about 13.2 trillion yen) as of June 2023, or about 64% of the total amount of funds.<br>・ The percentage of private-sector funds is on the rise and is expected to continue to grow.<br>・ Although the increase in private-sector funding is not the result of this project alone, as described above under "Effectiveness," the regulation and policy support for project preparation and the capacity of the parties involved have been strengthened through this project. Thus, it is judged that the project has contributed to a certain extent. |
| | 3.(Supplementary Indicator) Opinions on the effects of improvement in the infrastructure investment environment from the viewpoint of related private companies.<br><br>(Interviews with 4 Japanese companies and 1 major Indonesian company implementing PPP (5 companies in total), ( ) | ・ Regulations and system regarding infrastructure development/PPP have improved over the past 10 years. (5 companies)<br>・ The establishment of IIGF has led to a greater number of PPPs and improved access to government finance. (1 Indonesian company)<br>・ The project has been recognized since its implementation, and it was believed that the project has played a role in improving the PPP regulations and policies. It is especially useful that various PPP promotion schemes such as AP and Viability Gap Funding Scheme, which were |

| | | |
|---|---|---|
| | number of responded companies) | supported by this project, have started functioning. (3 companies)<br>• The Legok Nangka Waste to Energy project in West Java, which incorporated the AP scheme and for which JICA conducted the TA, is attracting attention as Japanese company with high expectations. (4 companies)<br>• KPPIP has provided technical advice and assistance in obtaining business licenses, planning to obtain government guarantees, coordination with relevant agencies, land acquisition issues, and funding, which have facilitated PPP projects. In particular, KPPIP's coordination and debottlenecking functions have made a big difference with regard to land issues, which had been a factor in the stagnation of PPP projects (1 company). |




Source: Prepared by External Evaluator based on information provided by KPPIP

Figure 4: Percentage of Funds Invested in the Development of Priority Projects and National Strategic Projects

As shown in the achievement status of the above indicators, the National Strategic Projects are progressing and the share of private financing is increasing to a certain extent. It was confirmed that the project has strengthened the capacity of KPPIP, the Ministry of Finance, and institutions related to infrastructure finance to implement schemes to promote PPP projects, such as AP and Viability Gap Funding, and has facilitated the formation of bankable projects. In addition, private companies interviewed confirmed that KPPIP's ability to coordinate with relevant organizations and resolve issues that

cause stagnation, such as land acquisition issues, has contributed to the promotion of projects. Although there are many factors other than this project that contributed to the improvement of the investment environment in Indonesia, as mentioned by the private companies, this project is considered to have made a certain contribution to the improvement of the investment environment in Indonesia by improving the implementation capacity of KPPIP and related government organizations in PPP-related regulations. Based on the above, the project has mostly achieved its overall goal.

3.2.2.2 Other Positive and Negative Impacts

1) Impacts on the Environment

The project was classified as Category C based on the *JICA Guidelines for Environmental and Social Considerations* (April 2010), as it was judged to have minimal undesirable effects on the environment. No negative impacts were confirmed by the implementing agency and the implementing consultant.

2) Resettlement and Land Acquisition

No resettlement or land acquisition has occurred as a result of this project.

3) Gender Equality, Marginalized People, Social Systems and Norms, Human Well-being and Human Rights, and Unintended/Intended Positive/Negative Impacts

<Expansion of organizations eligible for implementation in procurement support services for government contracting agency (TA Services)>

As mentioned above in Output 2, the regulation of Ministry of Finance on PDF was revised from the efforts made by the project, and international agencies were now able to implement PDF/TA. The project consulted with the National Property Risk Management Bureau of the Ministry of Finance to confirm that bilateral aid agencies such as JICA can also implement PDF and TA. As a result, in the Legok Nangka Waste to Energy Project (PPP Project) in West Java, JICA, in cooperation with the International Finance Corporation (IFC) of the World Bank Group, was to conduct TA work to assist the Indonesian government on a series of procurement procedures including bidding operations (preparation of bidding documents, bid evaluation, etc.) for the selection of a waste power generator (private company), negotiations with the selected waste power generator[21]. In fact, the project was awarded to a consortium of Japanese firms in August 2023. This is the first time in the world for JICA to provide TA to a government agency in a PPP project, and this is considered to be a significant impact of the project. This is

[21] https://www.jica.go.jp/Resource/press/2019/20190924_10.html

one of the impacts of the PPP project. The Japanese firms interviewed were more hopeful that JICA's implementation of TA would provide them with the confidence that, for example, conditions would not change during the bidding process, and that this would encourage Japanese firms to participate in PPP projects in the future. TA operations had previously been appointed by the Ministry of Finance to PT SMI, IIGF, and other organizations, but the creation of an example of actual implementation by a bilateral aid organization such as JICA has expanded eligible organizations that can conduct TA operations. This was one of the impacts in advancing the PPP projects.

<Formalization of land-related policies and regulations proposed for improvement in this project>

The project has provided advisory support and made technical proposals to improve regulations and policies related to land that were important for infrastructure development projects, and these have been formalized. Under Output 2, the project provided support for institutionalization for innovative land solutions to promote urban infrastructure and urban environment improvement, held policy discussions with relevant organizations on issues and details to be stipulated in the regulations related to land rights for air and underground space utilization, vertical land consolidation, and land bank, and made proposals for institutional improvement. Based on these proposals, for example, detailed government regulation for Omnibus Law[22] on "Right to Manage, Land Rights, Multi-story Housing Units, and Land Registration" (No. 18/2021) was made with regard to air and underground space utilization rights. As for the Land Bank, the government regulation on the "Land Bank Agency" was issued by the detailed regulation of the Omnibus Law (No. 64/2021), and in December 2021, the Land Bank Agency was established with the authority to use land for public purposes such as national development and agrarian land reform. The Regulation on Land Consolidation was issued in October 2019 as Regulation No. 12/2019 of the Ministry of Land and Spatial Planning/State Land Agency. Furthermore, as the issue of "lost land" (land that is no longer functional due to natural phenomena) is an obstacle to infrastructure development, KPPIP proposed to amend the existing Presidential Regulation (No. 52/2022) in order to resolve issues related to land compensation, which was amended in 2023 (No. 27/2023)[23]. Thus, it was confirmed that the KPPIP PMO has made use of its know-how regarding proposals, consultation details, and institutional amendments made by the project.

[22] The Law on Job Creation to improve the investment environment. This law is aims to attract foreign and domestic investment, create new jobs and stimulate the economy by simplifying the procedures and harmonizing various laws and regulations into one after reviewing various existing laws and regulations related to investment and business.

[23] Addressing the social impacts of communities on land identified as destroyed in development for the public good."

Based on the above, the promotion of project formation of bankable projects, which was set as the project purpose, was achieved through the implementation of this project. In addition, while there are other external factors on the overall goal of promoting priority infrastructure projects and improving the investment environment in Indonesia, a certain contribution from the project has been confirmed. Thus, the effects of the project have been realized. Other impacts were observed such as that the project's efforts led to legal reform, which expanded the scope of TA operations to international agencies, including bilateral aid agencies such as JICA, and that regulations for land issues, which had been proposed for improvement were formalized. Therefore, the effectiveness and impact of the project are high, as the effects of the project have generally been realized as planned.

3.3 Efficiency (Rating: ②)

3.3.1 Inputs

Table 4: Plan and Actual of Inputs

| Inputs | Plan | Actual (At the Completion) |
|---|---|---|
| (1) Experts | • Long-Term: No. of person not specified (33 MM)<br>• Short-Term: No. of person/MM not specified | • Long-Term: Total 2 persons<br>• Short-Term: Total 21 persons (86 MM) |
| (2) Trainees received | N/A | 3 times (33 persons) |
| (3) Equipment | Vehicle, Office Equipment | PC, Copy machines and other office equipment |
| (4) Domestic Training | N/A | Total 1,158 persons |
| Japanese Side Total Project Cost | Total 880 million yen | Total 1,172 million yen |
| Indonesian Side Total Project Cost | N/A | N/A |

* MM stands for man month.
Source: Information provided by JICA

3.3.1.1 Elements of Inputs

In addition to Table 4 above, as mentioned above under “Appropriateness of the Project Plan and Approach” the project hired nine local consultants with experience in preparatory studies and implementation support work for PPPs and infrastructure development. They contributed to the smooth implementation of the project by assigning them to the ministries in charge of project formation and other issues that needed to be resolved, conducting regulation surveys and close communication with various related

ministries, and preparing highly complete documents in both English and Indonesian.

3.3.1.2 Project Cost

Project costs exceeded the plan with actual expenses of 1,172 million yen (133% of plan) compared to the planned 880 million yen. The reason for exceeded cost was due to the increased input of experts to strengthen the consolidation of results during the extended period and to respond to the strong request from the Indonesian government for AP implementation support and improvement of land-related policies.

3.3.1.3 Project Period

The project period was planned for 36 months (May 2014–April 2017), while the actual period was 68 months (May 2014–December 2019). As mentioned above, the change of president during the start-up phase of the project caused a delay in the launch of KPPIP, the implementing agency, and the project needed to support KPPIP from the establishment of its management structure, and it was necessary to change the scope of the project from supporting the MPA concept to promoting National Strategic Projects in Indonesia as a whole. The change in scope was agreed upon by both parties and implemented in December 2015 through a formal process. In the Terminal evaluation conducted in December 2016, the project was proposed to be extended for two years beyond the initial period, based on the need to address emerging needs for promoting infrastructure development, including the formulation of guidelines for functionalizing the AP scheme and human resource development for related institutions, in response to the growing demand for infrastructure development in Indonesia. The extension was formalized in February 2017 with the agreement of both parties. The functionalization of the AP scheme, which was added as an activity under Output 2, was a necessary activity to ensure the achievement of the project purpose. Since the extension has confirmed the realization of the effects, it can be concluded that the extension was appropriate. Therefore, the period for which the extended two-year period was added was used as the planned value (60 months: May 2014–April 2019) and compared to the actual value of 68 months (May 2014–December 2019). The result was 113% of the planned value, and the project period was slightly exceeded the plan.

Therefore, efficiency of the project is moderately low.

### 3.4 Sustainability (Rating: ③)

#### 3.4.1 Policy and System

In the *Medium-term National Development Plan* (2020–2024) in effect at the time of the ex-post evaluation, infrastructure development continues to be a key issue for promoting economic growth and reducing the economic disparity between East and West Indonesia. At the same time, the plan emphasizes the promotion of infrastructure development through PPPs within the limited government budget. Furthermore, the National Strategic Projects proposed by President Jokowi are targeted to be completed by 2024, the end of his term. The importance of KPPIP's role in promoting National Strategic Projects will continue. Based on the interviews with the implementing agencies, it is expected that the KPPIP will continue to function, since the National Strategic Projects are expected to be implemented after 2024 and infrastructure development will continue to be an important issue in Indonesia. Therefore, no major policy or system aspects related to this project were found.

#### 3.4.2 Institutional/Organizational Aspect

The KPPIP is a body established by Presidential Decree (75/2014) of 2014 as a formal organization with the objective of becoming a coordinating body for the decision-making process in order to facilitate the resolution of challenges arising from the lack of effective coordination among the parties involved. In particular, it will serve as a point of contact to facilitate coordination in efforts to resolve issues in National Strategic Projects. The main functions of the KPPIP are (1) to establish the standard quality of pre-feasibility studies and review pre-feasibility study results, (2) to select and determine priority projects, (3) to determine funding schemes for priority projects, (4) to conduct monitoring and debottlenecking activities, (5) to determine strategies and policies to accelerate infrastructure development, and (6) to facilitate capacity building required for priority infrastructure development. At the time of the ex-post evaluation, there was no change in the functions of the KPPIP.

The KPPIP PMO is under the jurisdiction of the Coordinating Ministry for Economic Affairs, and at the time of the ex-post evaluation, the KPPIP PMO had 66 staff members, of which 40 were technical staff members, excluding general affairs, etc. Of the 40, 27 were government employees who belong to the Coordinating Ministry for Economic Affairs and are under the concurrent jurisdiction of the KPPIP PMO. There were 13 contract employees with infrastructure-related skills. Compared to when it was first established, the number of contract employees with specialized skills, which used to be around 30, has decreased due to the decrease in the budget. As a result, there have been some changes in the content of implementation, such as the limited implementation of

capacity building through training for implementing agencies and local governments, especially for the infrastructure projects mentioned in (6) above. However, there were no major problems caused by the shortage of staff.

As the main institutions implementing PPPs, the PPP Unit of the Ministry of Finance had 48 staff, the IIGF had about 150 staff, and PT SMI had 360 staff (17 in charge of PPPs). The KPPIP PMO has confirmed that the KPPIP member agencies (Ministry of Investment, National Development Planning Agency's PPP Department, etc.) have not experienced any problems due to insufficient number of staff in carrying out PPP-related tasks. Compared to the time of planning, there was no significant difference in the number of staff in these organizations, and no problem was found in promoting PPP implementation due to insufficient number of staff.

Based on the above, as an organization to promote bankable projects, there were no problems in the organization of not only KPPIP but also related institutions such as the Ministry of Finance, IIGF, and PT SMI, whose capacity was strengthened through this project, and no issues were found in their institutional/organizational aspects.

### 3.4.3 Technical Aspect

KPPIP has contract employees from the private sector with expertise and experience in PPP and infrastructure development. They have experience working for private financial institutions and private infrastructure engineering, and have a sufficient level of technical expertise to promote PPPs. In addition, KPPIP hires outside experts when it is necessary to use technologies that are not available within KPPIP. These staff members are performing the major functions of KPPIP as described above, and no technical issues were found. In addition, technical support has been provided by the World Bank and the Australian government, which are available for consultation on technical matters[24]. On the other hand, contract employees with professional skills, who account for about 30% of the staff, are on one-year contracts. One of the issues for improvement in terms of technical sustainability and establishment of organizational capacity is to put them on long-term contracts, and in the future, government employees should be responsible for the technical skills, such as monitoring priority projects and debottlenecking activities.

Many of the staff members of the Ministry of Finance and infrastructure finance institutions targeted for capacity strengthening under the project were still involved in PPPs and infrastructure development at the time of the ex-post evaluation, and the skills they

[24] KPPIP is receiving technical assistance under the Australian "Indonesia-Australia Partnership for Infrastructure (KIAT)". KIAT is an Indonesia-Australia partnership aimed at supporting sustainable and inclusive economic growth through improved access to infrastructure for all. It has a budget of A$300 million over 10 years starting in 2016 to provide technical assistance to improve infrastructure policy, planning, and implementation. (https://www.dfat.gov.au/sites/default/files/indonesia-australia-partnership-infrastructure-kiat-phase-1-mid-term-review_0.pdf)

had acquired, including implementation of the AP scheme and infrastructure finance analysis, were still being used. Therefore, no major technical issues were found.

3.4.4 Financial Aspect

The budget of KPPIP, the implementing agency, is shown in Table 5, and the budget of KPPIP is allocated by the Coordinating Ministry for Economic Affairs, which has jurisdiction over KPPIP. The budget has been cut by about half since 2020, mainly due to the impact of COVID-19. In Indonesia, all government agencies have had their budgets cut to combat the new coronavirus infection. In addition, according to KPPIP, this is due to an increase in the number of organizations under the Coordinating Ministry for the Economic Affairs, which allocates budgets. In fact, the number of affiliated organizations increased from 10 in 2019 to 45 in 2023, confirming that the increase in the number of allocations within the limited budget was also a factor in the decrease in KPPIP's budget. However, among the existing 45 organizations, KPPIP has the third largest budget allocation, indicating that it is considered important among the Coordinating Ministry for Economic Affairs.

Table 5: KPPIP Budget Trends

(Unit: billion rupiah)

| Year | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|
| Budget | 40 | 30.35 | 15.46 | 15.33 | 15.69 | 16.03 |

Source: Questionnaire responses from KPPIP

Due to the reduced budget, the OBC supplemental survey, which had been conducted as part of capacity building during the project, was not conducted. On the other hand, the OBC supplemental survey should not necessarily be conducted by KPPIP. It is commissioned by government contracting agency through the Ministry of Finance to PT SMI or IIGF, or by outsourcing to outside parties. Therefore, this did not cause any delay in the preparation of infrastructure projects. KPPIP is conducting OBC and FBC reviews, monitoring of projects, and debottlenecking activities within a limited budget. In addition to this, as mentioned above in section “3.4.2 Organization and Structure,” the implementation of capacity building through training for implementing agencies and local governments for infrastructure projects was limited due to budget decreases. Thus, compared to during the implementation of this project, there were some activities that could no longer be implemented due to the reduced budget. The KPPIP functions in coordination with other related agencies and has maintained a certain budget size in recent years, but some minor problems have been observed.

From the PPP-related departments of the Ministry of Finance, it was confirmed that that there are no major problems with the Ministry of Finance budget needed to realize the PPP projects. For example, as shown in Table 6, the Ministry of Finance injects a certain amount of PDF implementation costs to PT SMI and IIGF each year. Costs for IIGF have been increasing each year. Costs for PT SMI have decreased during COVID-19 pandemic, but certain capital injections were confirmed. Interviews with PT SMI and IIGF confirmed that no financial challenges have arisen.

Therefore, although there are some minor problems in KPPIP's budget, it is being coordinated with other relevant agencies and has high prospects for improvement and resolution.

Table 6: PDF Implementation Costs from Ministry of Finance to PT SMI and IIGF

(Unit: billion Rupiah)

| | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| PT SMI | 47.35 | 62.16 | 30.19 | 19.90 | 24.30 |
| IIGF | 20.21 | 30.64 | 26.78 | 34.31 | 42.22 |

Source: Questionnaire responses from the Ministry of Finance

3.4.5 Environmental and Social Aspect

There were no adverse effects of the project on the surrounding environment.

3.4.6 Preventative Measures to Risks

One immediate risk is that the new administration to be formed in 2024 will change its policies. Organizations established by the current president, including KPPIP, may be subject to change. On the other hand, Indonesia's infrastructure demand is high, and even under the new administration, private sector investment demand for infrastructure promotion will continue to be high. Among KPPIP's functions, the monitoring of priority projects and debottlenecking activities are functioning effectively and are regarded by relevant organizations as functions that will continue to be necessary in the future. Therefore, even though the name and structure of the KPPIP organization may change, the sustainability of the KPPIP's functions themselves is considered to be remained. Therefore, the impact is considered to be small.

Slight issues have been observed in the financial aspects, however, there are good prospects for improvement/resolution. Therefore, sustainability of the project effects is high.

## 4. Conclusion, Lessons Learned and Recommendations

### 4.1 Conclusion

This project aimed to promote the preparation of the bankable infrastructure projects in Indonesia by establishing a management structure for a Committee for Acceleration of Priority Infrastructure Delivery (hereinafter referred to as “KPPIP”) and providing support for the improvement of systems and policies related to infrastructure development through strengthening the capacity of the KPPIP Project Management Office and related institutions. By doing so, the project intended to improve investment climate in Indonesia. The objectives of the project were consistent with the development policy and development needs in the country, and the project plan and approach were appropriate. The specific coordination was not planned with the other JICA projects nor non-JICA projects. But the project was consistent with Japan's development cooperation policy. Based on the above, the relevance and coherence of the project are high. The project purpose of promoting preparation of bankable projects was achieved. On the other hand, the extent to which this project to the overall goal of improving the investment environment in Indonesia was unclear, as there were many external factors other than this project. However, the project contributed to a certain extent to the improvement of the investment environment, as it supported the functionalization of the system to promote PPP projects and confirmed that problem-solving activities by the KPPIP have led to the promotion of National Strategic Projects. In addition, other impacts were observed. For example, the project has enabled bilateral aid organizations such as JICA to provide support services for procurement procedures in PPP project. This has led to JICA actually providing support services for the Legok Nangka Waste to Energy Project in West Java (PPP project). Other example was that the system for land issues proposed for improvement in this project was formalized. Therefore, the effectiveness and impact of the project are high. The project costs exceed the plan, and the project period slightly exceeded the plan. Thus, the efficiency is moderately low. Regarding the sustainability of the project, there are some minor problems with the financial aspects, but the prospects for improvement and resolution are high, and sustainability is high.

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

### 4.2 Recommendations

#### 4.2.1 Recommendations to the Implementing Agency

The KPPIP was established by the current Presidential Regulations and is a committee whose purpose is to promote the implementation of National Strategic Projects. The National Strategic Projects are planned to be realized by 2024, when the current administration ends. However, as of the time of the ex-post evaluation, more than 60 projects remain, and it is expected that they will continue beyond 2024. In addition,

infrastructure development/PPP projects are expected to remain in high demand in Indonesia even after the completion of the National Strategic Projects. Therefore, the functions of KPPIP are essential in promoting infrastructure projects. In particular, KPPIP's monitoring and debottlenecking activities are highly valued by the Ministry of Finance and other relevant agencies, and these functions should be continued.

On the other hand, approximately 30% of KPPIP's technical staff are employees on one-year contracts. Given the sustainability of KPPIP's organizational capacity, consideration should be given to having the organization composed of government employees in the future. In the short term, a human resource plan should be developed to reduce staff mobility by extending the contract terms of these contract employees and promoting them as government employees.

It is recommended that the KPPIP begin discussions and deliberations on the post-2024 KPPIP, including future staffing plans, with the competent Coordinating Ministry for Economic Affairs by the end of the current administration, as it is similarly contemplated by the implementing agency.

#### 4.2.2 Recommendations to JICA

None.

### 4.3 Lessons Learned

<u>Effective use of local consultants who are familiar with local conditions and have specialized skills will help resolve issues.</u>

In this project, by assigning local consultants who were familiar with the local situation to the relevant organizations and project sites, it was possible to conduct constant surveys on regulations and communicate closely with the relevant organizations even without Japanese experts, making it easier to identify issues and derive directions for improvement, thereby contributing to the achievement of the project's results. For example, when the loan agreement for the Patimbang International Port Development Project (Yen Loan project) (L/A November 2017) was delayed, a local consultant was assigned to the department reviewing the loan agreement at the Ministry of Transport, identified the issues (obtaining environmental permits was an issue), proposed solutions to the problems, and built consensus among the agencies concerned. In addition, when the Medan Hospital PPP project was being implemented as a pilot project to apply the AP scheme, the local consultant took the lead in conducting the OBC and FBC surveys, which facilitated the project formation. In this way, by working together with related institutions that were unfamiliar with how to proceed with PPPs and yen loans to clarify and resolve issues, which also led to capacity building for the partner institutions. When promoting PPP/infrastructure development

support, it is necessary to research and understand the local legal system and how to obtain permits and licenses, and to identify and resolve issues through close involvement and communication with relevant local institutions. The support of local consultants specializing in infrastructure finance and PPPs is indispensable. If JICA implements similar projects in the future, it would be effective to proceed on the premise that such local consultants will be effectively utilized.

## 5. Non-Score Criteria

### 5.1 Performance

#### 5.1.1 Objective Perspective

JICA concluded a Memorandum of Understanding with PT SMI, an infrastructure finance institution, to cooperate in the preparation of PPP projects and capacity building of PT SMI through this project, infrastructure finance-related activities other than PPP, and other mutually agreed matters. This agreement enabled smooth cooperation from PT SMI on OBC/FBC support, AP training module development, and PPP training for local governments, which were implemented by the project. Also, in the Medan Hospital PPP project, which was being implemented as a pilot project to apply the AP scheme, the relationship with PT SMI enabled close discussions with the Ministry of Health, which was in charge of the project. This made it possible to make recommendations for a PPP system and related systems in the hospital sector, the first of its kind in the social sector in Indonesia. Since the preparation of infrastructure development and PPP projects is complex, projects must be promoted while clarifying the issues through close communication and information sharing with relevant organizations. Formal collaboration with an important institution such as PT SMI was beneficial to both parties, not only in achieving the objectives of this project, but also in strengthening the capacity of PT SMI. It is worth mentioning that such cooperation by JICA was very effective in enhancing the effectiveness of this project.

### 5.2 Additionality

None

(End)

Republic of Indonesia

FY2022 Ex-Post Evaluation Report of Japanese ODA Loan

"Lower Solo River Improvement Project (II)"

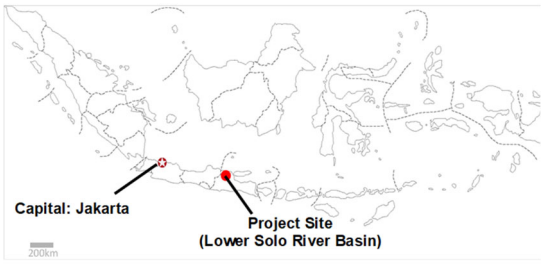
External Evaluator: Masumi Shimamura, Mitsubishi UFJ Research and Consulting Co., Ltd.

## 0. Summary

This project improved the lower reaches of the Solo River in East Java Province with the aim of mitigating flood damages and providing a stable water supply in the area, thereby contributing to the economic development of the East Java Region through improvement of investment environment, etc. In the lower reaches of the Solo River, water resource development is progressing from a comprehensive perspective, including flood control and water utilization, and the objective of this project is consistent with the policies and needs at the time of the appraisal and the ex-post evaluation. However, there were some issues with the appropriateness of the project plan and approach regarding the introduction of Flood Forecasting and Warning System (hereinafter referred to as "FFWS") and land acquisition. The project is consistent with Japan's development cooperation policy and concrete results can be confirmed through collaboration with another project within JICA. The project also contributes to the SDGs goals, an international framework. Therefore, its relevance and coherence are moderately low. In terms of project implementation, the project cost was within the plan, but regarding the project period, the project is not completed at the time of the ex-post evaluation because land acquisition by the executing agency has not been completed. Therefore, efficiency of the project is moderately low. Regarding project effects, quantitative indicators related to water utilization have not achieved the targets, and contribution to improvement of investment environment is partial. However, it was confirmed through interviews with the executing agency and local residents, etc., as well as concrete evidence data, that the objectives for flood control, which directly affects many lives, have been achieved, that no flood damage has occurred on the main Solo River since 2015, and that people's living conditions have been improved. Thus, effectiveness and impacts are high. Regarding operation and maintenance, slight issues have been observed in the financial, and environmental and social aspects including the current status, however, there are good prospects for improvement/resolution. Therefore, sustainability of the project effects is high.

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

## 1. Project Description




Project Location

Bojonegoro Barrage

(source: external evaluator)

### 1.1 Background

The Solo River is the largest river on the island of Java, flowing through the provinces of Central Java and East Java. The basin has encountered severe water shortages during dry season and frequent and extensive flooding during rainy season, resulting in marked imbalance of water resources between dry and rainy seasons. In addition, East Java province, which is located in the lower reaches of the Solo River, includes cities such as Surabaya, Indonesia's second largest city, and Gresik, and in addition to water shortages, water demand was expected to increase. The Indonesian government has been promoting comprehensive development of water resources in the Solo River Basin, and as part of this, the government has been implementing flood control and water utilization projects in the lower reaches of the Solo River with its own funds as well as the "Lower Solo River Improvement Project (I)," the Phase I project, with ODA loan to address 10-year return period flood control. Continuing on these projects, it was an urgent issue to proceed with water resource development from a comprehensive perspective, including flood control and water utilization, to protect the lower reaches of the Solo River from flood damage and to realize a stable water supply.

### 1.2 Project Outline

The objective of this project is to mitigate flood damages and provide a stable water supply in the lower reaches of the Solo River Basin, East Java Province, by implementing river improvement works (development of regulating reservoirs and ancillary drainage channels, barrage, etc.), thereby contributing to the economic development of the East Java region through improvement of investment environment, etc.

| | | |
|---|---|---|
| Loan Approved Amount / Disbursed Amount | 9,345 million yen / 8,515 million yen | |
| Exchange of Notes Date / Loan Agreement Signing Date | March 2005 / March 2005 | |
| Terms and Conditions | Interest Rate | 1.3% |
| | Repayment Period (Grace Period | 30 years 10 years) |
| | Conditions for Procurement | General Untied |
| Borrower / Executing Agency | Republic of Indonesia / Ministry of Public Works and Housing, Director General of Water Resources (hereinafter referred to as "DGWR") | |
| Project Completion | Not complete | |
| Target Area | The lower reaches of the Solo River Basin, East Java Province | |
| Main Contractors (Over 1 billion yen) | PT. Brantas Abipraya (Indonesia) / PT. Hutama Karya (Indonesia) (JV), PT. Waskita Karya (Indonesia) / PT. Adhi Karya (Indonesia) (JV), PT. Pembangunan Perumahan (Indonesia) / PT. Wijaya Karya (Indonesia) (JV) | |
| Main Consultant (Over 100 million yen) | Nippon Koei Co., Ltd. (Japan) | |
| Related Studies (Feasibility Studies, etc.) | ・ Comprehensive Development and Management Plan Study for Bengawan Solo River Basin (CDMP) (Ministry of Public Works: Former Ministry of Settlement and Regional Infrastructure) (April 2001)<br>・ Implementation Program for this project (Ministry of Public Works: Former Ministry of Settlement and Regional Infrastructure) (March 2004) | |
| Related Projects | [ODA Loan]<br>・ Lower Solo River Improvement Project (I) (L/A signing: December 1995) | |

## 2. Outline of the Evaluation Study

2.1 External Evaluator

Masumi Shimamura, Mitsubishi UFJ Research and Consulting Co., Ltd.

2.2 Duration of Evaluation Study

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

Duration of the Study: December 2022-January 2024

Duration of the Field Study: May 17-June 6, 2023, August 19-27, 2023

2.3 Constraints During the Evaluation Study

The project is not yet complete, as part of the outputs (construction of Jabung Regulating Reservoir and ancillary drainage channels) has not been completed due to the incomplete land acquisition. However, a certain degree of effectiveness has been achieved, and the evaluation decisions have been made based on the results of qualitative survey and specific evidence data.

## 3. Results of the Evaluation (Overall Rating: B[1])

3.1 Relevance/Coherence (Rating: ②[2])

3.1.1. Relevance (Rating: ②)

3.1.1.1 Consistency with the Development Plan of Indonesia

At the time of the appraisal, the Indonesian government has identified the improvement of civil life as one of its policy issues in *the New National Medium-Term Development Plan (REPENAS) (2005-2009)*. Under this, the government has implemented water resource development and flood control projects that affect civil life. The government also formulated a new law on water resource management in March 2004, taking into account the state of democratization, decentralization, and administrative transparency. In the new law, water resource management was to be planned, implemented, monitored, and evaluated in a comprehensive manner for water resource conservation and water disaster control for each basin.

At the time of the ex-post evaluation, the Indonesian government places "strengthening environmental measures and improving resilience to natural disasters and climate change" as one of the seven priority issues in *the National Medium-Term Development Plan (RPJMN, 2020-2024)*. In addition, DGWR, the executing agency, has formulated *the Strategic Plan (Rencana Strategis) (2020-2024)*, and implements flood control measures in river basins, mainly structural measures such as river improvement, but also non-structural measures such as flood forecasting as one of the countermeasures for water resources management. The flood control plan for the lower reaches of the Solo River is based on *the Master Plan for the Comprehensive Development of the Lower Solo River Basin*[3] *(April 2001)*. Based on the Master Plan, DGWR has formulated *the Strategic Plan for Water Resources Management*

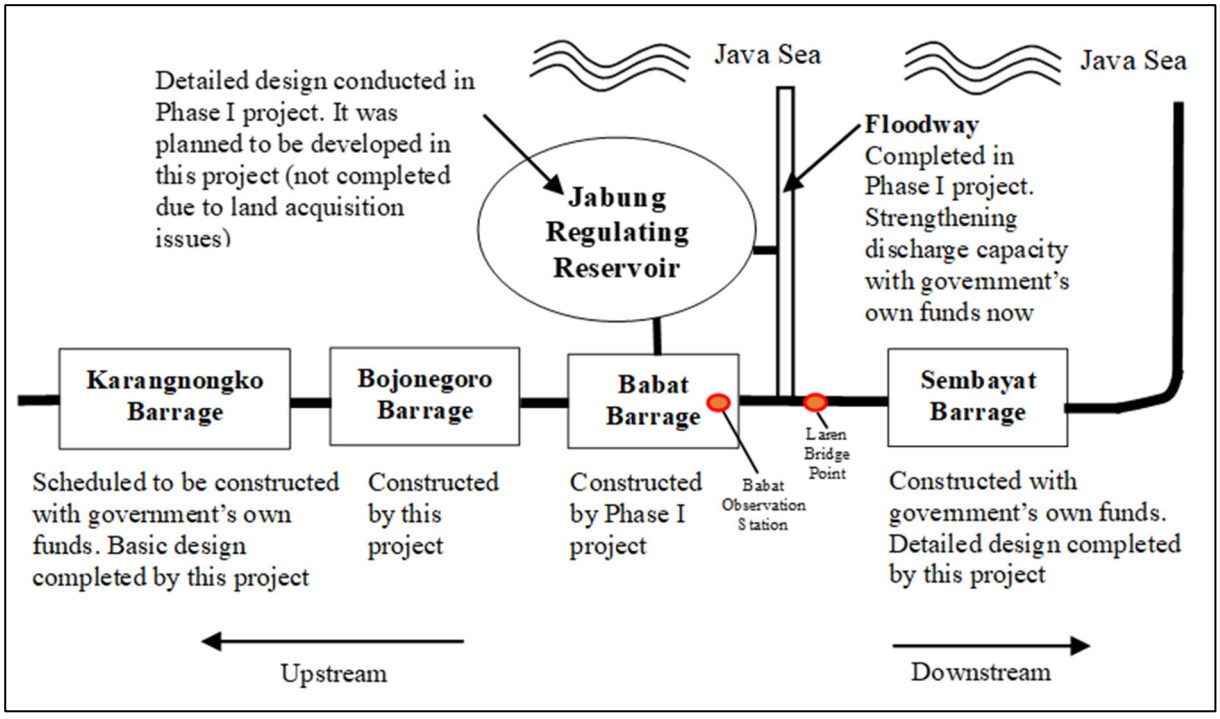
[1] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

[2] ④: Very High, ③: High, ②: Moderately Low, ①: Low

[3] *The Master Plan for the Comprehensive Development of the Lower Solo River Basin* has since been reviewed and updated (and was also reviewed in the consulting services for this project).

*(POLA)* for the Solo River and *the Water Resources Management Implementation Plan (RENCANA)*,[4] a concrete plan for implementing the Solo River Basin management based on the plan. Based on these plans, DGWR is working on comprehensive water resources management in the Solo River Basin by linking the preceding Phase I project, this project, and the government's own funded projects. (See Figure 1 and Table 1 for the location map of major flood control infrastructure and storage capacities of major facilities in the lower reaches of the Solo River for Phase I project, this project and government's own funded projects, respectively.)

Based on the above, the project, which aims to reduce flood damage and ensure stable water supply through improvement of the lower reaches of the Solo River and development of ancillary facilities, is consistent with Indonesia's development policy at the time of the appraisal and the ex-post evaluation.




Source: Prepared from questionnaire responses

Figure 1: Location Map of Major Flood Control Infrastructure for Phase I Project, This Project and Government's Own Funded Projects

[4] *The Strategic Plan for Water Resources Management (POLA)* and *the Water Resources Management Implementation Plan (RENCANA)* are also updated from time to time, the latest being the 2023 edition.

Table 1: Storage Capacities of Major Facilities in the Lower Reaches of the Solo River

| Structures | Completion Year | Storage Volume (million $m^3$) | Remark |
|---|---|---|---|
| Karangnongko Barrage | 2027 (planned) | 59.0 | Scheduled to be constructed with government's own funds (2023-2027). Basic Design conducted by this project. |
| Bojonegoro Barrage | 2012 | 13.0 | Constructed by this project. In operation. |
| Babat Barrage | 2003 | 30.0 | Constructed by Phase I project. In operation. |
| Jabung Regulating Reservoir | Incomplete | 30.5 | It was planned to be developed in this project but not completed due to land acquisition issues. |
| Floodway (Rubber Dam) (Note) | 2001 | 2.0 | Completed in Phase I project. In operation. Government is strengthening discharge capacity of floodway from 640 $m^3$/sec. to 1,000 $m^3$/sec. with its own funds (2019-2023). |
| Sembayat Barrage | 2017 | 10.0 | Constructed with government's own funds. Detailed Design completed by this project. In operation. |

Source: Results from questionnaire and interview survey of the DGWR

Note: The floodway is designed to discharge water into the Java Sea during floods, but during the dry season it is used for water storage, and thus a rubber dam is constructed at the end of the floodway to store water.

3.1.1.2 Consistency with the Development Needs of Indonesia

At the time of the appraisal, the Solo River Basin was severely affected by flooding during the rainy season, with 19 reports of flood damage since 1994 through March 2004, mainly in Bojonegoro, the target area of this project. In addition, East Java Province, which is located in the lower reaches of the Solo River Basin, is home to cities such as Surabaya, Indonesia's second largest city, and Gresik, and is one of the largest economic regions in the country, and water demand was expected to increase. Protecting these areas from flood damage and providing a stable water supply were highly necessary from the perspective of regional economic development and improvement of investment environment.

Since February 2015, up to the time of the ex-post evaluation, there has been no flood damage to the downstream area due to the overflow of the main Solo River. However, flooding during the rainy season in the area surrounding the Jabung Regulating Reservoir, which has yet

been developed by the project, and flooding of tributaries connected to the Solo River (such as Lamong River) have caused flood damage in some areas of Gresik Regency. For this reason, the Indonesian government continues to promote river improvement and flood control efforts using its own funds and is promoting construction of flood control facilities and water resource development in the entire Solo River Basin.

Therefore, the project is in line with the development needs of Indonesia both at the time of the appraisal and the ex-post evaluation.

3.1.1.3 Appropriateness of the Project Plan and Approach

The project plan and design were based on the lessons learned from the similar projects.[5] Specifically, with regard to the FFWS, in addition to hard measures by improving facilities, the plan was to develop the FFWS, which would be a new system for DGWR, and to strengthen staff capacity as a soft measure and provide integrated support on both hard and soft sides, and integrated support was actually provided. However, it did not go well, and the FFWS was not in operation at the time of the ex-post evaluation. DGWR explained the following four points (problems regarding software utilization and operational implementation systems) as reasons for this.

- Training regarding the FFWS operation was not sufficient: The FFWS software uses MIKE11, which is a common software that is widely used overseas. The training was conducted at the software company's Singapore office, but training period was three days, and participants were three members of the Solo River Office (Balai Besar Wilayah Sungai, Bengawan Solo; hereinafter referred to as "BBWS"), under DGWR, which is responsible for operation and maintenance. Participants were unable to acquire sufficient skills during the short training period and were unable to fully utilize the FFWS.
- BBWS concluded a maintenance contract for the FFWS software (461 days from September 17, 2013), but was unable to get sufficient support: Communication with the software company was via email, and there was no on-site after-sales support. BBWS did not actively approach the software company for assistance regarding unclear points, and generally took a passive stance.
- Efforts to improve the accuracy of the FFWS did not go well: In order to improve the accuracy of the system, in addition to water level, flow volume, and rainfall data that the FFWS measures and automatically imports, it is necessary to collect many variable data (land use data, water gate opening data, land elevation data, river shape data, etc.),

[5] In this project, appropriate measures were to be considered while confirming the appropriateness of the land acquisition plan and the progress during the project. In addition, soft (capacity development) measures were to be implemented in an integrated manner, such as development of FFWS and strengthening of implementation capacity of the executing agency staff, etc.

however, BBWS field staff were not able to fully utilize the FFWS, and this did not lead to improved accuracy.

- DGWR's backup and support system for BBWS was not sufficiently established: DGWR did not have a system in place to support BBWS, and the actual operation was left to BBWS. According to DGWR, there was a reorganization of the Ministry of Public Works and Housing in 2020, and Directorate of Water Resources Engineering Development was newly established. The Directorate's mission is to provide detailed backup support when each River Office introduces a new technology or a new system until the field staff is fully proficient in using them. Such a system was not fully established, and support for BBWS was not sufficient. At the time of the ex-post evaluation, DGWR expressed to the external evaluator that it would work with the Directorate to make maximum efforts toward restarting the FFWS. Since the facilities related to the FFWS have been developed under the project, DGWR intends to integrate the facilities with the system and restart the FFWS.

Regarding land acquisition, appropriate measures were considered based on lessons learned from similar projects in the past, while confirming the relevance of the land acquisition plan and the progress during the project. However, as mentioned later in "3.2.1 Project Outputs" and "2) Resettlement and Land Acquisition" in "3.3.2.2 Other Positive and Negative Impacts," due to the incomplete land acquisition for the Jabung Regulating Reservoir, construction of the reservoir and some water gates and other facilities have not been completed. In Phase I project, land acquisition is not completed because residents living on private land refused to accept compensation and resettle. The land at issue in this project is state land, where residents do not reside, and the residents, who make a living from agricultural and fishing activities, have filed a lawsuit in court seeking compensation for their livelihood. In this project, based on the experience in Phase I project, DGWR and BBWS were aware of the risks that land acquisition will become an issue during planning and were making preparation, and encouraging local governments to promote the plan during the project implementation stage, checking the progress, and patiently and carefully proceeding with discussions and negotiations while giving due consideration to farmers and fishermen. As a result, land acquisition for private land was completed, but a lawsuit was filed regarding state land. On the other hand, although the plan at the time of the appraisal was to begin preparations for land acquisition prior to the signing of the loan agreement, preparations actually began one year and 10 months after the signing of the loan agreement.

In terms of equity, it was confirmed from the interviews with DGWR and BBWS that the project was designed to ensure that the benefits of the project, both in terms of flood control and water utilization, would not be disproportionately benefiting a particular person or group of people, and that the project would benefit all the people in the project area.

From the above, it can be concluded that there were some problems with the project plan and approach.

### 3.1.2 Coherence (Rating: ③)

#### 3.1.2.1 Consistency with Japan's ODA Policy

Japanese government placed "building a democratic and just society" as one of its priority areas in its *Country Assistance Program for Indonesia (November 2004)* and aimed to "improve basic public services" by providing support for development of public goods needed in terms of rural and regional development, improving maintenance and management system of these public services, and taking measures against natural disasters such as frequent floods, landslides and droughts, in order to promote local self-reliance and development. This project aims to reduce flood damage and provide stable water supply through river improvement and the development of ancillary facilities, and it can be said that the project objectives were consistent with Japan's development cooperation policy at the time of the appraisal.

#### 3.1.2.2 Internal Coherence

Internal coherence has been secured for this project since collaboration with Phase I project, Lower Solo River Improvement Project (I), took place and concrete effects have been generated. As mentioned earlier in "3.1.1.1 Consistency with the Development Plan of Indonesia," the river improvement in the lower reaches of the Solo River is based on *the Master Plan for the Comprehensive Development of the Lower Solo River Basin*, and the comprehensive water resources management in the lower reaches of the Solo River Basin is being implemented in collaboration with Phase I project, this project and the government's own funded projects. According to DGWR and BBWS, the flood control targets for the lower reaches of the Solo River at the time of the ex-post evaluation are as follows. The government aims to complete river improvement work to cope with 25-year return period flood by 2030.

<Flood Control Targets of *the Master Plan for the Comprehensive Development of the Lower Solo River Basin* (the Latest Version)>

- Phase I project + government's own funded project: responding to 10-year return period flood
- Phase I project + this project + government's own funded project: responding to 20-year return period flood
- Government's own funded project after this project: responding to 25-year return period flood

As will be discussed later in "3.3.1.1 Quantitative Effects (Operation and Effect Indicators),"

the achievements of the operation and effect indicators are not the effects of this project alone. In addition, qualitative effects and impacts are not effects specific to this project, but are due to synergistic effects with Phase I project and government's own funded projects. (See "3.3 Effectiveness and Impacts" for specific synergistic effects.)

From the above, the indicators for this project were set based on the assumption of collaboration with related projects, and project effects have been generated through the actual collaboration.

3.1.2.3 External Coherence

This project was implemented in collaboration with Indonesian government's own funded projects, and concrete results have been generated. In terms of consistency with international framework, an interview with DGWR confirmed that the project contributes to goal 11 of the SDGs, "make cities and human settlements inclusive, safe, resilient and sustainable." Specific results will be discussed later in "3.3.2 Impacts," but the project has contributed to improving safety, hygiene, and livelihoods of residents and farmers in the lower reaches of the Solo River Basin.

From the above, the project is consistent with Indonesia's development plans and development needs, however, there were some issues with the appropriateness of the project plan and approach. The project is consistent with Japan's development cooperation policy, and coordination with another project within JICA and Indonesian government's own funded projects have taken place, and concrete results can be confirmed. The project also contributes to the SDG goal 11, which is an international framework. Therefore, its relevance and coherence are moderately low.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

This project provided support for river improvement and development of ancillary facilities in the lower reaches of the Solo River. Table 2 shows a comparison of major planned and actual outputs.

Regarding civil work, construction of the Jabung Regulating Reservoir and associated drainage channel has not been completed because land acquisition has not been completed.[6] Bojonegoro Barrage was developed as planned. There were changes in the number of observation stations and installations of the FFWS ancillary equipment (changed from 27 locations to 21 locations). The results of interviews with DGWR and consultants confirmed that installation site and quantity of rain gauges and water level gauges were changed as it was

[6] The package for the Jabung Regulating Reservoir, whose construction was suspended due to incomplete land acquisition, is the J-2 (1) package.

confirmed that they had been installed near the planned installation sites. It was also confirmed that the remaining observation stations were to be installed in stages after BBWS staff at the site gained experience in operation and maintenance. These responses were based on the actual situation and needs in the field, and the changes in scope are deemed appropriate. Consulting services were implemented as planned.

Table 2: Comparison of Major Planned and Actual Outputs

| Item | Plan | Actual | Comparison/Reasons for Change |
|---|---|---|---|
| Civil Works | Construction of Jabung Regulating Reservoir and accompanying drainage channel (water storage capacity of 30.5 million $m^3$) | Construction of the regulating reservoir's connecting channel and some of the water gates has progressed, but is not yet completed | Not yet completed due to incomplete land acquisition |
| | Construction of Bojonegoro Barrage (movable barrage: barrage width 140 m) | Construction of Bojonegoro Barrage (movable barrage: barrage width 140 m) | As planned |
| Ancillary Facilities (FFWS) | 15 rainfall observation stations, 12 water level observation stations | 10 rainfall observation stations, 6 water level observation stations, 2 rainfall + water level observation stations, 3 water level + water quality observation stations | Changed the observation stations according to actual needs. It was decided that the remaining observation stations would be installed after BBWS staff working at the observation stations gained experience in operation and maintenance |
| Consulting Services | ・ Detailed design<br>・ Tender assistance<br>・ Construction supervision<br>・ Study and review of existing Master Plan for Solo River Basin management<br>・ Detail design review of dike, Sembayat Barrage and Jero swamp development, etc.<br>・ Training of staff of executing agency, etc. | ・ Detailed design<br>・ Tender assistance<br>・ Construction supervision<br>・ Study and review of existing Master Plan for Solo River Basin management<br>・ Detail design review of dike, Sembayat Barrage and Jero swamp development, etc.<br>・ Training of staff of executing agency, etc. | ・ As planned.<br>・ As planned.<br>・ As planned.<br>・ As planned.<br>・ As planned.<br>・ As planned. |

Source: Information provided by JICA, results from questionnaire survey and interviews with DGWR

Water Gate Control Room of Bojonegoro Barrage
(Source: external evaluator)

FFWS Installed Near Bojonegoro Barrage
(Source: external evaluator)

Area Where Land Acquisition has not been Completed in Jabung Regulating Reservoir (used as fishpond) (Source: external evaluator)

### 3.2.2 Project Inputs

#### 3.2.2.1 Project Cost

Table 3 shows the planned project cost and the actual cost at the time of the ex-post evaluation. The total project cost was planned to be 10,995 million yen (of which 9,345 million yen was to be covered by Japanese ODA loan) at the time of the appraisal, while the actual cost was 10,438 million yen[7] (of which 8,515 million yen was covered by Japanese ODA loan) at the time of the ex-post evaluation, which was kept within the plan[8] (95% of the plan).

Since the project has not yet been completed due to incomplete land acquisition, a comparative analysis of inputs commensurate with outputs was conducted for verification purposes. The project costs (at the time of planning and at the time of the ex-post evaluation) for the outputs excluding the portion of package J-2 (1) for the unfinished Jabung Regulating Reservoir were calculated and compared and analyzed, respectively (Table 4), which was within the plan (95% of the plan). One possible reason for this is that the project cost was kept down due to the appreciation of yen[9].

[7] The exchange rate was calculated at 1 IDR = 0.0096762 yen. (From the IMF International Financial Statistics 2005-2018 average rate)
[8] As the project is not completed at the time of the ex-post evaluation, there is a possibility that land acquisition cost and remaining construction cost for the Jabung Regulating Reservoir and associated drainage canals to be borne by the Indonesian side may increase in the future.
[9] The exchange rate at the time of the appraisal was 1 IDR = 0.012 yen.

Table 3: Planned Project Cost and the Actual Cost at the Time of the Ex-post Evaluation

(Unit: million yen)

| Item | Plan | Actual at the Time of the Ex-post Evaluation | Comparison |
|---|---|---|---|
| ODA Loan Portion | 9,345 | 8,515 | |
| Indonesian portion | 1,650 | 1,923 | |
| Total | 10,995 | 10,438 | 95% of the plan |

Source: Information provided by JICA, results from questionnaire survey and interviews with DGWR

Table 4: Planned Project Cost and Actual Cost at the Time of the Ex-post Evaluation Excluding Package J-2 (1) Portion for the Unfinished Jabung Regulating Reservoir

(Unit: million yen)

| Plan | Actual at the Time of the Ex-post Evaluation | Comparison |
|---|---|---|
| 9,931 | 9,474 | 95% of the plan |

Source: Calculated based on the information provided by JICA and results from questionnaire survey and interviews with DGWR

Note: According to DGWR, planned cost at the time of the appraisal for the incomplete Package J-2 (1) was IDR 109,964,539,271 (1,064 million yen), and the actual cost at the time of the ex-post evaluation was 99,597,834,900 (964 million yen).

3.2.2.2 Project Period

Table 5 shows the planned and the actual project period. The planned period at the time of the appraisal was 110 months, from April 2005 to May 2014. Regarding the actual period, the period up to the second field survey (March 2005 to August 2023) was 222 months, which significantly exceeded the plan (202% of the planned period). As mentioned above, the main reason for the delay is that the land acquisition has not yet been completed and thus the project is not complete. In addition, delay in selection of contractors was a factor in extending the project period. Initially, the plan was to select contractors for the development of the Jabung Regulating Reservoir in one package, but the selection was divided into two packages (J-2 (1) and J-2 (2)). However, for both packages, all bidders' proposals did not comply with the requirements set out in the bidding documents, leading to re-tendering and delays in contractor selection.

The loan disbursement period was extended from July 2015 to September 2017, but DGWR did not extend the period, stating that it would continue its operations with its own funds after the end of the loan disbursement extension period.

Table 5: Comparison of Planned and Actual Project Period

| Item | Plan | Actual |
|---|---|---|
| Total Project Period (Note 1) | Apr. 2005-May 2014 (110 months) | Mar. 2005-Project not completed. (222 months until Aug. 2023) |
| Signing of Loan Agreement | Apr. 2005 | Mar. 2005 |
| Selection of Consultants | Apr. 2005-Apr. 2006 (13 months) | Apr. 2005-Aug. 2006 (17 months) |
| Consulting Services | Apr. 2006-May 2014 (98 months) | Aug. 2006-Apr. 2017 (98 months) |
| Land Acquisition | Jan. 2005-Dec. 2010 (72 months) | Jan. 2007-Not completed as of Aug. 2003 |
| Tendering and Conclusion of Contract | Jul. 2006-Mar. 2009 (33 months) | Sept. 2007-Nov. 2013 (75 months) |
| Civil Works | Jun. 2008-May 2013 (60 months) | Nov. 2008-Not completed as of Aug. 2023 (Note 2) |
| Warranty Period | May 2013-May 2014 (13 months) | Jan. 2017-Jan. 2018 (Note 3) |

Source: Information provided by JICA, results from questionnaire survey and interviews with DGWR

Note 1: The definition of project completion is completion of warranty period (definitions at the time of the appraisal).

Note 2: Package J-2 (1) of the Jabung Regulating Reservoir, whose construction was suspended due to incomplete land acquisition, was completed in January 2017.

Note 3: Warranty period for Package J-2 (1) of the Jabung Regulating Reservoir, where construction was suspended due to incomplete land acquisition.

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

The economic internal rate of return (EIRR) for the project at the time of the appraisal was calculated to be 8.1%, assuming the project cost (excluding taxes) and operation and maintenance costs as “costs,” and reduction in flood damages (reduction in damages to assets such as farmlands, houses, and infrastructure facilities), supply of water for industrial and domestic use (amount willing to pay) and supply of water for agricultural use (amount of production increase considering changes in crop types and cropping patterns) as “benefits,” and the project life as 50 years. On the other hand, although attempts were made to collect benefit-related data (reduction in flood damages and supply of water for agricultural use), DGWR, BBWS, and local governments did not accumulate these data from the time of the appraisal to the time of the ex-post evaluation. Basic data that could be used for analogical reasoning was also missing and could not be collected thus, a recalculation of EIRR at the time of the ex-post evaluation was not possible.

Therefore, efficiency of the project is moderately low.

3.3 Effectiveness and Impacts[10] (Rating: ③)

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

At the time of the appraisal, (1) "water supply by use" (industrial, domestic and agricultural) (2) "annual maximum flow at flood control reference point," (3) "discharge capacity at flood control reference point," (4) "annual reduction in number of flood by overflow," (5) "annual highest water level," (6) "annual maximum inundated area" and "(7) annual maximum number of inundated houses" were set as quantitative effect indicators of the project. (1) is an indicator for water utilization and (2) through (7) are indicators for flood control. Table 6 summarizes the baseline values, target values and actual values for 2020 to 2022 for each indicator. As mentioned above, it should be noted that the effects of the project on water utilization and flood control are not the result of this project alone, but are the results of synergistic effects with Phase I project and the government's own funded projects.

Table 6: Operation and Effectiveness Indicators of the Project

| Indicators | Baseline Value (2004 Actual Values Unless Otherwise Indicated) | Target Value (2015, 1 Year After Completion) | Actual Value (Percentages in parentheses indicate achievement rates) | | |
|---|---|---|---|---|---|
| | | | 2020 | 2021 | 2022 |
| Water Supply by Use (Industrial) ($m^3$/day) (Note 1) | 64,282 | 266,458 | 71,818 | 74,120 | 67,698 (25%) |
| Water Supply by Use (Domestic) ($m^3$/day) (Note 1) | 23,760 | 127,094 | 24,251 | 23,328 | 60,452 (48%) |
| Water Supply by Use (Agricultural) ($m^3$/day) (Note 1) | 1,926,029 | 2,558,995 | N.A. | 1,823,040 | 1,529,280 (60%) |
| Annual Maximum Flow at Flood Control Reference Point ($m^3$/second) (Note 2) (Note 3) | 2,207 (1981-1999 maximum daily average flow) | 2,530 (for 20-year return period flood of 3,480) | 1,704 Dec. 15, Babat observation station | 3,101 Nov. 18, Babat observation station | 2,865 Nov. 19, Babat observation station |

[10] When providing the sub-rating, Effectiveness and Impacts are to be considered together.

| | | | | | |
|---|---|---|---|---|---|
| Discharge Capacity at Flood Control Reference Point ($m^3$/second) (Note 2) | 2,530 (flow rate of 20-year return period flood is 3,480, of which 640 is discharged to the Java Sea and 310 is overflowed) | 2,530 (of which, at the flow rate of 20-year return period flood, 310 is stored in Jabung Regulating Reservoir as a result of the project) | 3,170 Babat observation station | 3,170 Babat observation station | 3,170 Babat observation station |
| Annual Reduction in Number of Flood by Overflow | Once in 10 years | Once in 20 years | No flood damage to the downstream area since 2015 due to overflow of the main Solo River | | |
| Annual Highest Water Level (m) (Note 3) | +8.90 (highest water level at Babat observation point) (1981-1999) | +6.43 (Laren Bridge point) | +5.35 Dec. 16, Laren Bridge point | +6.22 Jan. 13, Laren Bridge point | +5.51 Oct. 25, Laren Bridge point |
| Annual Maximum Inundated Area (ha) | 14,955 for 20-year return period flood level | 0 for 20-year return period flood level | No flood damage to the downstream area since 2015 due to overflow of the main Solo River. Bojonegoro Barrage and Jabung Regulating Reservoir floodway (developed in the Phase I project and currently being strengthened with government's own funds) are functioning, reducing the risk of broken dike and improving flood control capacity. | | |
| Annual Maximum Number of Inundated Houses (house) | 29,675 for 20-year return period flood level (Calculated based on figures as of 1994, considering the population growth rate) | 0 for 20-year return period flood level | | | |

Source: Documents provided by JICA (baseline values and target values), questionnaire responses and interviews with DGWR, BBWS and PJT1 (actual values)

Note 1: Water supply by use (industrial, domestic, agricultural) is water supply data from Jasa Tirta I Public Corporation (PJT1), which uses the Solo River as its water source and supplies raw water to the area surrounding the project site. This includes the amount of water supplied to Local Water Supply Company (PDAM Bojonegoro, PDAM Lamongan, PDAM Gresik) and large-scale factories (oil refineries, fertilizer factories), etc., which are major customers of PJT1.

Note 2: The observation point for actual values is at Babat. (No observations are made at the Laren Bridge point thus data from the Babat observation point, which is close to the Laren Bridge point, is shown.)

Note 3: Since the data for each of the annual maximum flow and the annual highest water level are observed at different observation points and on different dates, and there is also flow downstream from the floodway (see Figure 1 for the location of observation points) it is not possible to simply compare the actual values of the two indices.

The performance of indicators related to water use were significantly lower than the target. Specifically, the achievement rates of water supply by use in 2022 for industry, domestic, and agriculture were 25%, 48%, and 60%, respectively. The main reasons are: 1. the Jabung Regulating Reservoir (storage capacity of 30.5 million $m^3$) has not been developed because of incomplete land acquisition; 2. DGWR has set a cap on the volume of water to be withdrawn and to be allocated in order to secure water resources for the entire Solo River Basin; and 3. there are water uses that DGWR and BBWS are not aware of.

Regarding 1., as mentioned above, the Jabung Regulating Reservoir is not completed, and the water storage expected at the time of the appraisal has not been realized. Regarding 2., in order to use the water resources of the Solo River, it is necessary to obtain a "water intake permit,"[11] and water users cannot withdraw more than the upper limit of the amount of water permitted.[12] Regarding 3., water sources other than the Solo River include groundwater, well water, reservoirs, and spring water, and local small businesses and village-owned enterprises (hereinafter referred to as "BUMDES") draw water from these sources.[13] Local residents also receive water for daily use from BUMDES. In addition, during the field survey, it was confirmed that farmers and others are pumping water from the Solo River for agricultural activities without permits, and that the volume of non-revenue water[14] is increasing.[15] Interviews with DGWR and BBWS confirmed that the target values set for water use at the time of the appraisal were based on the actual water demand, taking into account water intake restrictions, and were not set excessively.

Most of the targets for flood control indicators have been achieved, and the project purpose of responding to 20-year return period flood has largely been achieved. Discharge capacity at flood control reference point is the maximum flow rate at which floodwater can flow safely at the flood control reference point, and the actual value is 3,170 $m^3$/sec. Furthermore, by comparing discharge capacity with annual maximum flow at flood control reference point, if the annual maximum flow is less than the discharge capacity, it means that water that has

[11] Water intake permits are issued through BBWS. The basis for setting limits on water allocation and water intake by DGWR is as follows.

- *Strategic Plan for Water Resources Management (POLA)* (2023) indicating the direction of Solo River basin management
- *Water Resources Management Implementation Plan (RENCANA)* (2023) which is a concrete plan for implementing Solo River Basin management based on POLA

[12] In reality, demand for water exceeds the upper limit, resulting in water shortage. Therefore, large factories such as oil refineries and fertilizer plants, which are major customers of PJT1, are taking risk measures by securing water sources other than the Solo River by developing their own reservoirs or taking water from the Brantas River as a backup. As a result, water supply by use (industry) in 2022 is lower than that of the previous year.

[13] Water intake from these sources requires a separate permit from the local government.

[14] Non-revenue water here refers to the amount of water distributed from the Solo River as water source but does not result in the revenue for PJT1.

[15] Water supply by use (agriculture) in 2022 is lower than the previous year's water supply, possibly due to an increase in non-revenue water.

increased due to heavy rain, etc. can safely flow down the river. The actual value of annual maximum flow is lower than the discharge capacity in all years. In addition, the annual highest water level is below the upper limit in all years. Regarding annual reduction in number of floods by overflow, annual maximum inundated area, and annual maximum number of inundated houses, there has been no flood damage to the downstream area due to the overflow of the main Solo River since 2015.

3.3.1.2 Qualitative Effects (Other Effects)

The qualitative effects of the project, "reduction of flood damage" and "stable water supply" are described below. The "improvement of investment environment through stable water supply in the lower reaches of the Solo River Basin," which was set as a qualitative effect at the time of the appraisal, was categorized as impacts. Therefore, the said indicator is described below in "3.3.2.1 Intended Impacts."

(1) Reduction of flood damage

DGWR and BBWS have confirmed that there has been no flood damage to the downstream areas due to the overflow of the main Solo River since February 2015. In addition, as a result of the qualitative survey[16] conducted during the project site visit, all the survey respondents (84 people) replied that after the project, the flooding of the main Solo River during the rainy season has been controlled, and no flood damage has occurred in the surrounding area.

Table 7 shows the trends in rainfall data (monthly average value) in the Solo River Basin from 2015 to 2022. In February 2015, when the last flood occurred due to overflow of the main Solo River, the rainfall was 356.50 mm. According to the local report,[17] the water level of the Solo River at the Bojonegoro observation point reached 13.36 meters on February 12, 2015. In addition, according to the report by the Bojonegoro Regional Disaster Mitigation Agency, three people drowned due to the rising water level of the Solo River since February 10 of the same year. Since 2015, heavy rains exceeding 356.50 mm have occurred in years and months indicated in orange in Table 7, but as described above, flooding of the main Solo River has been prevented. This is considered to be due to the synergistic effects of Phase I

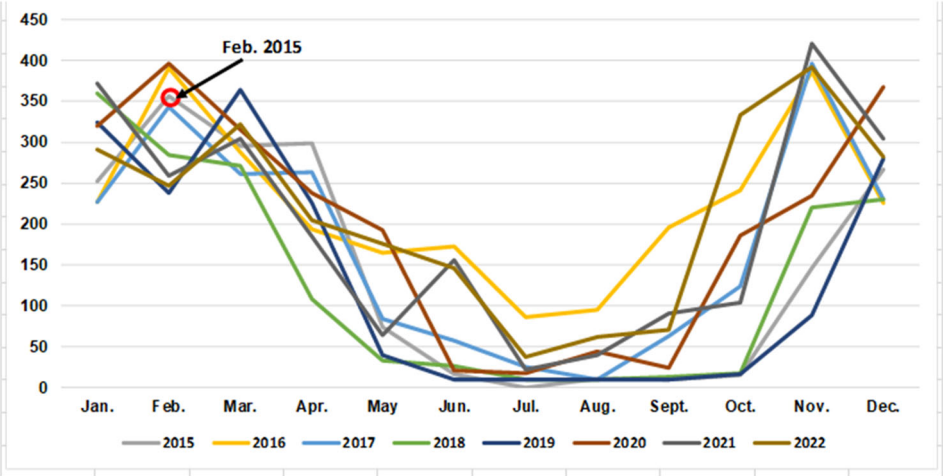
[16] The qualitative survey was conducted through interviews with a total of 84 people in the project area, including water supply organization staff (4 people), businesspeople (14 people), agricultural people (33 people), and local residents other than those listed above (33 people). The breakdown is (by regency) 41 from Bojonegoro, 43 from Gresik, (by gender) 68 men, 16 women, (by age) 4 in their 20s, 23 in their 30s, 20 in their 40s, 27 in their 50s. 10 in their 60s or older. Water supply organization staff include one person each from PJT1 and the three Local Water Supply Company (PDAM Bojonegoro, PDAM Lamongan, PDAM Gresik), and business personnel include oil refineries and fertilizer factories that are large customers of PJT1's, as well as hotels with small businesses, restaurants, car wash companies, laundries, etc. The gender bias is due to the fact that the key informants, such as water supply organizations and businesspeople, tend to be men, as well as due to local customs.

[17] Dinas Kominfo, Provinsi Jawa Timur (East Java Province Communication and Information Office) https://kominfo.jatimprov.go.id/read/umum/43552

project, this project, and the government's own funded projects.

Table 7: Rainfall Data for Solo River Basin Monthly Average Value (unit: mm)

| | Jan. | Feb. | Mar. | Apr. | May | Jun. | Jul. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2015 | 252.49 | 356.50 | 295.19 | 298.58 | 73.80 | 16.97 | 0.36 | 11.06 | 10.28 | 15.35 | 146.03 | 266.78 |
| 2016 | 226.91 | 390.48 | 287.69 | 193.65 | 164.71 | 173.07 | 86.01 | 95.30 | 196.28 | 241.69 | 386.42 | 226.37 |
| 2017 | 226.91 | 343.25 | 261.42 | 263.73 | 84.19 | 57.28 | 25.93 | 10.39 | 63.39 | 123.59 | 396.76 | 229.92 |
| 2018 | 359.80 | 284.91 | 271.28 | 108.23 | 33.72 | 26.36 | 10.00 | 10.02 | 13.26 | 17.83 | 220.50 | 230.57 |
| 2019 | 324.61 | 237.86 | 364.49 | 226.00 | 39.65 | 10.04 | 10.25 | 10.04 | 10.14 | 16.05 | 88.47 | 279.85 |
| 2020 | 320.60 | 396.52 | 315.11 | 238.04 | 192.29 | 20.94 | 17.91 | 44.81 | 23.86 | 185.71 | 234.26 | 367.31 |
| 2021 | 371.67 | 258.88 | 304.61 | 185.43 | 64.63 | 156.46 | 21.60 | 40.32 | 90.51 | 104.39 | 420.53 | 305.11 |
| 2022 | 291.26 | 246.72 | 322.36 | 204.54 | 176.00 | 145.77 | 37.75 | 62.22 | 70.56 | 333.00 | 392.31 | 282.73 |




Source: Prepared based on the data provided by BBWS

Based on the above interviews with DGWR and BBWS, qualitative survey results, and rainfall data in the Solo River Basin, it can be considered that the project has contributed to reducing flood damage in the lower reaches of the Solo River Basin.

(2) Stable water supply

Table 8 shows the trends in water supply volume of the three Local Water Supply Companies (Perusahaan Daerah Air Minum; hereinafter referred to as "PDAM"),[18] which supply water to the surrounding areas using the Solo River as their water source. PDAMs are major customers of Jasa Tirta I Public Corporation (Jasa Tirta 1; hereinafter referred to as "PJT1"), a state-owned company affiliated with the Ministry of Public Works and Housing,

[18] The three companies are PDAM Bojonegoro, PDAM Lamongan, and PDAM Gresik.
- Water sources used by PDAM Bojonegoro include deep wells and springs in addition to the raw water from the Solo River purchased from PJT1. The amount of water supplied from the Solo River is 21.24% of the company's total water supply.
- PDAM Lamongan uses only raw water from the Solo River purchased from PJT1.
- PDAM Gresik uses two sources of water: raw water from the Solo River and the Brantas River, which are purchased from PJT1. Before 2021, PDAM Gresik used only the Brantas River as its source of water, but from 2022 onwards, raw water has been purchased from the Solo River.

which purchase raw water from the Solo River from PJT1, purify it, and supply it to surrounding areas.

PDAM Bojonegoro's water supply is increasing every year. PDAM Lamongan's water supply decreased slightly in 2021, but recovered in 2022. PDAM Gresik used only the Brantas River (Java Island's second largest river flowing through East Java Province) as its water source before 2021, but since 2022 it has been purchasing raw water from the Solo River from PJT1 to supply water to the surrounding areas. As described in the qualitative survey results below, the operation of the Sembayat Barrage, which was constructed with the government's own funds (detailed design was conducted in this project), has expanded the water supply of the Solo River, and PDAM Gresik is now able to use the Solo River as its new water source.

Table 8: Trends in Water Supply Volume of Each PDAM (Only the Water Volume Supplied from the Solo River as the Water Source is Extracted)

(Unit: million $m^3$/year)

| Name of Local Water Supply Company | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| PDAM Bojonegoro | 1,957,194 | 2,062,125 | 2,109,630 | 2,304,345 | 2,520,835 |
| PDAM Lamongan | 5,569,025 | 5,797,987 | 5,871,589 | 5,781,427 | 6,200,436 |
| PDAM Gresik | - | - | - | - | 1,144,588 |

Source: Data obtained from each Local Water Supply Company (PDAM)

As a result of the qualitative survey, it was confirmed that water supply situation during the dry season improved after the project for all the water supply organizations (a total of 4 organizations in PJT1 and each PDAM). In addition, after the project, the number of complaints from customers about the amount of water supply decreased. However, all four organizations indicated that water supply was still limited during the dry season, although water supply had stabilized compared to before the project.

As a result of the qualitative survey, out of the 14 businesspeople, only two of them, the staff of an oil refinery and a fertilizer factory, which are large customers of PJT1, said that they are using Solo River water for their businesses. The remaining 12 companies were running small businesses using groundwater/well water supplied by BUMDES. Five of these 12 people were doing businesses outside of PDAM's water supply area. The remaining seven people indicated reasons for not using the Solo River water, including the high cost of water charged by PDAM and the poor quality of the water provided by PDAM during the dry season. When interviewed with two companies, an oil refinery and a fertilizer factory, about the water supply situation before and after the project, they mentioned that stable water

supply has been realized since the Bojonegoro Barrage started operation. However, as noted in footnote 12, these large-scale factories are taking risk countermeasures by building their own reservoirs or drawing water from the Brantas River to secure water sources other than the Solo River.

As a result of the qualitative survey, it was found that all 66 people (33 people involved in agriculture and 33 people living in the area) do not use water from the Solo River, but instead use groundwater and well water supplied by BUMDES. The reasons for not using the Solo River water are the same as those running the small businesses above. Some farmers were pumping water from the Solo River for agricultural work without permits.

Based on the above results of the trends in water supply volume from the Solo River in each PDAM and the qualitative survey, it can be said that the project has contributed to stable water supply of the Solo River compared to before the project, however, water supply during the dry season is still limited.

There is a difference in the effects of flood control and water utilization in this project, and when interviewed DGWR and BBWS about the reasons for this, they have responded that "reduction of flood damage in the lower reaches of the Solo River is a matter that directly affects many lives and is being addressed as a top priority." In light of this, this ex-post evaluation places more emphasis on flood control, which directly affects the lives of many people.

### 3.3.2 Impacts

#### 3.3.2.1 Intended Impacts

The state of generation of effects on "improvement of investment environment through stable water supply in the lower reaches of the Solo River Basin," "improvement of living environment" and "economic development of the East Java Region," which were categorized as the impacts of the project were confirmed from the results of questionnaire survey and interviews with DGWR, qualitative survey, data on the number of customers of water supply institutions as well as statistical data.

(1) Improvement of investment environment through stable water supply in the lower reaches of the Solo River Basin

Tables 9 to 12 show the trends in the number of customers of water supply organizations (PJT1 and each PDAM, a total of 4 organizations). Overall, the number of business and factory customers is on the rise. In particular, PDAM Gresik, shown in Table 12, has come to supply water from the Solo River from 2022 onwards, and has signed new large-scale contracts with 15 factories in the Gresik JIIPE Industrial Park. As mentioned above, this is

due to the expansion of the Solo River water supply as a result of the operation of the Sembayat Barrage, which was constructed with the government's own funds. Along with the development of the JIIPE Industrial Park, new residential areas are also scheduled to be developed in the surrounding area, and PDAM Gresik is actively marketing the area to expand the water supply for domestic use.

Table 9: Trends in the Number of PJT1 Customers

| | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| Industry | 4 | 4 | 4 | 4 | 4 |
| PDAM | 3 | 3 | 3 | 3 | 4 |

Source: PJT1

Note: PDAM has four institutions: Bojonegoro, Lamongan, Blora, and Gresik (new contract signed with Gresik in 2022)

Table 10: Trends in the Number of PDAM Bojonegoro Customers

| | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| Domestic | 29 | 31 | 29 | 27 | 26 |
| Business | 34,520 | 36,969 | 39,291 | 40,122 | 42,333 |
| Others | 2,505 | 2,593 | 2,681 | 2,823 | 2,867 |

Source: PDAM Bojonegoro

Table 11: Trends in the Number of PDAM Lamongan Customers

| | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| Domestic | 19,409 | 23,703 | 24,321 | 24,476 | 27,460 |
| Industry | 13 | 15 | 15 | 18 | 20 |
| Others | 1,906 | 1,363 | 1,394 | 1,433 | 1,481 |

Source: PDAM Lamongan

Note: New customers after 2021 include a manufacturing plant for water meter valves, an animal feed plant, a concrete plant, a cold storage warehouse, etc.

Table 12: Trends in the Number of PDAM Gresik Customers

| | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| Domestic | 93,396 | 97,372 | 101,321 | 78,520 | 82,455 |
| Of which, Solo River Water Users | - | - | - | - | 5,593 |
| Business | 215 | 226 | 235 | 169 | 173 |
| Of which, Solo River Water Users | - | - | - | - | 15 |
| Others | 1,821 | 1,947 | 2,024 | 1,389 | 1,572 |
| Of which, Solo River Water Users | - | - | - | - | 194 |

Source: PDAM Gresik

On the other hand, as a result of the qualitative survey, three out of 14 businesspeople (21%) answered that "this project is contributing to the improvement of investment environment." Specifically, respondents stated that "construction of the Bojonegoro Barrage has improved the surrounding landscape and increased the number of cafes and other facilities around the barrage," and that "the access road constructed by the project has improved the convenience of movement, and small business activities such as laundry shops, food stalls, and stores have started business."

Although it is not possible to verify the causal relationship with this project, as reference information, the Gross Regional Domestic Product (hereinafter referred to as "GRDP"), and the production values in industrial, commercial, construction, and agricultural sectors in Bojonegoro Regency, the project area located in the lower reaches of the Solo River, and in Gresik Regency, the project area further downstream of the Solo River are shown in Table 13. GRDP decreased in both regencies in 2020 but has been on the rise since the following year, achieving a V-shaped recovery. Similarly, the production values of commercial, construction, and agricultural sectors in Bojonegoro Regency and industrial, commercial, construction, and agricultural sectors in Gresik Regency decreased temporarily in 2020 or 2021 but recovered from the following year. The production value of the industrial sector in Bojonegoro Regency is on an increasing trend, with no decrease seen. It is possible that the temporary decline in 2020 or 2021 may have been due to the spread of COVID-19. Movement restrictions against COVID-19 were imposed throughout Indonesia, including in this region, with significant impacts on economic and social activities. At the time of the ex-post evaluation, the Indonesian government has lifted the movement restrictions.

Table 13: GRDP and Production Values in Industrial, Commercial, Construction, and Agricultural Sectors in Bojonegoro and Gresik Regency

(Unit: billion IDR)

| | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|
| Bojonegoro Regency | | | | |
| Gross Regional Product (Nominal GRDP) | 78,046 | 70,259 | 84,201 | 100,493 |
| Production Value in Industrial Sector (Manufacturing) | 4,680 | 4,764 | 5,149 | 5,720 |
| Production Value in Commercial Sector (Wholesale/Retail trade, etc.) | 6,677 | 6,338 | 6,973 | 7,846 |
| Production value in Construction Sector | 5,514 | 5,450 | 5,721 | 6,447 |
| Production Value in Agricultural Sector | 9,820 | 9,964 | 9,857 | 10,876 |
| Gresik Regency | | | | |
| Gross Regional Product (Nominal GRDP) | 138,894 | 134,269 | 144,656 | 163,908 |
| Production Value in Industrial Sector (Manufacturing) | 66,603 | 66,584 | 72,265 | 81,039 |
| Production Value in Commercial Sector (Wholesale/Retail trade, etc.) | 18,295 | 16,743 | 18,261 | 20,775 |
| Production value in Construction Sector | 13,484 | 12,625 | 12,904 | 14,328 |
| Production Value in Agricultural Sector | 10,285 | 10,337 | 10,160 | 11,085 |

Source: Indonesia Central Bureau of Statistics (BPS)

From the above, the project has contributed to improving the investment environment in the surrounding area to a certain extent, but the number of factories supplied with water by PJT1 has not increased. PDAM Bojonegoro's customers are mainly small and micro business customers. There has been no significant increase in the number of factories serviced by PDAM Lamongan. Therefore, large-scale effects are considered to be partial, such as the industrial park in Gresik, which PDAM Gresik has newly started supplying water since 2022.

(2) Improvement of living environment

As a result of the qualitative survey, all 66 people, including agricultural people (33 people) and residents (33 people), responded that there has been no flooding due to the overflow of the main Solo River, and that the sanitary environment during the rainy season has improved and the living environment has improved. In addition, 92% (61 people) responded that they were afraid of floods before the project, but they can now live with peace of mind after the project, and 71% (47 people) responded that they became more aware of disaster prevention and are taking flood countermeasures after the project. Other comments

include, “Access roads were constructed by the project, making travel more convenient,” “Local residents were able to participate in the construction work and earn extra income during the project period,” and “After the completion of the Bojonegoro Barrage, landscape has improved and it has become a place for residents to relax.”

Based on the above, it can be considered that the project is contributing to the improvement of living environment of surrounding residents.

(3) Economic development of the East Java Region

Although it is difficult to verify a direct causal relationship with the project since economic development is affected by factors other than the project, in order to confirm the assumptions made at the time of the appraisal, Table 14 shows the GRDP and the production values of industrial, commercial, construction, and agricultural sectors in East Java Province[19] for 2019-2022. GRDP decreased in 2020 but has been on the rise since the following year, achieving a V-shaped recovery. Similarly, the production values of the industrial, commercial, and construction sectors temporarily decreased in 2020, but recovered from the following year. The production values of the agricultural sector are steadily increasing. It is thought that the temporary decrease in 2020 may have been affected by the spread of COVID-19.

Table 14: GRDP and Production Values of Industrial, Commercial, Construction, and Agricultural Sectors in East Java Province

(Unit: billion IDR)

| Item | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|
| Gross Regional Product (Nominal GRDP) | 2,345,549 | 2,299,808 | 2,454,716 | 2,730,907 |
| Production Value in Industrial Sector (Manufacturing) | 711,055 | 705,263 | 753,752 | 835,711 |
| Production Value in Commercial Sector (Wholesale/Retail trade, etc.) | 433,800 | 412,016 | 452,684 | 509,939 |
| Production value in Construction Sector | 220,275 | 213,813 | 222,709 | 246,876 |
| Production Value in Agricultural Sector | 201,253 | 208,186 | 212,632 | 226,696 |

Source: Indonesia Central Bureau of Statistics (BPS)

In light of the above analysis of improvements in the investment environment and living environment, it can be inferred that this project has contributed to a certain extent to the economic development of East Java Province.

[19] East Java Province consists of 29 regencies and nine cities, including Bojonegoro and Gresik Regencies, which are the target areas of the qualitative survey.

3.3.2.2 Other Positive and Negative Impacts

1) Impacts on the Environment

This project was classified as Category A based on *the JBIC Guidelines for the Confirmation of Environmental and Social Consideration* (formulated in October 1999) since it involves the construction of a new large-scale reservoir. The Environmental Impact Assessment (EIA) for the development of the Bojonegoro Barrage and the Jabung Regulating Reservoir was approved by the East Java Provincial Government in December 2002 and November 2004, respectively.

According to DGWR and BBWS, environmental monitoring was conducted during the construction period based on the environmental management plan and the environmental monitoring plan, and BBWS reported the monitoring results to the East Java Provincial Government and Bojonegoro Regency every six months. It was confirmed through questionnaire responses and interviews that no negative impacts were reported during or after the project regarding the monitoring items of air quality, noise, river water quality, groundwater, and ecosystem. As for noise, it was pointed out that loud noises exceeding 55 dBA[20] were temporarily made, but there were no complaints from nearby residents. During the construction period, environmental mitigation measures were implemented, and silt fences were installed to protect against turbid water generated by river construction.

According to interviews with residents during the field survey, construction vehicles came and went during construction and there were temporary impacts such as dust and noise and the Solo River turned muddy, but no one complained of any particular problems and they indicated that there were no problems after the project.

Based on the above and the on-site inspection, it is considered that there was no particular negative impact on the environment.

2) Resettlement and Land Acquisition

According to questionnaire responses and interviews with DGWR and BBWS, the project only involved land acquisition and did not require resettlement (no residents are living in the land subject to land acquisition).

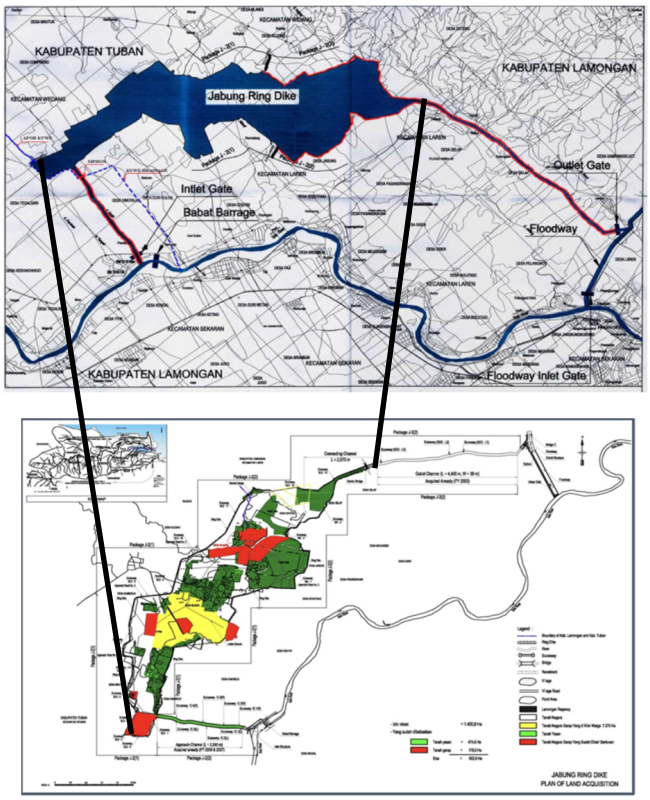
The issue of land acquisition on state land for the Jabung Regulating Reservoir remains unresolved. Specifically, people who engage in fishing and farming on land (258.11 ha) of the targeted state land for which compensation was not approved by the National Land Agency filed a lawsuit in court seeking compensation for their livelihoods. After going through the District and High Courts, the plaintiffs (farmers and fishermen) won their case

[20] 55 dBA is a slightly noisy level with loud irregular noise coming from outdoors. The International Finance Corporation (IFC) / World Bank noise level guidelines state that noise levels should not exceed 55 dBA during the day time (7:00-22:00) and 45 dBA during the night time (22:00-7:00) in residential areas.

in the Supreme Court's ruling on September 19, 2018, and it was confirmed that the government would pay compensation. At the time of the ex-post evaluation, the National Land Agency is currently surveying 485 plots of the target land, and DGWR aims to complete the process by the expiration date (December 2024) of the Location Determination Decree issued by the East Java Governor. However, there is no concrete prospects as to whether the surveying process and compensation calculation/agreement will be completed by the expiration date.

DGWR and BBWS responded that land acquisition procedures were carried out appropriately in accordance with Indonesian law and JICA guidelines. In addition, it was also confirmed with DGWR and BBWS that the process of land acquisition in the areas where land acquisition has already been completed was carried out in accordance with the land acquisition plan, and that the status of land acquisition was monitored. During the project implementation stage, they approached local governments (East Java Province, Tuban Province, etc.) to promote the plan, monitored the progress and persistently carried out discussions and negotiations while giving due consideration to the affected fishermen and farmers.

The location map of the Jabung Regulating Reservoir is shown in Figure 2. The area shown in yellow is the land (258.11ha) for which the plaintiff won in the Supreme Court judgment. The green area is private land (582.74 ha) and land acquisition has been completed. The red area is state land (178 ha) that has been certified as eligible for compensation by the National Land Agency, and land acquisition has been completed. The white area is state land (377.26ha) that is not subject to compensation payments, and there has been no particular movement from fishermen or farmers so far. According to BBWS, in light of the Supreme Court ruling, there is a movement for a new lawsuit from fishermen and farmers who operate on white area, seeking compensation.




Source: Prepared from materials provided by DGWR

Figure 2: Location Map of Jabung Regulating Reservoir

Based on the above, the issue of land acquisition for the Jabung Regulating Reservoir remains unresolved at the time of the ex-post evaluation, and there is no concrete prospect for its future. However, the executing agency continues to seriously deal with the land acquisition issues in order to realize the development of the Jabung Regulating Reservoir, and has indicated its intention to see the project through the end.

3) Gender Equality

No particular impact on gender due to the project could be confirmed.

4) Marginalized People

No particular impact on marginalized people due to the project could be confirmed.

5) Social Systems and Norms, Human Well-being and Human Rights

As mentioned above in "(2) Improvement of living environment" in "3.3.2.1 Intended Impacts" as a result of the qualitative survey, over 90% of respondents answered that they were able to live with peace of mind after the project. More than 70% of respondents answered that their awareness of disaster prevention increased after the project and that they

were taking flood countermeasures.

6) Unintended Positive / Negative Impacts

As mentioned above in "(1) Reduction of flood damage" in "3.3.1.2 Qualitative Effects (Other Effects)," due to synergistic effects of Phase I project, this project, and the government's own funded projects, the project objective of preparing for 20-year return period flood has largely been achieved.

The project has not achieved its quantitative indicator targets regarding water use, and its contribution to improvement of investment environment is partial. However, targets for flood control, which directly affects many lives, have been achieved, and no flood damage has occurred on the main Solo River since 2015, improving people's living conditions. In addition, Indonesian government is continuing to develop water resources-related infrastructure in the lower reaches of the Solo River using its own funds. In light of the above, this project has mostly achieved its objectives. Therefore, effectiveness and impacts of the project are high.

## 3.4 Sustainability (Rating: ③)

### 3.4.1 Policy and System

At the time of the ex-post evaluation, there are no changes to *the National Medium-Term Development Plan (2020-2024)* or DGWR's *Strategic Plan (Rencana Strategis) (2020-2024)*, and the government's policy of reducing flood damage and ensuring stable water supply through river improvement remains unchanged. In addition, it was confirmed through interviews with DGWR that there are no changes to the water resource management system in the Water Resources Law, Regulations of the Ministry of Public Works and Housing based on the Law, and the Statutory Plan.[21] (Policy and system described in "3.1.1.1 Consistency with the Development Plan of Indonesia" remain unchanged.)

From the above, sustainability of policy and system of the project is assured.

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[21] The following is a chronological summary of the government's legal and governance system in this sector.

<Legal system>

- Water Resources Law (Law Number 17 of 2019 concerning Water Resources)

<Regulations of the Ministry of Public Works and Housing>

- Regulation of the Minister of Public Works and Housing Number 4/PRT/M/2015 concerning Criteria and Determination of River Areas
- Regulation of the Minister of Public Works and Housing Number 17/PRT/M/2017 concerning Guidelines for Forming a Coordinating Team for Water Resources Management at the River Basin Level
- Regulation of the Minister of Public Works and Housing Number 21 of 2020 concerning River Channel Diversion

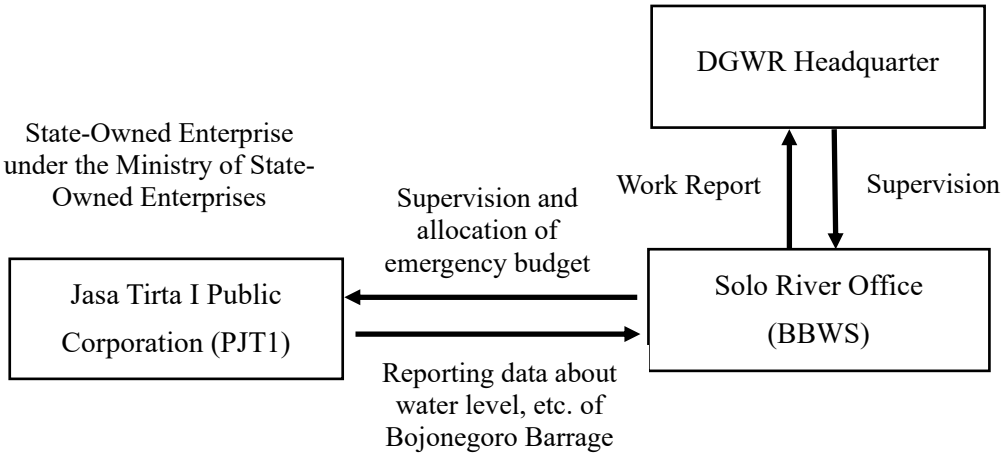
<Statutory Plans of the Minister of Public Works and Housing>

- *Strategic Plan for Water Resources Management (POLA)* (2023) indicating the direction of Solo River basin management
- *Water Resources Management Implementation Plan (RENCANA)* (2023) which is a concrete plan for implementing Soli River Basin management based on POLA

3.4.2 Institutional/Organizational Aspect

PJT1 is responsible for operation and maintenance of the Bojonegoro Barrage developed by the project. PJT1 is also responsible for operation and maintenance of water resource-related infrastructure such as the Babat Barrage, floodway, and the Jabung Regulating Reservoir outlet (spillway) that were constructed by Phase I project. PJT1 conducts operation and maintenance (routine maintenance, preventive maintenance, minor repairs, emergency repairs, etc.) of water resource-related infrastructure owned by DGWR in a total of five comprehensive river basins, including the Solo River and the Brantas River. In addition, as mentioned earlier in "3.3 Effectiveness and Impacts," PJT1 also supplies water (raw water) to large users such as Local Water Supply Company in Solo River Basin (PDAM Bojonegoro, PDAM Lamongan, PDAM Gresik, etc.) and large factories.[22] BBWS under DGWR, is in charge of water resource development (investment projects) and major repairs that cannot be handled by PJT1.

The organizational relationship diagram for operation and maintenance of the project is shown in Figure 3. Supervision and work reports are conducted among DGWR, BBWS, and PJT1. (PJT1 reports to BBWS on a quarterly basis data and information on the Bojonegoro Barrage, including water levels and volumes, water supply customer information, financial status, water allocation information, etc.) Division of roles and authority of each organization is clear and there are no problems. There are no particular concerns regarding communication and coordination or decision-making, either.




Source: Prepared from questionnaire responses

Figure 3: Organizational Relationship Diagram for the Operation and Maintenance of this Project

PJT1 Division 3 is in charge of operation and maintenance work in the field. Division 3 consists of 200 staff, 54 full-time employees and 146 contract employees, and is responsible for operation and maintenance of the Solo River Basin, including this project. At the

[22] The roles and responsibilities of PJT1 are stipulated in Government Regulation No. 46/2001 regarding PJT1.

Bojonegoro Barrage and the Babat Barrage constructed by Phase I project, water levels and volumes are constantly monitored, and Division 3 staff are stationed at the site in three shifts 24 hours a day, 365 days a year. Interviews with the staff in the field during the project site inspections indicated that the current staffing levels are mostly sufficient.

From the above, no particular problem has been identified regarding the institutional/organizational aspect of operation and maintenance.

### 3.4.3 Technical Aspect

The staff in charge of operation and maintenance of PJT1 Division 3 have acquired technical knowledge at graduate schools, universities, and vocational schools, and hold civil, mechanical, and electrical engineer qualifications. It was confirmed through questionnaire responses and interviews that the staff have acquired the basic skills necessary to perform day-to-day operation and maintenance work.

Maintenance manuals have been prepared and utilized in a timely manner at the on-site operation and maintenance offices adjacent to each barrage in the Solo River Basin, including the Bojonegoro Barrage. According to the on-site operations and maintenance staff, once the Karangnongko Barrage, which is under construction with government's own funds, is completed (scheduled for completion in 2027), a total of four barrages (Karangnongko, Bojonegoro, Babat, and Sembayat) will be developed in the basin, and a comprehensive manual that synchronizes the four barrages will need to be developed.

Training was conducted to BBWS and PJT1 staff in the operation of water gates of the Bojonegoro Barrage, maintenance and inspection of mechanical and electrical equipment, water level and water volume measurement techniques, and inspection of embankment, among others, to strengthen operation and maintenance management capacity through the consulting services provided by the project. According to interviews with participants of the training, many of them are still engaged in operation and maintenance work, share the training content with other staff members, and continue to maintain knowledge and skills they acquired through the training in their daily maintenance work. PJT1 also conducts regular training at least once a year on the Bojonegoro Barrage water gate operation, maintenance and inspection of mechanical and electrical equipment, measurement of water level and water volume, safety management of infrastructure facilities, staff safety, health, environment, etc. with more than 10 PJT1 staff participate in each training session. In addition, daily on-the-job training is provided to younger staff members by skilled senior staff members to improve their technical skills.

From the above, it is considered that the staff of PJT1 has sufficient technical capacity to conduct ordinary operation and maintenance work, and there are no particular problems.

3.4.4 Financial Aspect

The budget and actual expenditures for operation and maintenance costs for the Solo River Basin, including the project, are shown in Table 15.

Table 15: Operation and Maintenance Costs for the Solo River Basin, including the Project (Note 1)

(Unit: million IDR)

| | 2020 | 2021 | 2022 |
|---|---|---|---|
| Budget | 35,375 | 36,951 | 37,130 |
| Actual Expenditure (Note 2) | 29,905 | 37,691 | 37,908 |

Source: Results of questionnaire survey and interviews with PJT1

Note 1: Operation and maintenance costs for PJT1 Division 3.

Note 2: The reason that actual expenditures in 2021 and 2022 exceeded the budget was due to emergency repairs such as repairing damaged embankments. The excess amount was appropriated from the budget of other departments in PJT1.

According to PJT1, operation and maintenance costs of the project are covered by water fees collected from water users, but due to the lack of water resources in the Solo River, revenue is limited and it is not enough for PJT1 to carry out all operation and maintenance activities.[23] For this reason, PJT1 is trying to make up for the shortfall by diversifying its operations[24] with the aim of increasing revenue. In addition, various efforts are being made to prioritize operation and maintenance activities, to minimize the negative impacts of budget shortfalls, and to effectively utilize BBWS budget by conducting maintenance activities in cooperation with BBWS.

Financial data for the entire PJT1 is shown in Table 16. PJT1 is self-financed and receives no subsidies from the government. Although operating revenue decreased in 2020, there was a V-shaped recovery in 2021, with revenue exceeding that in 2019. On the other hand, operating expenses are increasing year by year, so although income is on a recovery trend, it remains at over 60% of 2019, and profit is also over 70% of 2019. According to PJT1, COVID-19 did not have any particular impact on its finances.

[23] The water rate level for supplying raw water to users is determined by the Ministry of Public Works and Housing. According to BBWS, the 2022 operation and maintenance cost for PJT1 was 32% of the annual budget required for operation and maintenance of the lower reaches of the Solo River Basin, as calculated in a 2015 study conducted by the Ministry of Public Works and Housing.

[24] According to PJT1, it sells bottled drinking water sourced from the Brantas River, provides water quality testing services, and provides office building rental services.

Table 16: Financial Data for the Entire PJT1

(Unit: million IDR)

| | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|
| Operating Revenue | 501,058.36 | 544,732.79 | 488,617.75 | 570,198.28 |
| Operating Expenses | 365,049.37 | 391,332.67 | 411,939.17 | 474,728.56 |
| Income | 136,008.99 | 153,400.12 | 76,678.58 | 95,469.72 |
| Non-Operating Income | 38,592.52 | 15,115.04 | 12,703.24 | 12,527.36 |
| Non-Operating Expenses | 27,858.26 | 11,613.98 | 3,523.71 | 4,244.00 |
| Non-Operating Income (Loss) | 10,734.26 | 3,501.06 | 9,179.53 | 8,283.36 |
| Income Before Income Tax Expense | 146,743.25 | 156,901.18 | 85,858.11 | 103,753.08 |
| Income Tax Benefit | 32,915.40 | 35,857.34 | 20,311.85 | 17,725.80 |
| Profit for the Year | 113,827.84 | 121,043.84 | 65,546.26 | 86,027.28 |
| Other Comprehensive Income | 0.38188657 | -952.4 | 6,335.19 | - |
| Total Other Comprehensive Income After Tax | 117,197.39 | 120,091.49 | 71,881.45 | 548.16 |
| Income of Owners of the Parent | 113,827.8 | 121,025.90 | 65,515.85 | 85,976.52 |
| Non-Controlling Interests | - | 17,972.10 | 30.41 | 50.77 |
| Comprehensive Income of Owners of the Parent | 117,197.40 | 120,073.50 | 71,851.04 | 86,524.67 |
| Non-Controlling Interests | - | 17,972.10 | 30.41 | 50.77 |

Source: PJT1 Annual Report (2021)

According to PJT1, once the Karangnongko Barrage, which is under construction with the government's own funds, is completed (scheduled for completion in 2027), it is expected that water utilization capacity of the Solo River will be strengthened and shortage of water resources will be alleviated. Accordingly, PJT1's revenue is expected to increase, and increase in operation and maintenance budget can also be expected.

From the above, it can be said that although there are some problems with the financial aspects of operation and maintenance, there is a high prospect of improvement in the medium term.

### 3.4.5 Environmental and Social Aspect

As mentioned above in "2) Resettlement and Land Acquisition" in "3.3.2.2 Other Positive and Negative Impacts," land acquisition for the Jabung Regulating Reservoir has not been completed, and DGWR aims to complete the procedure by December 2024. But there is no concrete prospect at the time of the ex-post evaluation. However, the executing agency has expressed its intention to see the project through the end to realize the development of the

Jabung Regulating Reservoir.

### 3.4.6 Preventative Measures to Risks

According to BBWS, due to the effects of global warming and other factors, localized torrential rains are occurring in a short period of time, causing a rapid rise in river water levels, and the risk of flooding is increasing due to damage to weak areas of embankments. For this reason, PJT1 is taking measures to address risks, such as revising the barrages' water gate operating manuals to be able to handle sudden increases in water.

### 3.4.7 Status of Operation and Maintenance

The facilities of the Bojonegoro Barrage developed by the project are operating without any problems, and operation and maintenance status is good and there are no problems. On the other hand, the FFWS is not operational. See "3.1.1.3 Appropriateness of the Project Plan and Approach" for the reason. As mentioned above, since 2015, there has been no flood damage to the downstream area due to the overflow of the main Solo River, and there have been no negative impacts due to the non-operation of the FFWS. At the time of the ex-post evaluation, DGWR expressed to the external evaluator that it would make maximum efforts in collaboration with the newly established Directorate of Water Resources Engineering Development to restart the FFWS.

Spare parts are stored at the PJT1 Division 3 field office adjacent to the Bojonegoro Barrage. At the time of the ex-post evaluation, no major repairs were required, and purchases and storage were considered to be the minimum. In addition, spare parts can be procured within Indonesia, and there were no particular problems.

Based on the above, regarding operation and maintenance status, the FFWS is not being used at the time of the ex-post evaluation, but maximum efforts will be made to restart it.

Slight issues have been observed in the financial, and environmental and social aspects including the current status of operation and maintenance, however, there are good prospects for improvement/resolution. Therefore, sustainability of the project effects is high.

## 4. Conclusion, Lessons Learned and Recommendations

### 4.1 Conclusion

This project improved the lower reaches of the Solo River in East Java Province with the aim of mitigating flood damages and providing a stable water supply in the area, thereby contributing to the economic development of the East Java Region through improvement of investment environment, etc. In the lower reaches of the Solo River, water resource development is progressing from a comprehensive perspective, including flood control and water utilization, and

the objective of this project is consistent with the policies and needs at the time of the appraisal and the ex-post evaluation. However, there were some issues with the appropriateness of the project plan and approach regarding the introduction of FFWS and land acquisition. The project is consistent with Japan's development cooperation policy and concrete results can be confirmed through collaboration with another project within JICA. The project also contributes to the SDGs goals, an international framework. Therefore, its relevance and coherence are moderately low. In terms of project implementation, the project cost was within the plan, but regarding the project period, the project is not completed at the time of the ex-post evaluation because land acquisition by the executing agency has not been completed. Therefore, efficiency of the project is moderately low. Regarding project effects, quantitative indicators related to water utilization have not achieved the targets, and contribution to improvement of investment environment is partial. However, it was confirmed through interviews with the executing agency and local residents, etc., as well as concrete evidence data, that the objectives for flood control, which directly affects many lives, have been achieved, that no flood damage has occurred on the main Solo River since 2015, and that people's living conditions have been improved. Thus, effectiveness and impacts are high. Regarding operation and maintenance, slight issues have been observed in the financial, and environmental and social aspects including the current status, however, there are good prospects for improvement/resolution. Therefore, sustainability of the project effects is high.

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

## 4.2 Recommendations

### 4.2.1 Recommendations to the Executing Agency

<Understanding water sources and water usage status in water supply areas>

One of the reasons why the actual values of quantitative effect indicators for water use were significantly lower than the target values is that there are water uses that are not grasped by DGWR and BBWS. In addition, field survey also confirmed that farmers and others are pumping water from the Solo River for agricultural and other activities without permission. Therefore, it is important for BBWS and PJT1, in cooperation with local governments,[25] to first survey the locations of wells, reservoirs, springs, etc., their water storage capacities and water supply destinations, and to understand water sources other than the Solo River and their water use in the water supply area. In addition, as a countermeasure against non-revenue water, it is desirable for BBWS and PJT1 to investigate the actual situation of illegal water intake and take measures such as holding discussions with water user associations to prevent individual farmers from drawing water from the Solo River in a disorderly manner.

[25] A permit from the local government is required to take water from water sources such as wells, reservoirs, and springs.

<Smooth and prompt action to restart the FFWS>

The FFWS is not in operation at the time of the ex-post evaluation. DGWR is expected to take smooth and prompt action in cooperation with the newly established Directorate of Water Resources Engineering Development and make maximum efforts to restart the FFWS.

<Systematic preparation for the development of the Jabung Regulating Reservoir>

Regarding the land acquisition issue in the state land of the Jabung Regulating Reservoir, the Supreme Court ruled in favor of the farmers and fishermen, and it was confirmed that the government would pay compensation for their livelihood. At the time of the ex-post evaluation, the National Land Agency was surveying 485 plots of target land, and DGWR aims to complete the land procedures by December 2024. DGWR and BBWS are expected to proceed with preparations in a planned manner, including securing budgets, so that they can promptly start the development of the Jabung Regulating Reservoir as soon as possible after the completion of the procedures.

<Preparation of a comprehensive manual that synchronizes the four barrages>

Manuals regarding the operation of water gates for the barrages that have been developed in the lower reaches of the Solo River (Bojonegoro Barrage, Babat Barrage, and Sembayat Barrage) have been prepared individually for each barrage and are not coordinated. Once the Karangnongko Barrage, which is currently under construction with the government's own funds, is completed (expected completion in 2027), a total of four barrages will be in operation. So DGWR, BBWS and PJT1 should cooperate and coordinate to develop a comprehensive manual that synchronizes the four barrages before the Karangnongko Barrage is completed.

4.2.2 Recommendations to JICA

None.

4.3 Lessons Learned

Importance of early preparation and coordination for land acquisition

Land acquisition has not yet been completed for both Phase I project and this project, and the projects are not yet completed. In Phase I project, residents living on private land refused to accept compensation and relocate. The land at issue in this project is state land, where residents do not reside, and the residents, who make a living from agricultural and fishing activities, have filed a lawsuit in court seeking compensation for their livelihood. Based on the experience in Phase I project, DGWR and BBWS have recognized the risk of land acquisition becoming an issue when planning and have prepared for this project, and as a result, land acquisition on private land was completed, but the project developed into a lawsuit regarding state land. In addition, the project had planned to start preparations for land acquisition prior to the signing of the loan agreement,

but preparations actually started one year and 10 months after the signing of the loan agreement. DGWR could have found a way to resolve the issue through discussions with the people who are engaged in agriculture and fishing on state lands by consulting with them from an early stage prior to the start of the project and by explaining the specific benefits of the development of the Jabung Regulating Reservoir under the project to gain their understanding. Therefore, it is important for the executing agencies to ensure sufficient preparation time for discussions with potential stakeholders from the time of project formulation, to negotiate making all possible predictions, and to take all measures.

Importance of detailed training and adequate support system on the part of the executing agency when introducing a new system

The FFWS installed in this project is not in operation at the time of the ex-post evaluation. Based on lessons learned from similar projects in the past, the plan was to provide integrated support for both hard infrastructure and soft infrastructure by strengthening the capacity of the executing agency staff, etc., in addition to hard infrastructure measures through construction of facilities. Although integrated support was actually provided, it did not work out as a result. The FFWS was a new system for DGWR and BBWS, and the consulting services for this project provided training on the operation of the FFWS. However, training period was short, only three days, and the training location was not on-site in the Solo River Basin, so practical technology transfer did not take place. As a result, the trainees were unable to acquire sufficient skills and did not know how to deal with problems when they actually occurred on site. In addition, the system to support BBWS was not in place within the Ministry of Public Works and Housing, and DGWR left the actual operation to BBWS in the field, and BBWS staff in the field were unable to fully utilize the FFWS. Therefore, when introducing a new system or a technology in a project, it is important for the executing agency to establish a backup system in full cooperation with related organizations from the planning stage. In addition, training should be planned and implemented in a practical manner so that trainees can fully understand and operate the equipment appropriately on their own. It is important to secure the training period necessary for acquiring the skills and to provide detailed technology transfer.

## 5. Non-Score Criteria

### 5.1 Performance

#### 5.1.1 Objective Perspective

None.

### 5.2 Additionality

The additionality of this project is JICA's support for comprehensive water resource

management to the lower reaches of the Solo River Basin. This project is based on *the Comprehensive Development Master Plan for the Lower Solo River Basin,* and JICA has supported water resource development in the lower reaches of the Solo River Basin by Phase I project and this project from a long-term and comprehensive perspective, including flood control and water utilization. As part of the consulting services for this project, *the Comprehensive Development Master Plan for the Lower Solo River Basin* was reviewed, and detailed design of the Sembayat Barrage, which was developed with the government's own funds, and basic design of the Karangnongko Barrage, which will be developed with the government's own funds, were conducted under this project. In fact, synergistic effects of Phase I project, this project, and the government's own funded projects have resulted in responding to 20-year return period flood, indicating that support for water resource management in the lower reaches of the Solo River Basin from a long-term and comprehensive perspective has been successful.

(End)

Comparison of the Original and Actual Scope of the Project

| Item | Plan | Actual |
|---|---|---|
| 1. Project Outputs | 1) Civil Works<br>・ Construction of Jabung Regulating Reservoir and accompanying drainage channel (water storage capacity of 30.5 million $m^3$)<br>・ Construction of Bojonegoro Barrage (movable barrage: barrage width 140m)<br>2) Ancillary Facilities (FFWS)<br>・ 15 rainfall observation stations, 12 water level observation stations<br>3) Consulting Services<br>・ Detailed design<br>・ Tender assistance<br>・ Construction supervision<br>・ Study and review of existing Master Plan for Solo River Basin management<br>・ Detail design review of dike, Sembayat Barrage and Jero swamp development, etc.<br>・ Training of staff of executing agency, etc. | 1) Civil Works<br>・ Construction of the regulating reservoir's connecting channel and some of the water gates has progressed, but is not yet completed<br>・ As planned<br>2) Ancillary Facilities (FFWS)<br>・ 10 rainfall observation stations, 6 water level observation stations, 2 rainfall + water level observation stations, 3 water level + water quality observation stations<br>3) Consulting Services<br>・ As planned<br>・ As planned<br>・ As planned<br>・ As planned<br>・ As planned<br>・ As planned |
| 2. Project Period | April 2005-May 2014<br>(110 months) | March 2005-Project not completed<br>(222 months until August 2023) |
| 3. Project Cost<br>Amount Paid in Foreign Currency<br>Amount Paid in Local Currency<br><br>Total<br>ODA Loan Portion<br>Exchange Rate | <br>2,205 million yen<br><br>8,790 million yen<br>(local currency 732,500 million IDR)<br>10,995 million yen<br>9,345 million yen<br>1 IDR = 0.012 yen<br>(As of September 2004) | <br>8,515 million yen<br><br>1,923 million yen<br>(local currency 198,780 million IDR)<br>10,438 million yen<br>8,515 million yen<br>1 IDR = 0.0096762 yen<br>(Average between 2005 and 2018) |
| 4. Final Disbursement | October 2017 | |

(End)

Republic of Paraguay

FY2022 Ex-post-Evaluation Report of Japanese ODA Loan Project

"Rural Roads Improvement Project"

External Evaluator: Hajime Sonoda, Global Group 21 Japan, Inc.

## 0. Summary

"Rural Roads Improvement Project" (hereinafter referred to as "the Project") was implemented to build a road network in the eastern region of Paraguay by paving unpaved rural roads with gravel / rubble and replacing aged wooden bridges, thereby contributing to the economic revitalization of the country and the improvement of the living environment for local residents. The Project was consistent with Paraguay's development plans and needs at both the time of planning and ex-post evaluation, and with Japan's ODA policy at the time of planning. As active coordination and collaboration with other donors were also observed, the Project's relevance and consistency are high. The output was less than planned, and the project cost and project period were larger than planned, thus the efficiency of the Project is low. All the target roads are now open to vehicular traffic year-round, and the hazards posed by the aging wooden bridges have been eliminated. Since the Project also realized an increase in traffic volume, a decrease in travel time, and a decrease in travel costs, it is judged that the objectives of the Project were achieved. After the implementation of the Project, many residents along the road began to use vehicles to travel, and it was observed that the travel time to the town was significantly reduced, and the frequency of visits to medical institutions and shipments of agricultural products increased. Therefore, it is considered that the road improvement by the Project has led to improvements in various aspects of their lives, and for some residents, it has also led to an increase in their income. Based on the above, the effectiveness and impact of the Project are high. There are no particular policy, institutional, or technical issues regarding the sustainability of the Project. The operation and maintenance conditions of roads and bridges of the Project are generally good. However, due to financial constraints, the road maintenance directly managed by the Paraguayan Ministry of Public Works and Communication (hereinafter referred to as "MOPC") is not sufficient, and a clear direction for financing road maintenance in collaboration with local governments has not been decided. Therefore, the sustainability of the Project is moderately low. Based on the above, the Project is evaluated to be partially satisfactory.

## 1. Project Description

Project Location


Gravel paved rural road[1]

### 1.1 Background

In 2010, nearly 90% of the 60,000 km of roads in the Republic of Paraguay (hereinafter referred to as "Paraguay") were unpaved, and the paved road length per 1,000 population was only 0.8 km in Paraguay, compared to 3 km in Argentina and 4 km in Uruguay. Unpaved roads were often cut off by rainfall, making them impassable to vehicles and limiting the shipment of agricultural products for local consumption and even for exports, which had a major impact on the local economy. In addition, local residents' access to schools, hospitals, and other facilities was also suspended during rainfall, which interfered with their daily lives. On the other hand, many of the bridges on rural roads were wooden bridges that were more than 40 years old, and safety was a major problem due to accidents involving collapsed bridges caused by decay from aging.

MOPC, which is responsible for road construction and maintenance, has been promoting road maintenance with financial support from the Inter-American Development Bank (IDB) and others. For rural roads, the First Rural Road Improvement Program (PNCR-1) and the Second Rural Improvement Program - Phase I (PNCR-2 Phase I) have been implemented since 1993. The Project is a part of the succeeding Second Rural Road Improvement Program - Phase II, and the loan agreement was signed in September 2010 as a co-financing project with the Inter-American Development Bank (IDB) and the OPEC Fund for International Development (OFID).

[1] All photographs in this report were taken by the external evaluator during the site visit.

### 1.2 Project Outline

To build a road network in the eastern region of Paraguay by paving unpaved rural roads with gravel / rubble and replacing aged wooden bridges, thereby contributing to the economic revitalization of the country and the improvement of the living environment for local residents.[2]

| | | |
|---|---|---|
| Loan Approved Amount/ Disbursed Amount | 4,822 million / 4,549 million | |
| Exchange of Notes Date/ Loan Agreement Signing Date | June 2010/ September 2010 | |
| Terms and Conditions | Interest Rates: | 0.8% (0.01% for consultants) |
| | Repayment: | 20 years |
| | (Grace period: | 6 years) |
| | Conditions for Procurement: | General untied |
| Borrower / Executing Agency | Republic of Paraguay / Ministry of Public Works and Communications (MOPC) | |
| Project Completion | June 2020 (outputs covered by ODA loans) | |
| Target Area | Eastern Paraguay (Misiones, Paraguarí, Guairá) | |
| Main Contractor (Over 1 billion yen) | Compania de Construcciones Civil (Paraguay) / Vialtec S.A (Paraguay) / Empresa Constructora Bauman S.A (Paraguay) (JV) | |
| Main Consultant (Over 100 million yen) | Latin America Koei Corporation (Japan) / Nippon Koei Co. | |
| Related Studies (Feasibility Studies, etc.) | SAPI (Special Assistance for Project Implementation, JICA) | |
| Related Projects | "National Rural Roads Program Stage 2" IDB / OFID, The World Bank's project to improve trunk and local roads in the three eastern provinces | |

[2] In the ex-ante evaluation sheet of the Project, it was stated as part of the project objectives that the project would "strengthen the organization and improve the maintenance and management system for road maintenance and management in local governments." The same was implemented under the IDB project, a co-financing project, but the Project did not have fund allocated for this purpose, nor was it planned in the consultant's scope of work. Therefore, the description in this ex-post evaluation is in line with what was actually planned for the Project.


Fig. 1 Departments covered by the co-financing projects

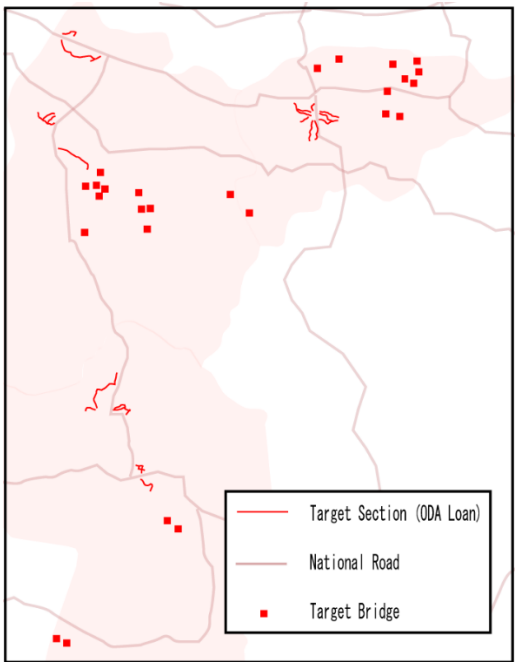



Fig. 2 Road sections and bridges covered by the ODA loan

## 2. Outline of the Evaluation Study

### 2.1 External Evaluator

Hajime Sonoda (Global Group 21 Japan, Inc.)

### 2.2 Duration of Evaluation Study

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

Duration of the Study: December 2022 - March 2024

Duration of the Field Study: March 30 - April 19 and June 7 - 10, 2023

## 3. Results of the Evaluation (Overall Rating: C[3] )

### 3.1 Relevance / Coherence (Rating:③[4])

3.1.1 Relevance (Rating:③)

3.1.1.1 Consistency with the Development Plan of Paraguay

Paraguay's road sector development policy was defined based on the MOPC's 2008-2013 Five-Year Plan. The plan included: (i) establishment of a trunk road network, (ii) improvement of road conditions for local industrial and civilian use, and (iii) fundamental improvement of the road maintenance system. The Project falls under (ii) and (iii), and was positioned as an important project in the transportation sector.

[3] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

[4] ④: Very High, ③: High, ②: Moderately Low, ①: Low

"The National Development Plan: Paraguay 2030" at the time of the ex-post evaluation identified three strategic axes: (i) poverty alleviation and social development, (ii) inclusive economic growth, and (iii) entry into the international community. The Project is considered important in relation to improving access to social services for poverty alleviation and social development, and internal and external connectivity for inclusive economic growth.

Based on the above, the Project is consistent with the development policy at the time of planning and post-evaluation.

#### 3.1.1.2 Consistency with Development Needs of Paraguay

As mentioned above, at the time of appraisal of the Project, unpaved roads in Paraguay were cut off due to becoming muddy or flooded during rainy weather, which had a significant impact on the local economy and hindered the lives of local residents. In addition, the hazardous nature of aged wooden bridges was a problem.

According to the MOPC's Transportation Master Plan (revised in 2020) at the time of the ex-post evaluation[5], as of June 2018, 6,939 km of Paraguay's total road network of 77,471 km were paved with asphalt or concrete, 2,407 km with rubble / gravel pavement which is same as the Project, and 88% of the total roads, or 68,125 km, were unpaved laterite roads. The Master Plan called for the improvement of unpaved roads to rubble / gravel pavement, as well as gradual improvement of the existing rubble / gravel roads to asphalt pavement. Since all the roads and bridges improved by the Project are fully utilized and leading to the Project's effectiveness (see Effectiveness and Impact section), their importance is considered to be maintained at the time of the ex-post evaluation.

Based on the above, the Project is consistent with Paraguay's needs at the time of planning and ex-post evaluation.

#### 3.1.1.3 Appropriateness of the Project Plan and Approach

The following can be pointed out regarding the plan and approach of the Project. However, it cannot be said that these reduce the relevance of the Project.

- The project formation process was appropriate, as candidates for target roads were selected through a public participation process with objective selection criteria, and target roads were determined according to priority within the amount of funds available. However, the actual unit cost of constructing roads and bridges was much higher than assumed at the time of appraisal, and the Project was only able to build two-thirds of the planned road length (see Efficiency).

[5] "ACTUALIZACIÓN DEL PLAN MAESTRO DE INFRAESTRUCTURA Y SERVICIOS DE TRANSPORTE DEL PARAGUAY 2018 - 2028"

- The issues related to the maintenance of roads and bridges of the Project have an unfavorable influence on sustainability (see Sustainability). At the time of appraisal, it was planned that, based on the results of maintenance through agreements with local governments to be tried in the IDB project, a similar system of maintenance would be implemented in the Project. However, in reality, there was no budget for such a system in the Project, and no such maintenance system was established. According to MOPC, the maintenance system established under the agreement with the local government for the IDB project ceased functioning once the project was terminated and financial resources were no longer available. Therefore, it cannot be said that the failure to implement this system in the Project had a significant impact on its sustainability.

- After the commencement of the Project, the detailed design and construction cost estimates for each bridge and road section revealed that the Project cost had increased significantly and that the proposed bridge and road segments could not be constructed entirely with the amount of the ODA loan agreement. Therefore, in November 2014, MOPC proposed to JICA that all bridges that urgently need to be cleared of hazards be included in the loan, while only about half of the road sections would be covered by the loan and the remaining sections would be constructed with other funds, to which JICA concurred. Subsequently, MOPC constructed a portion of the rural roads not covered by the ODA loan with funds from the Development Bank of Latin America and the Caribbean (CAF) and the FONPLATA Development Bank. The above arrangements were appropriate because the roads and bridges were constructed according to need and priority, within the limits of available funds.

### 3.1.2 Consistency (Rating:③)

#### 3.1.2.1 Consistency with Japan’s ODA Policy

At the time of appraisal, based on the results of policy discussions with the Government of Paraguay, the Government of Japan had identified "poverty reduction," "sustainable economic development," and "governance" as three priority areas for assistance. Support for the road sector was considered extremely important in terms of both poverty reduction and sustainable economic development, and two of the six development issues identified under these priority areas of assistance, "improving the livelihoods of the poor" and "improving economic and social infrastructure," were consistent with the development of the road sector. Therefore, the Project is consistent with Japan's ODA policy at the time of planning.

#### 3.1.2.2 Internal Coherence

JICA has been supporting Paraguay's road sector through several ODA loan projects and

grant assistance since 1977. After the start of the Project, JICA has been supporting road development in the eastern region through the ODA loan "Eastern Region Export Corridor Improvement Project" (since 2014). However, no specific linkage with the Project was planned or implemented for either of these projects.

3.1.2.3 External Coherence

The Project was a parallel type of co-financing for Phase II of the Second Rural Road Improvement Program with IDB and OFID separating the project implementation area.[6] The roads constructed under the Project, IDB, and OFID projects were all local roads in rural areas, and since the target departments were different, there were no synergies from interconnection at the facility level. On the other hand, as shown below, consulting services procured by MOPC through each donor fund were also used for other donor projects, suggesting that such interoperation that were not anticipated at the time of the appraisal resulted in synergies.

- MOPC has an IDB Project Implementation Unit supported by consultants hired with IDB funds, and the Project and other OFID-funded projects were implemented under this unit.
- The road sections and bridges to be covered by the Project were proposed by JICA through the "Special Assistance for Project Implementation" (hereinafter referred to as "SAPI Study") conducted after the loan agreement. Some of the bridges in urgent need were constructed with IDB funds and the rest with the Project.
- A portion of the road sections was implemented within the ODA loan funds of the Project, and a portion of the remaining sections was implemented with other funds. The detailed design of the bridges covered by the Project was prepared by the funds of the IDB Project. The consultant for the Project prepared the detailed design of the road sections proposed by SAPI Study, a part of which was financed by the ODA loan and the rest by other donors' funds.

It should be noted that the World Bank's "Road Maintenance Project" (2006-2016) improved National Highway No.4, which passes through the Misiones Department, the target area of the Project, but the road sections of the Project are not directly connected to the road sections improved by the World Bank.

Based on the above, the Project is consistent with Paraguay's development plans and needs at both the planning and ex-post evaluation stages, as well as with Japan's development

[6] IDB and OFID signed loan agreements in September 2009 and October 2009, respectively.

cooperation policy at the time of planning. Active coordination and collaboration with other donors were also observed. Therefore, its relevancy and coherence are high.

### 3.2 Efficiency (Rating:①)

At the time of the appraisal, it was planned that improvement of all the road sections targeted by the Project would be financed with the ODA loan, however, based on the results of the SAPI study, it was decided to use other donor funds for some road sections. Therefore, comparison of the outputs, project cost, and project period between the plan at the time of the appraisal and the actual results was made for the entire Project, including the road sections covered by the ODA loan and other donor funds.

#### 3.2.1 Project Outputs

The outputs planned and implemented in the Project are shown in Table 1. Most of the road sections targeted by the Project are rural roads of 5 to 20 km in length connecting rural areas to local cities. At the time of appraisal, it was planned that the specific road sections and bridges to be improved by the ODA loan would be determined under certain criteria, selecting the sections with the higher priority within the planned project cost, in the selection study to be conducted after the signing of the loan agreement.

Table 1: Planned and actual outputs

| | Planned outputs (at the time of appraisal) | Actual outputs |
|---|---|---|
| Road improvement: Rubble / gravel paving of unpaved roads | Approx. 350 km | ODA loan: 23 sections, 149 km<br>Other funds: 7 sections, 49 km<br>Total : 30 sections, 198 km |
| Bridge improvement: Replacement of wooden bridges with concrete bridges | Approx. 1,000m | 27 bridges 943m |
| Consulting Services | Detailed design, bidding assistance, construction supervision, etc. | As planned |

Source: Prepared by materials provided by JICA and MOPC
Note: At the time of planning, the target road sections and bridges had not been finalized and the number of bridges had not been specified.

After the signature of loan agreement in September 2010, a SAPI study was conducted from February to November 2011, which included "participatory road planning" involving local government and community representatives in the three target departments, review of detailed bridge designs funded by the IDB, unit costs study for road and bridge construction, and selection of target bridges and road sections. The study proposed 33 bridges (totaling 1,124 m) and 42 road sections (totaling 310 km) for the Project.

As described in the "Relevance" section, it was found that the proposed bridges and road sections could not be constructed entirely with the agreed amount of the ODA loan, so all bridges that were urgently needed to eliminate hazards, with the exception of bridges that had already been constructed with other funds, and about half of the proposed road sections (total 149 km: about 70 km of rubble pavement and 80 km of gravel pavement) were covered by the ODA loan. Subsequently, out of the approximately 160 km of rural roads that were not covered by the ODA loan, MOPC constructed 49 km in the Misiones and Guairá Departments with funds from CAF and FONPLATA Development Bank. The construction contract for them included maintenance for 2 to 2.5 years, along with road improvement with rubble and gravel pavement. The road improvements in Misiones and Guairá Departments were completed in August 2022 and March 2023, respectively, and both will be maintained until March 2025. As a result, of the 310 km proposed by the SAPI study, a total of 198 km have been constructed with the ODA loan and other funds. This is 57% of the 350 km planned at the time of appraisal.

According to the results of the field inspections, the quality of the rubble pavement, bridges, drainage facilities, and other concrete structures that were constructed under the Project with ODA loan are all considered to be of sufficiently high. As for the gravel pavement, although there were some sections where road surface drainage was difficult due to the topography and other reasons, in general, it is considered that the appropriate materials were used for construction with sufficient compaction. Therefore, the construction quality of the Project is considered to be generally high.

<Participatory Road Planning>

The Project adapted the "Participatory Road Planning" introduced in the earlier projects implemented by MOPC with the support of the IDB. This involved prioritizing road sections applying selection criteria through workshops with community representatives, which were held three times each in each department. For the Project, they were conducted through the SAPI study, and the following selection criteria were taken into account. The beneficiary area of each road section was defined as 1.5 km from the road.

- Number of connected municipalities
- Importance of urban / rural connections
- Total length of rural roads to be connected
- Number of markets to connect
- Area of connected agricultural and pastoral land
- Number of connected tourism attractions
- Number of beneficiaries
- Number of clinics and schools along the route
- Poverty rate
- Percentage of protected areas along

It should be noted that "traffic volume" and "number of grain silos" were planned to be included in the selection criteria at the time of appraisal, but were not considered in the SAPI study because measuring traffic volume on each road section requires a lot of fund and time, and there are few grain silos in the target departments.

<Road improvement by the Project>

Rubble pavement is laid with broken stones, and its construction is time-consuming because it is done by hand. It is used in residential areas, in front of schools, and on slopes with large inclinations, since the speed of vehicles is reduced and there is less dust when the vehicles are traveling. It is resistant to rainfall, and periodic repair work on the road surface is virtually unnecessary. On the other hand, it has been pointed out that the vehicles vibrate violently when traveling, resulting in high maintenance costs for motorcycles and other vehicles.

Gravel pavement is made of a pebbly soil called *ripio* which is widely distributed in Paraguay. Gravel pavement is completed when *ripio* is spread, shaped, and compacted. If the pavement is kept in good condition, vehicles can travel at speeds of 70 to 80 km per hour, but dust is generated when the pavement dries out. If *ripio* is lost due to rainfall or water runoff, the road becomes just an unpaved road, and the road surface deteriorates. Drainage facilities are important, and the road surface needs to be regularly repaired by replenishing *ripio* and compaction according to the condition of the road surface.

Rubble paved section

Surface of rubble paved road

Gravel paved section

Example of unpaved road

Bridge after replacement

### 3.2.2 Project Inputs

#### 3.2.2.1 Project Cost

The total cost planed for the Project was 5,692 million yen (including 4,822 million yen of the ODA loan), and all civil engineering costs (excluding taxes) were planned to be covered by the ODA loan (Table 2). In reality, the cost of civil works increased because road sections that could not be implemented with the ODA loan were implemented with other funds. In addition, the cost of consulting services increased due to the prolonged project period. Although the project cost excluding the construction cost of the sections covered by other funds was within the plan, the total project cost, including the construction cost of the sections covered by other donor funds (696 million yen), was 5,998 million yen, which was 5% higher than the plan.

Reasons for the increase in civil works costs for the Project include the following.

- The detailed design of the bridges was conducted earlier with IDB funds, during which the width of some bridges was increased from 6 m to 10 m to allow for adequate room for two-way traffic in preparation for future road improvements and increased traffic

volume. In addition, a SAPI study reviewed the bridge design, and changes were made to the bridge design to ensure appropriate girder clearance heights and pier rooting depths according to hydrologic and geologic conditions, and to add abutment and pier scour countermeasures. These led to an increase in bridge construction costs.

Table 2: Planned and actual project cost

(Unit: million yen)

| | Plan | | Actual | |
|---|---|---|---|---|
| | Entire Project | ODA Loan | Entire Project | ODA Loan |
| Civil Works* | 2,686 | 2,686 | ***4,142 | 3,446 |
| Consulting Services | 753 | 753 | 1,103 | 1,103 |
| Price escalation** | 1,190 | 1,190 | 0 | 0 |
| Contingency | 193 | 193 | 0 | 0 |
| Interest during construction, etc. | 146 | 0 | 146 | 0 |
| Land acquisition | 0 | 0 | 0 | 0 |
| Administrative expenses | 241 | 0 | 224 | 0 |
| Tax | 482 | 0 | 383 | 0 |
| Total | 5,692 | 4,822 | 5,998 | 4,549 |

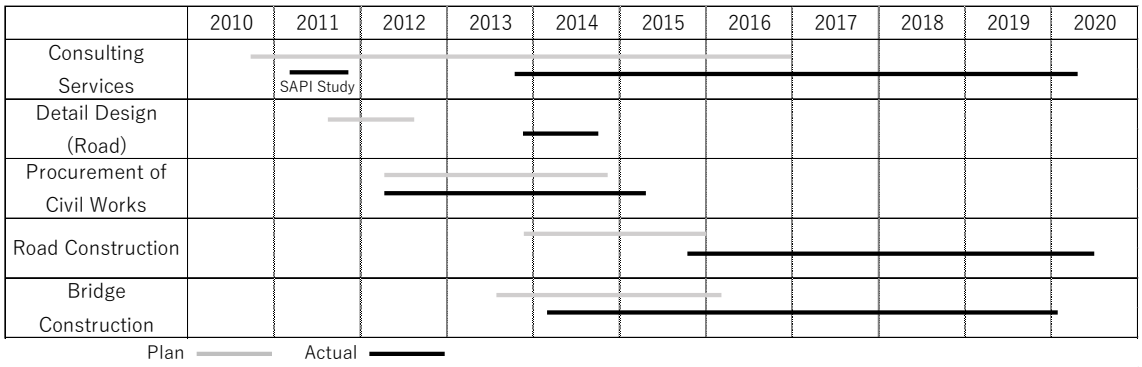
Source: Prepared by materials provided by JICA and MOPC

Note: * Some of the actual amount include estimated values (for road works funded by other funds).
** An 8.4% annual price increase had been assumed for civil works.
*** Includes 696 million yen of other donor funds.
Exchange rate: Plan 1 yen = 52.63 guarani (July 2009)
Actual 1 yen = 57.38 guarani (June 2019)

- The unit cost of road improvement (cost per km) increased significantly from 4.82 million yen/km for gravel pavement and 6.75 million yen/km for rubble pavement assumed at the time of appraisal (2009), 7 million yen/km for gravel pavement and 10.6 million yen/km for rubble pavement assumed during the SAPI Study (2011) to 16.89 million yen/km during detailed design (2014: The unit cost of each pavement type is not known, and the improved extension was approximately half for gravel pavement and half for rubble pavement). The reasons for this increase are thought to be that the contract period was later than expected at the time of appraisal, which caused prices to rise, and that the amount of construction work, such as land fill and drainage facilities, increased due to topographical and geological conditions. In addition, the ratio of rubble pavement, which has a large unit cost, increased from 23% assumed at the time of appraisal to 46%, taking into account changes in local conditions such as the expansion of residential areas and the desire of roadside residents to use rubble pavement, leading to an increase in road improvement costs.

3.2.2.2 Project Period

The Project was planned to be implemented over 65 months (5 years and 5 months) from the signing of the loan agreement in September 2010 to the start of facility operation in January 2016. In fact, the loan agreement was signed in September 2010, and the ODA loan portion of the project was implemented for 118 months until June 2020 (182% of the plan), and the final disbursement date was extended once. The road improvement works of the Project financed by other donors was completed in March 2023. Including this period, the project period was 151 months (September 2010 to March 2023, 232% of the plan). Thus, the project period for the Project was much longer than planned.




Source: Prepared by materials provided by JICA and MOPC

Figure 1: Planned and actual implementation period (ODA loan portion)

Factors contributing to the increased implementation period include the following.

- After signing the loan agreement, it took approximately seven months for the agreement to enter into force due to the time required in the Paraguayan side to prepare the necessary documents.
- Prior to the consultant contract, a SAPI Study was conducted to review the bridge detailed design prepared by IDB funding and select the target road sections. The delay in the IDB-funded bridge detailed design work delayed the start of this study. Also, it took longer than expected to select the target road sections.
- Due to the change of administration in Paraguay, it took longer than expected to procure consultants.
- Design changes were required for the bridge as a result of the topography changes caused by the torrential rains and flooding from April to September 2014. In addition, heavy rainfall and flooding in 2015-2016 interrupted construction, extending the construction period by nearly two years.

- The bidding process for the roads started late due to the time required for detailed design and review of the road sections to be covered by the ODA loan. In addition, the construction period was extended by nearly a year due to the heavy rainfall and flooding in 2015-2016. In addition, the construction period was extended due to the addition of drainage facilities following a review of design rainfall and the design modifications to match the width of the road right-of-way, etc.

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

At the time of appraisal, it was assumed that the economic internal rate of return (EIRR) for the road improvements of the Project would be at least 12%, with construction and operation and maintenance costs as costs, reduction of travel and time costs as benefits, and a project life of 20 years. After the selection of the target road sections, the consultant of the Project conducted a traffic volume survey and calculated the EIRR based on the following assumptions, which ranged from 12% to 84%, depending on the section.

| | |
|---|---|
| Cost: | Construction, operation and maintenance costs |
| Benefit: | Reduced travel and time costs, increased agricultural production through farmland expansion and increased agricultural productivity |
| Project life: | 10 years |

No recalculation was performed in this ex-post evaluation because sufficient information for recalculation was not available. While, in 2020, the IDB conducted an economic analysis of some of the targeted sections of the overall co-financing project with the benefits of travel and time cost savings and reduced operation and maintenance costs, which resulted in an economic internal rate of return of 26%.[7]

Based on the above, the output of road improvement was 198 km (149 km with the ODA loan and 49 km with other donor's funds: 57% of the plan) compared to the 350 km planned at the time of the appraisal, which was far below the plan. The actual project cost, including the cost of other donor-funded sections, exceeded the plan at the time of the appraisal by 5%. The actual project period including other donor-funded sections was 232% of the plan at the time of the appraisal, which was significantly higher than the plan. Therefore, the efficiency of the Project is low.

[7] Prior to the start of construction works of the Project, a traffic study was conducted through the economic analysis by the consultant, while, for travel speeds and road surface indicators, estimated values were used. In addition, estimated values were used also for the benefits from agricultural land expansion and productivity improvement. On the other hand, the IDB's economic analysis used estimated values for traffic volume, but measured values for the road surface condition index (IRI) and travel speed.

### 3.3 Effectiveness and Impacts[8] (Rating:③)

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operational and Effectiveness Indicators)

The indicators for the road component of the Project were established as "average annual daily traffic volume," "travel time reduction," and "travel cost reduction." Baseline and target values of these indicators were established by a baseline survey conducted by the consultant after the Project was initiated. Table 3 shows the baseline, planned, and actual values for each indicator.[9]

Table 3: Planned and actual values of the operation and effectiveness indicators

| Indicator | Baseline value Year 2014 | Target value Year 2020 | Actual value Year 2020 |
|---|---|---|---|
| Annual Average Daily Traffic (units/day) | 87 | 165 | unknown |
| Average running time (minutes/section) | 20 | 18 (10% improvement) | 14 (Achieved) |
| Average Travel Cost ($/section/year) | 238 | 215 (10% improvement) | 216 (Estimated value: almost achieved) |

Source: Prepared from materials provided by JICA and MOPC

(1) Annual Average Daily Traffic

The consultant for the Project measured traffic volumes on each of the targeted road section in January 2014, and future projections were made to set the target values. Annual daily traffic in 2014 (Baseline values) of the 23 road sections covered by the ODA loan was 87 units per day, and it was assumed to be nearly doubled as 165 units per day in 2020. MOPC does not conduct regular traffic volume surveys on rural roads, so actual data is not available. According to the qualitative survey conducted during the ex-post evaluation[10], the use of motorcycles and cars as modes of transportation by residents along the route increased significantly, as did the frequency of visits to the town for a variety of reasons. In addition, the population along the route is believed to have increased due to housing construction and other factors, which suggests that traffic has indeed increased after the Project (see Impact).

[8] Sub-rating for Effectiveness is to be put with consideration of Impacts.

[9] Ex-post evaluation usually checks the degree of target achievement two years after project completion (2022 for the Project), but considering that actual values for 2022 are not available and that each road section was actually completed between 2018 and 2020, target and actual values for 2020 were used in this ex-post evaluation.

[10] As the qualitative survey, 80 households (41 males and 39 females; purposive sampling focusing on the households further away from the town which are considered to have more benefited from the road improvements) were interviewed in the 10 target road sections through local consultants. The external evaluator also interviewed the mayors of the four cities.

(2) Reduction of travel time

The baseline values were estimated values set by the Project's consultants based on MOPC data for each pavement type, and the goal was to reduce these values by 10%. The actual values were calculated based on the results of a survey conducted in 2020 by the consultant commissioned with IDB funds, which covered 17 road sections, including 8 sections improved by the Project. The actual value was 70% of the base value, and the goal of a 10% reduction was achieved.[11]

(3) Reduced travel cost

Both the base and actual values for travel cost are estimated values set by the Project's consultant during the economic analysis process based on MOPC data and according to the pavement types before and after the Project. As shown in Table 3, the goal of a 10% reduction was almost achieved, while it is based on estimated values. Note that the travel costs include vehicle operation and maintenance costs and passenger time costs.

3.3.1.2 Qualitative Effects (Other Effects)

(1) Year-round traffic availability

Although the main objective of the Project was to solve the problem of "roads being cut off by rainfall" (see "Relevance and Consistency with Development Needs"), the site visit and qualitative survey showed that both the bridge and road remained passable for a variety of vehicles throughout the year at the time of the ex-post evaluation. According to the residents along the road, half of the residents reported that, before the Project, the road was "impassable" for vehicles during the rainy season and the other half reported that it was "very difficult but passable"[12], while, after the Project, 60% of the residents reported that the road is "passable as usual" during the rainy season and 40% reported that it is "passable while there are places where ruts can be made."

(2) Elimination of risks during river crossing

The Project replaced aging wooden bridges with concrete bridges, thereby eliminating the risks in crossing the river. Prior to the Project, many of the wooden bridges were narrow and had no fences, and the wooden members were dangerous because they were damaged or detached and could collapse. The bridges in the Project were designed based on the 100-year probability of flooding, are wide enough for two-way traffic, and have

[11] According to the study, the average speed on the improved rural roads was 49 km/hr, while the average speed on the unimproved rural roads studied as a comparison was 35 km/hr. Actual measurements during the ex-post evaluation showed speeds of 30-50 km/hr on rubble paved sections and 40-60 km/hr on gravel paved sections.
[12] An economic analysis conducted by the Project's consultant in 2014 estimated 65 days per year of impassable days due to rainfall.

sidewalks and fences. Hence, the previous dangers have been removed.

As described above, the Project has made the road passable throughout the year and removed the risks associated with the wooden bridges. Considering the achievement level of the established indicators, it is judged that the objectives of the Project have been achieved.

### 3.3.2 Impacts

#### 3.3.2.1 Intended Impacts

The development of the road network by the Project was expected to contribute to the economic revitalization of the target area and to the improvement of the living environment for local residents. This section summarizes the economic and social impacts of the Project based on the results of the qualitative survey, taking into account changes in the use and movement of the roads improved by the Project.[13]

(1) Changes in road use and mobility by residents

Before the Project, one-third of residents was using motorcycles and 70% was walking or rode horses, but at the time of the ex-post evaluation, more than 30% uses cars, 80% uses motorcycles, and few walks or ride horses (Table 4: multiple responses). Many residents purchased new passenger cars or motorcycles after the road improvements. Note that public transportation (buses) was originally scarce in the area covered by the Project. Since the number of residents who can get around by themselves increased after the Project, public transportation has almost disappeared.

Table 4: Changes in Residents' Means of Transportation

(Percentage of respondents who use it as a means of transportation: multiple responses)

| | Before the project | After the project |
|---|---|---|
| On foot, horseback, etc. | 69% | 3% |
| bicycle | 13% | 4% |
| motorcycle | 34% | 80% |
| Passenger cars and pickup trucks | 0% | 36% |

Source: Qualitative survey

[13] In the Project, the consultant had conducted a questionnaire survey of roadside residents as a baseline survey. However, based on the related documents provided by JICA for this ex-post evaluation, only two surveyed routes could be identified where road improvement had actually been implemented, and the database of the survey results was incomplete. In addition, the questionnaire used in the baseline survey was not available by the time the qualitative survey was initiated. As a result, there was no prospect of obtaining information that could be compared and analyzed with the baseline survey, so the qualitative survey was conducted in a manner that did not presuppose a comparison with the baseline survey.

The frequency of travel of the residents by purposes along the road changed as shown in Table 5. Many residents indicated that the frequency of visits to towns for shopping, administrative procedures, etc., and to medical institutions (health centers, hospitals, etc.) increased. The frequency of these visits increased by 20-30%. Although not many residents use the roads to ship agricultural and livestock products, the frequency of shipments increased significantly. Cases of increased agricultural production and sales through this process were also identified. About 20% of the residents who work in the town increased the frequency of their visits to work by about 10% because they can go to work without problems even during rainfall.

Table 5: Changes in Residents' Mode of Transportation

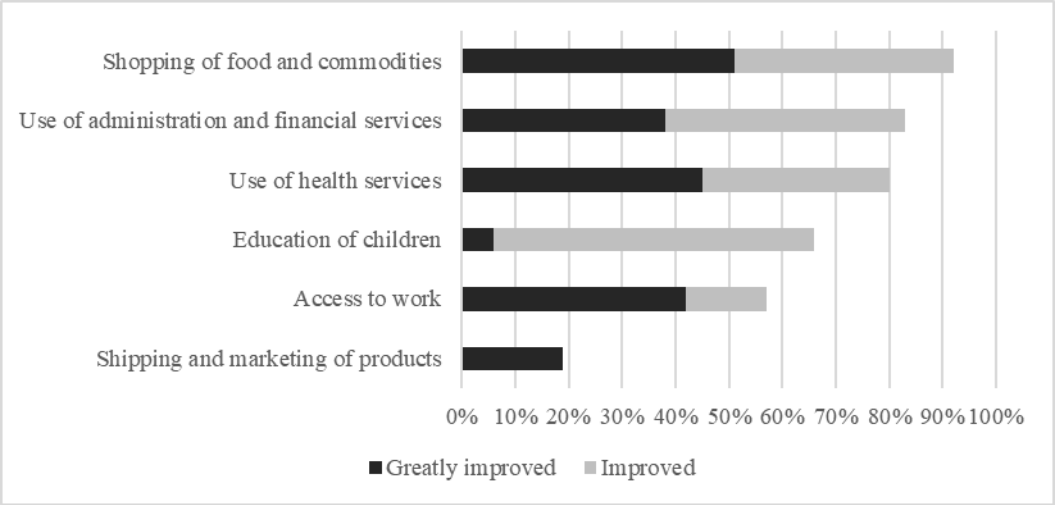
(Monthly Frequency of Travel: Multiple Responses)

| | Before the Project | After the Project (% increase) | Percentage of Respondents |
|---|---|---|---|
| Visits to Towns (shopping, procedures, etc.) | 8.1 times/month | 10.6 times/month (31%) | 84% |
| Visits to medical institutions | 2.3 times/month | 2.8 times/month (22%) | 99% |
| Shipment of agricultural and livestock products | 6.1 times/month | 8.7 times/month (16%) | 11% |
| Work, attendance at work | 25.7 times/month | 28.1 times/month (9%) | 22% |

Source: Qualitative survey

(2) Life changes at home

Most of the residents reported that the impact of the Project has been that it has made it easier for them to travel to town to get food and daily necessities, to access government and financial services, and to maintain the health of their families through access to health services (Figure 2). Many households also reported improvements in the education of their children and jobs in town. Some households reported improved shipment of products, and about 10% of households cited this as the most important impact (Table 6). From the above, it can be summarized that the road improvements by the Project led to improvements in various aspects of livelihoods for most residents, and for some residents, it also led to an increase in income.




Source: Qualitative survey
Note: For each aspect, the respondents were asked to indicate on a five-point scale whether the situation after the road improvement "worsened significantly" "worsened" "no change" "improved" or "improved significantly."

Figure 2: Changes in various aspects of life

Table 6: Most important impacts for family

(Percentage of respondents who mentioned each item as the most important impact)

| | |
|---|---|
| Life in general has improved. | 25% |
| Easier to get into town. | 16% |
| Can go out anytime I want. | 13% |
| Easier shipping and marketing of products. | 10% |
| Easier access to food and daily necessities. | 9% |
| Easier access to work. | 8% |
| Easier access to medical services. | 8% |
| Easier for children to commute to school. | 5% |
| Nothing in particular. | 6% |

Source: Qualitative survey

(3) Changes in the Neighborhood

Residents of several road sections cited the construction of new housing and population growth as impacting their neighborhoods. They also reported an increase in land prices as a result. In San Juan Bautista municipality, a large residential development took place along one of the road sections after the Project. In Villarrica municipality, several tourist accommodations were established taking advantage of the improved access after the road improvement. Furthermore, in various locations, increases in the number of stores along the road due to the increased traffic, as well as increases in sales at existing stores are

reported. From the above, it can be said that the road improvement through the Project led to an increase in economic activities and investments in the areas along the road.

A family with a new vegetable peddling business

(4) Changes in the three target departments

According to statistical data published by the National Institute of Statistics of Paraguay, the three target departments have improved in all the indicators shown in Table 7. In particular, the access to health services, private vehicle ownership (in Misiones and Guairá Departments), and the poverty rate are better than in the national rural areas. The Project may have contributed to this improvement, but it is difficult to verify it quantitatively. According to MOPC, the total population benefiting from the target road sections of the Project (population living within 1,500 meters of the road, 2014) is about 80,000, which is about 14% of the total population of the three departments of 580,000 (2014).

Table 7: Changes Observed in Socioeconomic Indicators in Rural Areas of the Three Target Departments

| | | Before Project 2004 | After Project 2017 |
|---|---|---|---|
| Average duration of schooling (years) of population aged 10 years and older (year) | Misiones | 6.8 | 8.6 |
| | Paraguarí | 6.2 | 7.5 |
| | Guairá | 6.2 | 7.6 |
| | Whole country | 6.1* | 7.0 |
| Access to health services (%) | Misiones | 51.0 | 80.1 |
| | Paraguarí | 51.5 | 75.0 |
| | Guairá | 51.7 | 71.5 |
| | Whole country | 65.4* | 68.4 |
| Percentage of households with private vehicles (including motorcycles) (%) | Misiones | 26.2 | 76.3 |
| | Paraguarí | 20.8 | 65.7 |
| | Guairá | 30.0 | 85.8 |
| | Whole country | 50.7* | 75.3 |
| Poverty Rate (%) | Misiones | 58.6 | 27.5 |
| | Paraguarí | 61.5 | 35.8 |
| | Guairá | 56.4 | 33.9 |
| | Whole country | 55.6* | 36.2 |

Note: * Before-project data for Whole country are as of 2009.
Source: National Institute of Statistics (Condiciones de Vida 2009-2018)

3.3.2.2 Other Positive and Negative Impacts

(1) Environmental Impact

The Project was determined to fall under Category B, as it does not fall under the large-scale one in the road sector as listed in the "JBIC Guidelines for Confirmation of Environmental and Social Considerations" (April 2002), its undesirable impacts on the environment were judged to be not significant, and it does not have any sensitive characteristics and sensitive target areas stipulated in the Guidelines.

In accordance with Paraguay's environmental legal system, an initial environmental impact assessment was conducted by the consultants, during which an environmental management plan was prepared and an environmental impact declaration (equivalent to an environmental permit) was obtained from the Ministry of Environment and Sustainable Development. For the civil works, each contractor prepared a social and environmental action plan in accordance with the MOPC's environmental technical specifications. The implementation was monitored by the consultant's environmental engineer, and the plans were properly implemented. No significant impacts on the natural environment due to the civil works of the Project have been identified.

(2) Resettlement and site acquisition

No land acquisition or resettlement was planned or implemented under the Project. No significant social impacts from the civil works of the Project have been identified, including in the indigenous residential areas where some road sections are close.

(3) Other positive and negative impacts

Some residents noted that the increased speed of motorcycles and vehicles increased the risk of accidents. However, no serious accidents causing personal injuries were reported.

For many of the residents of villages where access had been restricted during rainfall, the improved access by the Project led to an increase in the frequency of visits to the town, which is considered to have led to equitable social participation. In addition, residents' satisfaction with easier access to food and daily necessities and improved access to health care services was high, which was considered to be an impact related to people's well-being. No notable impacts on gender, social systems and norms, or human rights were identified.

The above results indicate that the Project has achieved its objectives, and its effectiveness and impacts are high.

### 3.4 Sustainability (Rating:②)

3.4.1 Policies and System

As mentioned in the "Relevance" section, improvement of rural road is a priority in the National Development Plan: Paraguay 2030, and the MOPC's Transportation Master Plan clearly states the plan to improve unpaved roads to rubble / gravel pavement, maintain the improved roads, and gradually upgrade them to asphalt pavement. Therefore, there are no specific policy or institutional issues regarding the sustainability of the Project.

3.4.2 Institutional / Organizational Aspect

(1) Maintenance of rural roads

Maintenance of rural roads is carried out by MOPC's direct management, in cooperation with local governments, etc. The roads in the Project will basically be maintained under the direct management of MOPC, but depending on the situation, collaboration with local governments may be undertaken.

a. Maintenance under direct management of MOPC

District offices established in each department by the MOPC Rural Roads Direction will be responsible for the maintenance of rural roads through direct management. The roads in the Project are handled by District 4 (Guairá), District 8 (Misiones), and District 9 (Paraguarí). The Rural Roads Direction has a Road Maintenance Coordination Section that allocates resources to the district offices and monitors their activities.

Table 8: Number of District Office Staff and Heavy Equipment Available for Operation

| | District 4 | District 8 | District 9 |
|---|---|---|---|
| Number of staff: 2021<br>2023 | 67 persons<br>40 persons | 75 persons<br>60 persons | 55 persons<br>26 persons |
| motor grader | 3 | 1 | 3 |
| wheel loader | 2 | 3 | 2 |
| dump truck | 7 | 5 | 5 |
| Other Heavy Machinery | | 1 hydraulic excavator<br>1 bulldozer | |

Source: Prepared based on materials provided by MOPC and interviews at district offices.

According to interviews with the three district offices mentioned above, the number of heavy equipment is inadequate compared to the length of the road to maintain. Many of the heavy equipment was purchased in the 1980s and is aging, and although it is being used while being repaired, some of it is no longer usable. According to the Road Maintenance Coordination Section, due to budget constraints, no new heavy equipment has been procured since 2018. In the opinion of the district offices, at least double the

current amount of heavy equipment is needed for proper maintenance. In addition, the number of staff at the district offices is declining as staff members are retiring while few new staff members are replacing them, while the staffing level to operate the current heavy equipment has been maintained.

No budget to purchase materials (*ripio*) to maintain the gravel paved roads has been allocated to the district office.[14] Therefore, repair work is mainly done by molding the road surface with a motor grader. Local governments and residents along the road sometimes provide materials, but quality materials are expensive and hard to obtain.[15] Even if materials can be obtained, they are quickly washed away by rainfall due to the lack of heavy equipment for compaction at the three district offices. Thus, it is difficult to conduct effective repairs in the current situation.

The district office receives numerous requests for road maintenance from mayors and residents. Based on these requests, each district office prepares a weekly maintenance plan, using the on-site knowledge of its staff as a guide. According to the district offices, it sometimes takes two to three months to implement maintenance after receiving a request, but all requests are attended by elaborating an efficient plan that takes into account the location of heavy equipment. However, preventive action in advance of the rainy season and early action after rainfall before expanding the damage (e.g., muddy conditions) are not always taken.

b. Maintenance in collaboration with local governments

The IDB's co-financing project for the Project included the maintenance of the rural roads which had been improved in the IDB's previous project, as well as the improvement of rural roads similar to those in the Project. Part of the maintenance was implemented through establishing Road Management Association (AGV: *Asociaciones de Gestion Vial*) through agreements among MOPC, municipalities and departments, and technical support and capacity building were carried out for this. According to MOPC, so far, road maintenance associations have been established in four departments (Departments of Alto Paraná, Itapúa, Canindeyú, and Caazapá, which are not included in the Project) with the participation of some municipalities and local governments (56 municipalities and 3 departmental governments) have contributed about 10-45% of the total cost and heavy equipment cost to ensure proper maintenance in a planned manner. This mechanism was highly appreciated not only by MOPC but also by local governments, as it enables planned

[14] While Paraguay generally requires greater transparency in the management of funds and materials to prevent corruption, it is difficult to identify the whereabouts of materials, which are often spilled due to rainfall. The difficulty in properly managing materials may be one of the reasons why budgets for the purchase of materials are not allocated to district offices.

[15] According to MOPC, the increase in the price of *ripio* is due to Paraguay's environmental legal system, which has restricted the mining of *ripio*.

and appropriate maintenance and promotes decentralization of road maintenance by increasing the participation and commitment of local governments. It functioned while the road maintenance budget was secured through the IDB project, but subsequently ceased to function, with the exception of a few cities, due to the lack of sufficient financial resources[16]. Since this was a framework that could function if financial resources could be secured, MOPC intends to expand a similar mechanism in the future and is looking for adequate financial sources from the national and local governments while discussing with the fiscal authorities.

Apart from the above, the district offices may also work jointly with the municipality and departmental governments to maintain roads. In this case, the district office provides the heavy equipment and operators, while the municipality and departmental governments provide spare parts and consumable items for the heavy equipment, and so on, sharing the necessary inputs according to their respective capabilities. While MOPC has agreements with some municipalities for road maintenance, this type of collaboration is done with or without such agreements. In addition, some municipality may perform their own road maintenance using municipal budgets, either by using heavy equipment owned or outsourced by the municipality.

c. Outsourced maintenance

Since 2006, MOPC, through a World Bank loan program, has begun outsourcing road maintenance, mainly on national roads, called "Administration and Management of Roads Based on Level of Service" (GMANS). Approximately 1,900 km, corresponds to about one-third of the paved national roads as of 2016, have been maintained in this way under six contracts. Furthermore, based on the above experience, MOPC has introduced a new road maintenance method called the "Contract for Rehabilitation and Maintenance of Paved Roads Oriented to the Level of Service (CREMA)". This is to rehabilitate the road in about two years and maintain it for another five years. About 60% of national and rural roads with asphalt pavement (about 3,200 km as of 2016) are maintained using the above two methods.

As for the rural road with rubble / gravel pavement, a 2 to 2.5 year maintenance period was included in the construction contract for the 49 km road sections in the departments of Guairá and Misiones, which was included the scope of the Project and financed by other donor’s fund but not covered by the ODA loan, and their maintenance is being conducted by outsourcing. On the other hand, maintenance was included in the scope of

[16] The municipality of Naranjal, which participated in a road maintenance association in the Department of Alto Parana, continued road maintenance for two years starting in 2021 by paying half of the costs, based on an agreement with MOPC. This is one example of how active participation by local governments can lead to the continuation of collaborative road maintenance without relying on external funding.

the IDB co-financing project for the Project, and similarly, in subsequent IDB projects, maintenance of gravel and gravel-paved rural roads for about 3 years was included in the contract. Among the target departments of the Project, 35 km of roads is being maintained by contract in Guairá[17]. According to the MOPC District Offices, there are a total of approximately 1,600 km of gravel and gravel-paved rural roads in the three target departments of the Project, and the total of 84 km of rural roads maintained by outsourced contractors in the three department is equivalent to about 5% of the total.

(2) Maintenance of bridges

The Bridge and Ancillary Facilities Maintenance Division under the MOPC Rural Road Direction is responsible for the maintenance of concrete and steel bridges on national and rural roads nationwide. As of April 2023, there were eight engineers and about 100 staff members, but there is no room for regular inspections of the many bridges scattered throughout the country. Each time a district office reports a need for repair, the current condition is checked, and if the need is urgent, repair work is performed. However, the district office indicated that even if they report a problem and the department's engineers check the site, it is rare that the problem is actually addressed.

According to the Division, the main issue with the bridges is scour of the piers and abutments. Older bridges in particular are prone to problems due to lack of adequate revetment, but recent bridges, including the bridges in the Project, are reported to have no major concerns.

It should be noted that MOPC is considering to promote collaboration with local governments on bridge maintenance as well.

Based on the above, the maintenance system by MOPC and MOPC district offices for roads and bridges of the Project is not sufficient. MOPC intends to actively promote maintenance in collaboration with local governments, but has not yet decided on a clear direction for securing financial resources for this purpose. Therefore, there are some issues regarding the institutional / organization aspects of the sustainability of the Project.

### 3.4.3 Technical Aspect

The pavement used in the Project has a long track record in Paraguay, and there are no technical challenges in its maintenance. The staff of the district office is maintaining the pavement based on their many-years of experience, despite the constraints in terms of human

[17] The road sections covered by the ODA Loan are not included in the maintenance coverage of the Guairá Department. The department of Misiones and Paraguarí are not included in the maintenance coverage of the IDB project.

resources and equipment.

Since the District Office staff does not have the knowledge to diagnose concrete bridges, if they recognize any visual damage, they will report it with photographs to the Bridge and Ancillary Facilities Maintenance Division. The Division will dispatch an engineer to conduct a detailed investigation if necessary. According to the Division, there is room for strengthening the capabilities of the Division's engineers in diagnosing bridge integrity, but to date, no maintenance problems requiring technical response have occurred on any of the Project's bridges, and no technical obstacles have been encountered.

Based on the above, there are no particular technical issues regarding the sustainability of the Project.

### 3.4.4 Financial Aspect

The overall MOPC budget, the MOPC rural road maintenance program budget, and the district office operating budget are shown in Table 9. According to interviews with MOPC headquarters and district offices, the budget, personnel, and equipment allocated to the district offices and the bridge division that perform maintenance and management of the Project are all limited, which is due to general budget constraints. In particular, the budget allocated to the MOPC has been further reduced in recent years due to the COVID pandemic. It should be noted that in Paraguay, independent funding of road maintenance through a gasoline tax or tolls has been considered, but no conclusion has been reached.

Table 9: MOPC Budget Amounts

(Unit: million guaranies)

| | FY2020 | FY2021 | FY2022 |
|---|---|---|---|
| Entire MOPC | 8,157,769 | 9,207,011 | 8,946,865 |
| Rural Road Maintenance Program | 1,409,183 | 1,131,571 | 891,924 |
| District Office Operation | unknown | 160,546 | 200,782 |

Source: Prepared from materials provided by MOPC

The road maintenance costs for the Project are paid from the district office operating budget, but as mentioned earlier, budget constraints are the main constraint on the district office's maintenance system. In addition, no new financial resources have been secured to expand maintenance through collaboration with local governments and outsourcing without relying on external funding. Therefore, there are issues with the financial sustainability of the Project.

### 3.4.5 Environmental and Social Aspect, Preventative Measures to Risks

Regarding environmental and social considerations and response to natural disasters and other risks, the MOPC district offices are in charge of the initial response, and the MOPC Rural Road Direction provides support as needed. No particular issues have been identified.

Maintenance work by MOPC

Gravel pavement section with water in the ruts

Trees growing on bridge revetment

Damage to bridge fence

### 3.4.6 Status of Operation and Maintenance

The site inspection of 12 of the 23 road sections of the Project confirmed that they are generally in good conditions and can be used for year-round traffic. All rubble pavement sections were in good conditions. Some sections of the gravel pavement sections remain rutted, and some sections have almost lost gravel, but they are passable throughout the year, and the extension of such sections is only about 10% of the total gravel pavement. All roads in the Project are subject to MOPC's direct maintenance, while for some gravel pavement sections the municipality provided repair materials, and some sections were partially maintained by the departmental government.

According to the site inspection of 14 of the 27 bridges in the Project, there were no bridges structures in need of repair, and all were in good conditions. However, there were

two bridges where the revetments or fences were in need of repair, and one bridge where scouring had begun at the bridge piers and should be monitored. In addition, there were several bridges where the vegetation on the revetment was not managed and trees were growing, which could damage the revetment if left in place.

Based on the above, the status of operation and maintenance of the Project is judged to be good overall, although there are minor issues.

From the above, it can be concluded that the operation and maintenance of the Project has some problems in institutional / organizational and financial aspects, and that the prospects for improvement and resolution are low. Therefore, the sustainability of the effects of the Project is moderately low.

## 4. Conclusions, Recommendations and Lessons Learned

### 4.1 Conclusion

The Project was implemented to build a road network in the eastern region of Paraguay by paving unpaved rural roads with gravel / rubble and replacing aged wooden bridges, thereby contributing to the economic revitalization of the country and the improvement of the living environment for local residents. The Project was consistent with Paraguay's development plans and needs at both the time of planning and ex-post evaluation, and with Japan's ODA policy at the time of planning. As active coordination and collaboration with other donors were also observed, the Project's relevance and consistency are high. The output was less than planned, and the project cost and project period were larger than planned, thus the efficiency of the Project is low. All the target roads are now open to vehicular traffic year-round, and the hazards posed by the aging wooden bridges have been eliminated. Since the Project also realized an increase in traffic volume, a decrease in travel time, and a decrease in travel costs, it is judged that the objectives of the Project were achieved. After the implementation of the Project, many residents along the road began to use vehicles to travel, and it was observed that the travel time to the town was significantly reduced, and the frequency of visits to medical institutions and shipments of agricultural products increased. Therefore, it is considered that the road improvement by the Project has led to improvements in various aspects of their lives, and for some residents, it has also led to an increase in their income. Based on the above, the effectiveness and impact of the Project are high. There are no particular policy, institutional, or technical issues regarding the sustainability of the Project. The operation and maintenance conditions of roads and bridges of the Project are generally good. However, due to financial constraints, the road maintenance directly managed by MOPC is not sufficient, and a clear direction for financing road maintenance in collaboration with local governments has not been decided. Therefore,

the sustainability of the Project is moderately low. Based on the above, the Project is evaluated to be partially satisfactory.

### 4.2 Recommendations

#### 4.2.1 Recommendations to the Executing Agency

- The bridges of the Project were constructed 4 to 5 years ago and are due for their first periodic inspection. Although no structural problems were found during the on-site inspection at the time of the ex-post evaluation, there were some bridges that should be monitored for scour at the pier, and others that appeared to need repair of revetments and fences. Therefore, the MOPC should conduct a periodic inspection of all bridges constructed by the Project and consider necessary repairs based on the results.

- MOPC needs to improve the maintenance of rural roads throughout the country, including road sections of the Project. To this end, it is necessary to fully examine the advantages and disadvantages of maintenance through direct management, maintenance in collaboration with the local governments, and maintenance by outsourcing, and to develop a strategy for efficient maintenance of rural roads according to the type of pavement. For the financial resources, sustainable methods should be considered for the future, such as reducing dependence on donor funds and using taxes collected by the national or local governments. In addition, the daily maintenance regime for concrete bridges on rural roads, including cleaning and vegetation management, should be clearly defined.

#### 4.2.2 Recommendations to JICA

JICA needs to monitor the implementation of the above recommendations by MOPC.

### 4.3 Lessons Learned

Establishment of indicators and data collection methods in accordance with project objectives

The main objective of the project was to eliminate traffic cut-off on unpaved rural roads with a traffic volume of approximately 100 vehicles per day during rainfall by providing rubble and gravel pavement. However, among the three established indicators (average annual daily traffic, average travel time, and average travel cost), only average travel time was actually measured to assess the level of achievement. Traffic volumes and travel times on rural roads with low traffic were not regularly monitored by the implementing agencies; instead, these measurements were carried out by hiring consultants. Additionally, average

travel costs were not directly measurable, therefore, estimated values were used for both the baseline and actual achievement of them. Furthermore, these indicators did not directly assess the concept of 'year-round trafficability' itself. Hence, in this ex-post evaluation, an analysis of project achievement was made, while taking into account the actual performance of the aforementioned indicators, by verifying whether the targeted road remained blocked during rainfall through interviews with the implementing agencies and residents living along the road.

In light of the above, it is crucial to consider indicators during the project appraisal phase that directly align with the project objectives. Furthermore, specific methods for data collection for both baseline and actual values should be established. It is essential to agree on the timing and allocate the necessary financial resources for data collection in collaboration with the implementing agency. If hiring a consultant is necessary for data collection, it is advisable to engage the same consultant to measure both baseline and actual values within a single contract to ensure consistency in data collection methods and measurement targets.

Baseline survey and comparable endline survey

Although this ex-post evaluation intended to conduct a qualitative survey comparable to the baseline survey on socioeconomic impacts conducted by the consultant, the information provided to the external evaluator prior to the field survey was incomplete. As a result, the survey could not be conducted in a manner comparable to the baseline survey. Therefore, if a baseline survey is to be conducted by the consultant, it is recommended that the same consultant conduct the survey up to the endline survey within the same contract.[18] If the baseline survey was conducted with the intention of being utilized in the ex-post evaluation, JICA needs to specifically confirm and preserve beforehand the methodology and scope of the baseline survey, as well as the data collected through the survey. Thereafter, JICA should determine the scope of work for the external evaluator after examining the extent of the survey that can be conducted in the ex-post evaluation.

## 5. Non-Score Criteria

### 5.1 Performance

5.1.1 Objective Perspective (none in particular)

### 5.2 Additionality (none in particular)

(End)

[18] Endline surveys are conducted for the purpose of analyzing project effects (outcomes and impacts) by comparing them with baseline surveys.

**Comparison of the Original and Actual Scope of the Project**

| Item | Plan | Actual |
|---|---|---|
| 1. Project Outputs | | |
| Road Improvements<br>Rubble / gravel paving of unpaved roads | Approx. 350 km | ODA loan: 149 km, 23 sections<br>Other funds: 49 km, 7 sections<br>Total : 198 km, 30 sections |
| Bridge Improvements<br>Replacement of wooden bridge with concrete bridge | Approx. 1,000m | 27 bridges 943m |
| Consulting Services | Detailed design, bidding assistance, construction management, others | As planned |
| 2. Project Period | September 2010-<br>January 2016<br>(65 months) | September 2010-<br>March 2023<br>(151 months) |
| 3. Project Cost<br>Total amount<br>ODA loan<br><br>Exchange rate | <br>5,692 million yen<br>4,822 million yen<br><br>1 yen = 52.63 guarani<br>(July 2009) | <br>6,033 million yen<br>4,488 million yen<br><br>1 yen = 57.38 guarani<br>(June 2019) |
| 4. Final Disbursement | December 2021 | |