

**Ex--Ante Evaluation (for Japanese ODA Loan)**

**1. Name of the Project**

Country: The Republic of the Union of Myanmar

Project: Greater Yangon Water Supply Improvement Project (Phase II) (I)

Loan Agreement: March 1, 2017

Loan Amount: 25,000 million yen

Borrower: The Government of the Republic of the Union of Myanmar

**2. Background and Necessity of the Project**

(1) Current State and Issues of the Development of the Urban Water Supply Sector in Myanmar

Yangon City, the former capital of the Republic of the Union of Myanmar, is the nation's economic center, with a population of about 5.21 million (as of 2014) people. Development of the water supply in Yangon City began in 1842, during the British colonial period. As of 2014, the water coverage is about 35% (accounting for 1.84 million residents) and the remaining 65% of the residents rely on mostly shallow wells with poor water quality. With the risk that the city's water resources will be drained by population growth, Yangon City faces pressing issues of shifting water intake sources from groundwater to river water and expanding the water coverage area.

Currently, Yangon City has four reservoirs and many tube wells to support a water supply of about 156 million gallons per day (MGD) in total but water has not been sufficiently supplied throughout the city—with the average daily water supply period has 8 hours due to leaks and insufficient water pressure. Also, some of the existing water treatment plants have been incapable of supplying potable water due to lack of disinfection facilities. Because of the expected future increase in its population to 8.52 million by 2040, Yangon City plans to preserve groundwater resources as a backup water supply from 2025 and the water coverage needs to be expanded to about 60% with a total supply volume increased to 525 MGD.

Yangon City has been using a water supply network centered on the downtown area, the Central Business District (CBD) of the city, and a large part of the network has been used for more than 50 to 100 years. Although Yangon City has a high water meter installation rate of about 70%, they are not reliable due to failure or false readings. Because of the water leakage from old water distributing pipes and unreliable water meters, Yangon City has been suffering from a very high non-revenue water rate of 66% compared to other ASEAN cities; therefore, requiring the renewal of the existing old pipes and replacement of water meters with reliable ones.

(2) Development Policies for the Urban Water Supply Sector in Myanmar and Priority of the Project

Yangon City has been developing water supply facilities in accordance with the

policies formulated in *Volume III: Water Supply System Master Plan of the Preparatory Survey Report on the Project for the Improvement of Water Supply, Sewerage and Drainage System in Yangon City in the Republic of the Union of Myanmar (2014)* (hereinafter referred to as the "Master Plan") supported by JICA. In order to cope with the increasing demand for water supply going forward, the Master Plan lists the following priority projects to be implemented by 2025: 1) developing water supply facilities in the Lagunbyin water reservoir system; 2) installing disinfection facilities; and 3) developing and modernizing water supply network in the water distribution Zone 1 (central business district). The implementation of the projects included in 1) and 2) above has been supported by the Greater Yangon Water Supply Improvement Project (Japanese ODA Loan with the L/A signed in 2014). The Greater Yangon Water Supply Improvement Project (Phase II) (hereinafter referred to as the "Project") is to develop: the Kokkowa river system water supply facilities, which is planned to be implemented after the Lagunbyin water reservoir system in the Master Plan; and the remaining priority project as shown in 3) above, development and modernization of water supply network in the water distribution District 1 (central business district).

#### (3) Japan and JICA's Policy and Operations in the Urban Water Supply Sector

The Project is consistent with one of the priority fields, assisting in developing an infrastructure and related systems necessary for sustainable economic development, in the Japan's economic cooperation policy for Myanmar established in April 2012. The past Japanese grant aid projects in the Urban Water Supply Sector include the Project for Urgent Improvement of Water Supply System for Yangon City (2013) and the Project for Improvement of Water Supply System in Mandalay City (2015).

#### (4) Other Donor's Activities

The ADB has implemented the development of a water treatment plant, the expansion and renovation of existing water supply network in Mandalay city since November 2015 as part of the Mandalay City Urban Services Improvement Project.

#### (5) Necessity of the Project

The Project to construct a water treatment plant (60 MGD) with Kokkowa River as a water source and renovate/develop a water supply network in the downtown and western area of Yangon City is consistent with the development policy of the government of Myanmar and the assistance policy of the Japanese government. The Project is also expected to contribute the supply of safe water corresponding to the 6th goal in the SDGs. Therefore, JICA's assistance for the Project is highly necessary and relevant.

### **3. Project Description**

#### (1) Project Objective

The objective of the Project is to enhance water supply service by Kokkowa Water Treatment Plant and improving distribution network in western and central area of

Yangon city, thereby contributing to improvements in the living environment of residents in Yangon city, Myanmar.

(2) Project Site/Target Area

Yangon Region

(3) Project Components

1) Construction of Kokkowa water treatment plant (60 MGD)

2) Installation of Transmission pipes: pipe-laying work, construction of a service reservoir in Hlaingthaya Township (water distribution Zone 9) and Relay pumping station

3) Development of water Distribution network in the water distribution Zone 1: Renovation of Kokine service reservoir, reconstruction of central service reservoir, upgrading the pumps at the Yegu pump station, laying distribution main pipe and distribution pipe, development of District Metered Area (DMA) and installing water supply devices.

4) Purchasing vehicles

5) Earth fill for construction site of water treatment plant (Implemented by the government of Myanmar)

6) Development a water distribution network in the water distribution Zone 9: Laying distribution main pipe and distribution pipe, development of DMA (Implemented by the government of Myanmar)

7) Consulting service (detail design, bidding assistance, construction supervision, conduct training for facility maintenance, census and organize stakeholder meeting for environmental and social consideration, assistance of deliberation and monitoring of mitigation measures)

(4) Estimated Project Cost

82,399 million yen (25,000 million yen covered by this period)

(5) Schedule

From March 2017 to March 2026 (109 months in total) provided that the project is considered to be completed when the facilities are placed in service in March 2025.

(6) Project Implementation Structure

1) Borrower: The Government of the Republic of the Union of Myanmar

2) Guarantor: None

3) Executing Agency: The Yangon City Development Committee (hereinafter referred to the "YCDC")

4) Operation and Administration/Maintenance and Management System:

The YCDC will be responsible for administering and maintaining water treatment, supply and distribution facilities. The YCDC is a capable executing agency considering its past experience in maintaining similar facilities. Also, the YCDC has balanced its overall budget every year by covering the deficit of the Engineering Department (Water & Sanitation) with the revenue from other departments and will be

able to continuously manage expenditures for maintaining the water supply related facilities from its overall revenue.

(7) Environmental and Social Considerations/Poverty Reduction/Social Development

1) Environmental and Social Considerations

① Category: B

② Reason for Categorization: The project does not fall under the large-scale water supply sector as per the Japan International Cooperation Agency Guidelines for Environmental and Social Consideration (issued in April 2010 and hereafter referred to the "JICA Guidelines for Environmental and Social Consideration"), so its potential adverse impacts on the environment are deemed negligible. The project does not have any sensitive characteristics, or it is located any sensitive area that might be impacted by influences cited in the Guidelines.

③ Environmental Permit: Myanmar's domestic laws does not require the preparation of an Environmental Impact Assessment (EIA) report and an Initial Environmental Examination (IEE) report concerning the project.

④ Anti-Pollution Measures: The water supply facilities, including the water treatment plant, will be designed and constructed with consideration given to preventing noise and dust. The construction will be implemented with mitigation measures such as maintenance of heavy machines and sprinkling of water. The sludge generated during the operation of the water treatment plant is expected to be appropriately disposed of.

⑤ Natural Environment: The project site including its surroundings does not include any natural preserved areas and the Project is expected to have no negative impact on the natural environment.

⑥ Social Environment: There are six households (24 people) illegally staying in the project site with a meeting place that is also illegally constructed. In addition, the Project requires about 20 acres land acquisition. The illegal occupants and the meeting place are expected to be relocated and compensated according to the resettlement plan in the entire Yangon region by the Yangon Region Government. The implementation of the land acquisition is subject to the compensation according to a Resettlement Action Plan (RAP) to be prepared based on the JICA Guidelines for Environmental and Social Consideration. There have been no particular counter opinions raised in the stakeholder meeting .

⑦ Other/Monitoring: In the Project, the executing agency and contractors will monitor air quality, noise and waste during construction as well as the method for disposing of sludge during operation.

2) Promotion of Poverty Reduction: None

3) Promotion of Social Development (e.g. Gender Perspective, Measure for Infectious Diseases including HIV/AIDS, Participatory Development, Consideration for People with Disabilities, etc.): None

(8) Collaboration with Other Donors: None

#### 4. Targeted Outcomes

##### (1) Quantitative Effects

##### 1) Performance Indicators (Operation and Effect Indicators)

Indicator	Baseline (Actual Value in 2015)	Target (2027) [Expected value 2 years after project completion]
[Water distribution Zone1 and 9]		
Served Population (Thousand persons)	546	1,066
Maximum Amount of Water Supply (MGD)	46	78
Rate of Facility Utilization (Kokkowa Water Treatment Plant) (%)	-	99
Water Pressure in Distribution Network (MPa)	0.075	0.15
Non-revenue Water Ratio (%)	66	20
Rate of Continuous Dosing of Disinfection Facility (%)	0	100
Minimum Amount of Remained Chlorination (mg/L)	0	0.1
Served Coverage Ratio (%)	36	65

##### [Yangon City] (Note)

Served Population (Thousand persons)	1,991	3,959
Maximum Amount of Water Supply (MGD)	162	289
Served Coverage Ratio (%)	37	59

(Note): The figures for Yangon City represent the expected effects in the entire city including not only by the Project, but also by the Greater Yangon Water Supply Improvement Project (Lagunbyin water supply system) and the water supply from the existing water sources.

##### (2) Qualitative Effects: Improvement in the living environment of Yangon city residents

##### (3) Internal Rate of Return

Based on the following assumptions, the Economic Internal Rate of Return (EIRR) of the project is calculated to be 14.3%. The Financial Internal Rate of Return (FIRR) is not calculated because the water charge, the benefit of the Project, is not large enough to recover operating, maintenance and management costs.

[EIRR]

Cost: Project cost (excluding tax) and operation, maintenance and management costs

Benefits: Willingness to pay for new water supply, effect of cost reduction (cost for substituting water sources)

Project life: 40 years

## **5. External Factors and Risk Control**

- ♦ Implementation of the earth fill and the development of the water distribution network to be made by the YCDC's own capital.
- ♦ Coordinate with resettlement plan of illegal occupants to be carried out by the Yangon Region Government.

## **6. Lessons Learned from Past Projects**

### (1) Lessons Learned from Similar Projects

The result of ex-post evaluation on Jamaica's Montego Bay Water Supply (Great River) Project demonstrates that the ratio of non-revenue water must be reduced in order to ensure financial sustainability of the water supply project. Therefore, the lesson has been learned that it is necessary for the project to include programs for improving the ratio of non-revenue water.

### (2) Application of lessons to the Project

The contents of the project have been decided taking into consideration the measures for improving nonrevenue water ratio such as the procurement of durable pipe types and water distribution management through the DMA and SCADA systems.

## **7. Plan for Future Evaluation**

### (1) Indicators to be Used

- 1) Served Population
- 2) Maximum Amount of Water Supply
- 3) Rate of Facility Utilization (Kokkova Water Treatment Plant)
- 4) Water Pressure in Distribution Network
- 5) Non-revenue Water Ratio
- 6) Rate of Continuous Dosing of Disinfection Facility
- 7) Minimum Amount of Remained Chlorination
- 8) Served Coverage Ratio

### (2) Timing of the Next Evaluation

Two years after the completion of the Project