

**Japanese ODA Loan****Ex-Ante Evaluation(for Japanese ODA Loan)****South Asia Division 4, South Asia Department  
Japan International Cooperation Agency****1. Name of the Project**

Country: The People's Republic of Bangladesh

Project: Dhaka Mass Rapid Transit Development Project (Line 1) (II)

Loan Agreement: November 22, 2021

**2. Background and Necessity of the Project****(1) Current State and Issues of the Urban Development Sector and the Priority of the Project in Bangladesh**

The population of Dhaka increased from 6.62 million to 17.6 million between 1990 and 2015 (United Nations Population Division, 2018). This population increase has caused a rapid increase in transportation demand, which in turn has led to chronic traffic congestion and air pollution. As a result, the average vehicle travel speed in Dhaka was 6.4 km/h in 2014, which is less than half that of central Tokyo (14.7 km/h, according to the Ministry of Land, Infrastructure, Transport and Tourism in 2015). Economic loss due to traffic congestion are estimated to be billions of dollars per year (World Bank 2018). In terms of air pollution, the annual average PM10 concentration is 146 µg/m<sup>3</sup>, which is much higher than the environmental standard set by the World Health Organization (20µg/m<sup>3</sup> - 70µg/m<sup>3</sup>). WHO points out that emissions from vehicles are responsible for roughly 40% of air pollution in Dhaka, and is concerned that emissions from such traffic congestion could harm the health of residents in the Dhaka metropolitan area. These factors have worsened the country's investment climate, creating a major bottleneck for economic and social development.

In the Revised Dhaka Strategic Urban Transport Plan (hereinafter referred to as the "RSTP"), development of five lines of the mass rapid transit system (hereinafter referred to as the "MRT") and two routes of the bus rapid transit system (hereinafter referred to as the "BRT") were planned as public transport networks. The Eighth Five Year Plan (FY2021-FY2025) sets a major goal of comprehensive economic growth, which benefits all the people including the poor. In addition, it aims infrastructure development for the realization of a balanced urban transportation system in the "Transportation and

Communication” sector.

The Dhaka Mass Rapid Transit Development Project (Line 1) (hereinafter referred to as the “Project”) develops the MRT Line 1, which connects Kamalapur Station in the central area of Dhaka City with Dhaka International Airport and Purbachal District, a new residential area in the east Dhaka Metropolitan Area. From the perspective of transport demand, the MRT Line 1 is considered as a prioritized development initiative in the RSTP along with the MRT Line 5, which connects east and west Dhaka, and the MRT Line 6, which connects north and south Dhaka.

(2) Japan’s and JICA’s Cooperation Policy and Operations in the Urban Development Sector

Japan’s Country Assistance Policy for Bangladesh (February 2018) has set forth the priority area of “accelerating inclusive economic growth,” with initiatives for developing transport infrastructure with diversified modes of transport and promoting the efficient movement of people and goods. In addition, the JICA Country Analysis Paper for Bangladesh (March 2019) identifies urban development including urban transport as a priority issue. The Project is thus consistent with this analysis and policy. Additionally, since it will help alleviate traffic congestion in the Dhaka metropolitan area, and reduce the negative environmental impact of air pollution, the Project will also contribute to the achievement of SDGs 9 (Industry, Innovation, and Infrastructure), 11 (Sustainable Cities and Communities), and 13 (Climate Action).

JICA’s recent major assistance activities in the urban development sector include the Dhaka Mass Rapid Transit Development Project (Tranche 1 Loan Agreement signed in 2012, Tranche 2 Loan Agreement signed in 2016, Tranche 3 Loan Agreement signed in 2018, Tranche 4 Loan Agreement signed in 2020) (Note: MRT Line 6), the Dhaka Mass Rapid Transit Development Project (Line 1) (Engineering Service Loan Agreement signed in 2017, Phase 1 Loan Agreement signed in 2019), the Dhaka Mass Rapid Transit Development Project (Line 5 Northern Route) (Engineering Service Loan Agreement signed in 2018, Tranche 1 Loan Agreement signed in 2020), the Project on the Revision and Updating of the Strategic Transport Plan for Dhaka (Technical Cooperation, FY 2014-2016), the Project for Establishment of Clearing House for Integrating Transport Ticketing System in Dhaka City Area (Phase 1) (Technical Cooperation, FY 2014-2018), the Project for

Establishment of Clearing House for Integrating Transport Ticketing System in Dhaka City Area (Phase 2) (Technical Cooperation, FY 2019-2022), Technical Assistance for Mass Rapid Transit Safety Management System of Line 6 (Technical Cooperation, FY 2020-2023), and the Project for Development of Policy and Guidelines for Transit Oriented Development along Mass Transit Corridors (Technical Cooperation, FY 2021-2024).

### (3) Other Donors' Activities

In addition to assisting the establishment of the Dhaka Strategic Urban Transport Plan, the World Bank implemented the Clean Air and Sustainable Environment Project, which supports detailed design of the BRT Route 3 south section (between Airport Station and Jhilmil), from 2009 to 2016. The Asian Development Bank has been implementing the Greater Dhaka Sustainable Urban Transport Corridor Project to develop the BRT Route 3 north section (between Gazipur and Airport Station) since 2010. It is also providing assistance for the MRT Line 5 Southern Route (between Gabtoli and Aftabnagar stations).

## **3. Project Description**

### (1) Project Objective

The objective of the Project is to alleviate the traffic congestion and mitigate the air pollution in Dhaka city and its adjacent areas by constructing a mass rapid transit system, thereby contributing to economic development and improving urban environment.

### (2) Project Site / Target Area

Dhaka and Narayanganj Districts

### (3) Project Components

- 1) Construction of a depot (land development, construction of depot buildings, railway sidings, etc.)
- 2) Construction of railway structures (total length of approx. 30km, construction of 19 stations, etc.)
- 3) Installation of railway system (track works, electric system, telecommunication system, signal systems, etc.)
- 4) Procurement of rolling stocks (200 cars)
- 5) Detailed design and Basic design Consulting services (F/S review, basic design, detailed design, tender assistance, etc.)
- 6) Supervision Consulting services (Construction supervision, Operation and Maintenance assistance, etc.)

(4) Estimated Project Cost

736,213 million Yen (Loan Amount in this tranche: 115,027 million Yen)

(5) Schedule

June 2017 (Loan Agreement of E/S loan) - May 2030 (156 months in total).

The Project will be completed upon the opening of all sections (August 2027).

(6) Project Implementation Structure

1) Borrower: The Government of the People's Republic of Bangladesh

2) Guarantor: N/A

3) Executing Agency: Dhaka Mass Transit Company Limited (DMTCL)

4) Operation and Maintenance : DMTCL

(7) Collaboration and Sharing of Roles with Other Donors

1) Japan's Activity

The yen-loan project, the Dhaka Mass Rapid Transit Development Project and the Dhaka Mass Rapid Transit Development Project (Line 5 Northern Route), will be constructed, which are planned to cross the Project. In addition, the construction of a new terminal at the airport to connect to the Project is planned under the Japanese ODA Loan project, "Hazrat Shahjalal International Airport Expansion Project." Furthermore, based on the outcomes of the technical cooperation, "Project for Establishment of Clearing House for Integrating Transport Ticketing System in Dhaka City Area (Phase 1)," the technical cooperation, "Project for Establishment of Clearing House for Integrating Transport Ticketing System in Dhaka City Area (Phase 2)" aims to establish a framework for making smart cards more widespread as well as to fully introduce and institutionalize the smart card payment system. Additionally, under the technical cooperation, "Technical Assistance for Mass Rapid Transit Safety Management System of Line 6", support for capacity development to establish and implement DMTCL's operational safety management system will be introduced. Furthermore, under the technical cooperation, "Project for Development of Policy and Guidelines for Transit Oriented Development along Mass Transit Corridors," there will be support concerning strategic urban development planning around MRT stations for officials of RAJUK.

2) Other Donors' Activity: N/A

(8) Environmental and Social Consideration/Cross-Sectoral Issues/Gender Category

## 1) Environmental and Social Consideration

- ① Category: A
- ② Reason for Categorization: The project falls into the railway sector, and is likely to have significant adverse impact due to its characteristic under the JICA guidelines for environmental and social considerations (April 2010).
- ③ Environmental Permit: The Environmental Impact Assessment (EIA) Report for the Project was approved by the Department of Environment in November, 2017. Later, in October 2018, the EIA report was revised due to change of station location, and submitted to the Ministry of Environment. Environmental Clearance Certificate (ECC), which needs to be renewed annually in Bangladesh, was renewed in November 2020.
- ④ Anti-Pollution Measures: Measures for air quality, noise, and vibration during construction, such as regular water sprinkling and installation of a temporary fence, will be taken for minimizing their impacts. The noise level after opening exceeds the noise standards in the country, but it is expected to satisfy the noise standards of conventional railways in Japan by the installation of long rails, sound insulation walls, etc. Deterioration of water quality is expected to be avoided by the introduction of wastewater treatment facilities from stations and rolling stock yards. The Project will generate construction surplus soil (approximately 2.4 million m<sup>3</sup> ) by the underground tunnel excavation, but most of the surplus soil will be reused for reclamation and banking by DMTCL and private companies, and the rest will be disposed of appropriately at the soil disposal site secured by DMTCL.
- ⑤ Natural Environment: The project target area does not fall under national parks and other vulnerable areas or their vicinities, and adverse effects on the natural environment are assumed to be minimal.
- ⑥ Social Environment: The Project is expected to involve land acquisition of approximately 39 ha and resettlement of 534 households. The land acquisition and resettlement of residents will proceed in accordance with Bangladesh's domestic laws and the Resettlement Action Plan, which was formulated based on the JICA Guidelines for Environmental and Social Considerations. At the residents' consultation, there was a demand for sufficient compensation and prior information disclosure,

so compensation and resettlement procedures reflecting the requests of affected residents will be carried out. At present, no particular objection to the Project has been made by affected residents.

- ⑦ Other / Monitoring: In the Project, the contractor will monitor air quality, noise, vibration, water quality, and waste during construction, under the supervision of the executing agency, and the executing agency will monitor noise, vibration, and water quality after opening. NGOs entrusted by DMTCL will monitor the progress of land acquisition and resettlement procedures and livelihood recovery support.
- ⑧ Cross-Cutting Issues: The Project is expected to have an effect of mitigating climate change (GHG emissions reduction) of approximately 63,421 tons/year (CO<sub>2</sub> equivalent). In addition, regarding the station buildings and facilities subject to the Project, barrier-free-based urban railway technical standards, which have been developed in the technical assistance related to ODA loan called the Preparation of Rules and Regulations under Urban Mass Rapid Transit Act (Dhaka, Bangladesh), will be adopted, and slopes and tiles for guiding the visually impaired will be installed to give consideration to persons with disabilities. Under the civil engineering package to be procured firstly under the Project, COVID-19 prevention measures will be taken such as measuring their temperatures, wearing masks, washing their hands, and attending on public education and awareness activities, etc. Same measures will be taken for subsequently procured packages as well.

2) Category of Gender: GI (S) (Integrated gender activity project)

Activities / reason for Categorization: A gender action plan will be introduced in the Project, including operation of women-only cars in rush hours and installation of security cameras in the trains and stations, to ensure the safety of women in the trains and stations and to enhance understanding of gender issues.

Other Important Issues: The introduction of advanced Japanese technologies (e.g. rolling stocks, electrical/signaling systems, civil engineering technology, etc.) to achieve high-quality infrastructure is possible.

#### 4. Targeted Outcomes

(1) Quantitative Effects

Outcomes (Operation and Effect Indicators)

Indicator	Baseline (Actual Value in 2018)	Target (2029) 【Expected value 2 years after project completion】
Passenger transportation volume (1,000 people/kg/day) (Between Kamalapur Station and Airport Station)	N/A	6,216
Passenger transportation volume (1,000 people/kg/day) (Between Notun Bazar Station and Purbachal Terminal Station)	N/A	4,264
Number of services (Number of trains/day) (Between Kamalapur Station and Airport Station)	N/A	146
Number of services (Number of trains/day) (Between Purbachal Terminal Station and Notun Bazar Station)	N/A	67
Number of services (Number of trains/day) (Between Purbachal Terminal Station and Kamalapur Station)	N/A	54
Train operating distance (km/day) (Between Kamalapur Station and Airport Station)	N/A	4,311
Train operating distance (km/day) (Between Purbachal Terminal Station and Notun Bazar Station)	N/A	2,013
Train operating distance (km/day) (Between Purbachal Terminal Station and Kamalapur Station)	N/A	2,535
Time required (minutes) (Between Kamalapur Station and Airport Station)	139	24.3
Time required (minutes) (Between Purbachal Terminal Station and Notun Bazar Station)	117	20.4
Time required (minutes) (Between Purbachal Terminal Station and Kamalapur Station)	207	36.2
Train operation rate (%)	N/A	92.6

**(2) Qualitative Effects**

Facilitation of transportation, development of Bangladesh's economy through the reduction of economic losses by reducing traffic congestion, mitigation of climate change through the reduction of GHG emissions by promoting a modal shift to public transportation and prevention of air pollution etc, .

**(3) Internal Rate of Return**

According to the following preconditions, the Project's Economic Internal Rate of Return (EIRR) will be 14.9%. The Financial Internal Rate of Return (FIRR) will be 3.7%.

**【EIRR】**

Cost: Project costs (excluding tax) and operation/maintenance costs

Benefit: Reduction in vehicle operation costs, travel time, greenhouse gas, etc.

Project Life: 39 years

**【FIRR】**

Cost: Project costs and operation/maintenance costs

Benefit: Fare revenues

Project Life: 39 years

**5 . External Factors and Risk Control**

(1) Preconditions: N/A

(2) External Factors: N/A

**6 . Lessons Learned from Past Projects**

The results of the ex-post evaluation of India's Kolkata Subway Construction Project revealed that, with projects that involve land acquisition and relocation of facilities, it is important to actively incorporate ideas from residents and parties involved from the planning and implementation phase. In addition, the ex-post evaluation of the Delhi Mass Rapid Transport System Project (I)-(IV) in India (evaluated in 2010) showed that construction delays were prevented because the executing agency (Delhi Metro Rail Corporation), not the water authorities or other such parties, relocated the underground installations.

Based on the lessons above, the Project was intended to determine the scale of the land acquisition and resettlement areas in the feasibility study stage and started discussions with stakeholders at an early stage during the detailed design phase of the E/S Loan through consulting services for environmental and social considerations. A geological survey, underground utilities survey, underground obstacle survey, and cultural asset survey will be conducted during the detailed design phase. In order to prevent construction delays and cost overruns resulting

from geological conditions, underground installations, underground obstacles, and cultural assets, while the executing agency DMTCL will relocate and remove underground installations and coordinate the relocation and removal work with relevant agencies.

## **7. Evaluation Results**

The Project is consistent with the development issues and development policies of Bangladesh, as well as the assistance policies and analyses of the Government of Japan and JICA. Through the development of a mass rapid transit system, the Project will help alleviate traffic congestion in the Dhaka metropolitan area, which is becoming increasingly severe, and help reduce the negative environmental impact of air pollution, thereby contributing to the achievement of SDGs 9 (Industry, Innovation, and Infrastructure), 11 (Sustainable Cities and Communities), and 13 (Climate Action). Therefore, the necessity for JICA to support the Project is substantial.

## **8. Plan for Future Evaluation**

### (1) Indicators to be Used

As indicated in Sections 4.

### (2) Future Evaluation Schedule

Ex-post evaluation: Two years after the project completion

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