

Ex-Ante Evaluation (for Japanese ODA Loan)

1. Name of the Project

Country: The People's Republic of Bangladesh

Project: Dhaka Mass Rapid Transit Development Project (Line 5) (E/S)

Loan Agreement: June 14, 2018

2. Background and Necessity of the Project

(1) Current State and Issues of the Urban Development Sector and Priority of the Project in Bangladesh

The population of Dhaka increased from 6.62 million to 16.98 million between 1990 and 2014 (United Nations Population Division, 2014). 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 is 6.4 km/hour, less than half that in central Tokyo (14.7 km/hour; Kanto Regional Development Bureau, of the Ministry of Land, Infrastructure, Transport and Tourism, 2015). In terms of air pollution, the annual average PM₁₀ concentration is reported to be 158 µg/m³ (World Health Organization [WHO], 2016), which exceeds the WHO environmental standard of 20 to 70 µg/m³. The economic loss due to traffic congestion is 3.868 billion US dollars per year (Bangladesh Water Development Board, etc., 2013), which is degrading the investment environment greatly and hindering the economic and social development of Bangladesh.

To solve this problem, the Government of Bangladesh identified the promotion of economic growth and poverty reduction as a major goal in the 7th Five-Year Plan (FY2016/17–FY2020/21) and highlighted in its Traffic and Communication Development Strategy the importance of reducing road traffic congestion in the metropolitan area with appropriate investment. Based on this plan, the government revised the Strategic Transportation Plan (STP), the master plan for Dhaka urban transportation that was formulated in 2005, with aid from JICA in August 2016. In the revised STP, five Mass Rapid Transit (MRT) routes and two Bus Rapid Transit (BRT) routes were proposed to form a public transport network. MRT Line 5, which is to be developed under the Dhaka Mass Rapid Transit Development Project (Line 5) (hereinafter referred to as the "Project"), is prioritized as one of the preferential lines in the revised STP. The other priority lines are MRT Line 1, a rail link connecting north and south Dhaka to the new eastern city of Purbachal, and MRT Line 6, a rail link connecting north and south Dhaka that is now being developed through the Japanese ODA loan for the Dhaka Mass Rapid Transit Development Project.

The Project will connect east and west Dhaka and form a public transportation

network, along with MRT Lines 1 and 6 connecting north and south Dhaka, to alleviate the traffic congestion and mitigate the air pollution in Dhaka, thereby contributing to economic development and improving the urban environment.

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

The JICA Country Analysis Paper for Bangladesh (May 2014) identifies urban development as a priority area. Additionally, Japan's Country Assistance Program for Bangladesh (February 2018) sets the Acceleration of Economic Growth that Benefits All People as a priority area and aims to develop high-quality transportation and traffic infrastructure and promote the efficient transportation of passengers and goods. The Project is, therefore, consistent with these policies and the analysis.

In the past, JICA implemented Institutional Building Assistance for Dhaka Urban Transport Network Development (Dispatching of Experts; FY2010–FY2011) and Preparation of Rules and Regulations under Urban Mass Rapid Transit Act (Dhaka, Bangladesh) (Technical Assistance Related to ODA Loan; FY2013–FY2015) with the goal of supporting the development of the legal system, including urban railway law and urban railway technical standards. Additionally, JICA provided support for the establishment of the revised STP through the Project on the Revision and Updating of the Strategic Transport Plan for Dhaka (Technical Assistance Related Loan; FY2014–2016).

(3) Other Donors' Activity

The World Bank assisted in the formulation of the STP and implemented the Clean Air and Sustainable Environment Project, followed by support for the detailed design of BRT Line 3 (between the airport and Jhilmil) from 2009 to 2016.

The Asian Development Bank has been implementing the Greater Dhaka Sustainable Urban Transport Corridor Project to develop BRT Line 3 (between Gazipur and the airport) since 2010 with the aim of opening the route by the end of 2019.

3. Project Description

(1) Project Objective(s)

The objective of the Project is to alleviate the traffic congestion and mitigate the air pollution in Dhaka by constructing a mass rapid transit system that connects east and west Dhaka, thereby contributing to economic development and improving the urban environment. The Engineering Service (E/S) Loan for the Project (hereinafter referred to as the "E/S Loan"), which covers the detailed design, tenders, environmental and social consideration procedures, and other processes for this Project, is intended to promote the smooth implementation of the Project.

(2) Project Site / Target Area

Dhaka District

(3) Project Component(s)

- 1) Depot land development and construction (land development and construction of depot buildings, railway sidings, etc.; international competitive tendering)
- 2) Civil works for main line and stations (total length of approximately 20 km; construction of stations, including elevated and underground railway facilities, etc.; international competitive bidding)
- 3) Electrical and mechanical system (international competitive tendering)
- 4) Rolling stock and equipment for rolling stock in the depot (180 cars [30 six-car trains]; international competitive tendering)
- 5) Consulting services (F/S review, detailed design, tender assistance, construction supervision, environmental and social consideration, institutional development assistance, assistance in preparing for non-rail business, security assessment, and risk mitigation; shortlist)

This E/S Loan covers the following aspects of component 5 above except for construction supervision: F/S review, detailed design, tender assistance, environmental and social consideration, institution development assistance, assistance in preparing for non-rail business, security assessment, and risk mitigation.

The Project is expected to be co-financed by ADB.

(4) Estimated Project Cost (Loan Amount)

519,850 million Yen (E/S Loan Amount: 7,358 million Yen)

The total project cost will be recalculated during the detailed design phase covered by the E/S Loan.

(5) Schedule

June 2018–June 2022 (49 months in total)

The E/S Loan will be completed upon its disbursement.

(June 2022).

(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 (DMTC)
- 4) Operation and Maintenance System:

DMTC is responsible for the operation and maintenance of the Project. Through the technical support provided by the consultant for the preceding ODA loan project (Dhaka Mass Rapid Transit Development Project [Line 6]) as well as the planned technical cooperation project called the Project for Training MRT Operation and Management Staff, the necessary skills and knowledge will be transferred to DMTC staff engaged in the operation and maintenance of MRT Line 6. Trainers who are trained under these cooperative measures will train staff involved in the project. The consulting services for the Project will assist the operation and maintenance of

underground sections that are not included in the consulting services for MRT Line 6. The operation and maintenance costs and the principal and interest repayment costs will essentially be covered by revenue from fares. Since this revenue may be insufficient because the fares need to be affordable to the poor, the preceding ODA loan project (Dhaka Mass Rapid Transit Development Project) has reduced the financial burden of the principal and interest repayments by covering the shortage in fare revenue with government funding and a concessional sublease provided by the government. In the Project, JICA has also agreed with the Government of Bangladesh to consider similar measures in the detailed design phase.

(7) Cooperation and Sharing of Roles with Other Donors

The ODA loan project called the Dhaka Mass Rapid Transit Development Project is assisting with the development of MRT Line 6 and the establishment of DMTC, the executing agency for the Project. In addition, the Dhaka Mass Rapid Transit Development Project (Line 1) (E/S) is assisting with the detailed design and tender assistance for MRT Line 1, which will cross MRT Line 5.

The Project is also supposed to introduce a fare collection system based on the use of IC cards. The Project for Establishment of a Clearing House for Integrating a Transport Ticketing System in the Dhaka City Area (2014–2018; Technical Cooperation Project) is assisting in designing an IC card clearing system and developing the organizational structure for a clearing house. Based on the system's design, JICA is formulating a technical cooperation project that is scheduled to start in FY2018 called the Project for Establishment of a Clearing House for Integrating a Transport Ticketing System in the Dhaka City Area (Phase II) to establish a permanent system for promoting the use of IC cards. The Project will also adopt this IC card clearing system.

(8) Environmental and Social Consideration / Poverty Reduction / Social Development

1) Environmental and Social Consideration

- ① Category: A
- ② Reason for Categorization: The Project falls into the railway sector under the JICA Guidelines for Environmental and Social Considerations (published in April 2010; hereinafter referred to as the "JICA Guidelines") and is likely to have influential characteristics.
- ③ Environmental Permit: An Environmental Impact Assessment (EIA) Report on the Project was approved by the Department of Environment, Ministry of Environment and Forests of Bangladesh, in November 2017.
- ④ Anti-Pollution Measures: Air pollution, noise, and vibrations caused by the construction work will be minimized by implementing various measures, such as regularly sprinkling water, installing temporary enclosures, installing sound absorbers for the construction equipment, installing noise barriers, and

conducting periodic equipment maintenance. Although the estimated ground- and bridge-level train noise in the project area exceeds the country's noise limits, the use of sound absorbers and other such measures will prevent the noise from worsening and ensure that it meets Japan's requirements for conventional railroad lines. The wastewater discharged from the stations and the depot will not have an adverse effect on the water quality if it is appropriately treated using wastewater treatment equipment. The groundwater, which is located below the underground structures and thus unlikely to have any particularly adverse effects, will be regularly monitored. The large quantity of construction waste soil (about 1.5 million m³) that will be generated by the underground tunnel excavation work will be reused as reclamation and filling soil by RAJUK (the capital development authority) and private enterprises. In the detailed design process, the specific uses, storage methods, treatment methods, and other details regarding the waste soil will be determined by the Government of Bangladesh.

- ⑤ Natural Environment: As the Project site is not located in or around national parks or other vulnerable areas, any undesirable impact on the natural environment is likely to be minimal.
- ⑥ Social Environment: The construction of the alignment and depot, most of which will make use of the space above and below existing roads, will involve the acquisition of about 23.6 ha of land (about 22 ha for the depot and about 1.6 ha for the ground and elevated sections). Out of 4,660 residents from 1,107 households affected by the Project, 135 residents from 29 households will need to be resettled. The land acquisition and resettlement will be implemented in accordance with the domestic procedures of Bangladesh and a resettlement plan formulated under the JICA Guidelines. No particular objections to the Project were raised during meetings with local residents.
- ⑦ Other / Monitoring: During the construction phase, the contractor and the executing agency are in charge of monitoring air pollution, noise, vibration, water quality, waste, etc. After the start of operations, the executing agency will monitor the air pollution, noise, vibration, water quality, etc. The executing agency will also monitor progress in terms of land acquisition and resettlement.

2) Cross-Cutting Issues

- (i) Project Related to Climate Control: The Project is expected to mitigate climate changes by reducing carbon dioxide emissions by about 39,491 tons per year.
- (ii) Poverty Eradication and Poverty Consideration: N/A
- (iii) Control of AIDS/HIV and Other Infectious Diseases: The gender action plan mentioned below will discuss measures for controlling AIDS/HIV and other infectious diseases during the construction work.
- (iv) Participatory Development and Consideration for Persons with Disabilities: The

Project will adopt a barrier-free design, including braille blocks and slopes for wheelchairs, in accordance with Bangladesh’s urban railway technical standards.

3) Gender Category: [Gender Project] GI (S) (Gender Activities Integration Project)
Activity Components/Reason for Categorization:

In Bangladesh’s public transportation systems, no measures have been taken to eliminate sexual harassment and a lack of sufficient safety for women using public transportation acts as an obstacle to women’s use of these systems. Therefore, as it is necessary to ensure women’s safety on trains and in stations and to promote greater understanding of gender issues, JICA and DMTC have agreed to implement gender action plans, such as the operation of women-only cars during peak hours and the installation of surveillance cameras on trains and in stations. The progress of this gender action plan will be monitored in the progress report for the Project.

(9) Other Important Issues: N/A

4. Targeted Outcomes

(1) Quantitative Effects

1) Performance Indicators (Operation and Effect Indicators)

Indicator	Baseline (Actual Value in 20__)	Target (20__) (Expected value __ years after project completion)
Passengers carried (1,000 persons-km/day)		
Frequency of trains (number of trains in service/day)	To be determined during the appraisal process for the loan for the construction phase of the Project.	
Operation rate (%)		
Car-kilometers (km)		
Travel time for a certain section (min.)		

(2) Qualitative Effects

Response to transportation demand in the Dhaka Metropolitan Area, reduction in air pollution through the promotion of public transportation, and mitigation of climate change through the reduction of greenhouse gas emissions.

(3) Internal Rate of Return

To be determined during the appraisal process for the loan for the construction phase of the Project.

5. Preconditions / External Conditions

(1) Preconditions: N/A

(2) External Conditions: N/A

6. Lessons Learned from Past Projects

(1) Lessons Learned from Past Projects

The ex-post evaluation of India's Calcutta Metro Railways Construction Project (2002) revealed that, for projects involving land acquisition and facility relocation, it is important to take into account the opinions of local residents and parties involved in the planning and implementation phase. The ex-post evaluation also indicates that underground installations, such as waterworks and sewerage, can cause construction delays and cost overruns. In addition, the ex-post evaluation of India's Delhi High-Speed Transit System Construction Project (I)-(IV) revealed that construction delays were prevented because the executing agency (Delhi Metro)—not the water authorities or other such parties—relocated all underground installations. In the preceding ODA loan project (Dhaka Mass Rapid Transit Development Project), the alignment for the project had to be changed due to the construction of a flyover by other governmental agencies. It is clear that proper coordination with the relevant agencies must be conducted in the planning phase.

In addition, the results of the ex-post evaluation of India's past urban railway projects, including the Delhi High-Speed Transit System Construction Project (I)-(VI), indicated that it is necessary to ensure that there are enough methods to secure profitability and that, if there are not enough methods, there must be further examination.

(2) Application of Lessons Learned to the Project

Based on the lessons above, the Project is intended to determine the scale of the land acquisition and resettlement areas and start discussions with stakeholders during the detailed design phase of the E/S Loan through consulting services for environmental and social consideration. To prevent construction delays and cost overruns resulting from geological conditions, underground installations, underground obstacles, and cultural assets, JICA will conduct a geological survey, underground utilities survey, underground obstacle survey, and cultural asset survey during the detailed design phase while the executing agency DMTC will relocate and remove underground installations and coordinate the relocation and removal work with relevant agencies.

With regard to coordination with other agencies during the planning phase, only development projects planned in the revised STP should be implemented. Although projects implemented by other agencies are unlikely to make plan changes to the Project, the necessary coordination will be made through inter-agency discussions attended by the relevant agencies, including DMTC.

In terms of financing the Project, JICA will secure concessional financial measures from the Bangladesh government as well as assist in formulating a business plan through the provision of consulting services to secure non-fare revenues, including development revenue from transit-oriented development (TOD), tenant revenue from stores located on the station premises, and advertising revenue.

7. Evaluation Results

The Project aims to improve traffic flow in Dhaka, which is facing traffic congestion and deteriorating environmental conditions caused by rapid urbanization and increased traffic. To achieve this, the Project will develop MRT Line 5, which connects the city's east and west, and construct a public transport network in the city, thereby contributing to economic growth and an improved urban environment. The Project is consistent with the development policies of the Government of Bangladesh and the assistance policies and the analysis of the Government of Japan and JICA. The Project will also contribute to the achievement of Sustainable Development Goal (SDGs) 11 ("Make cities and human settlements inclusive, safe, resilient, and sustainable"). Thus, the necessity for JICA to support the Project is substantial.

8. Plan for Future Evaluation

(1) Indicators to be Used

To be determined during the appraisal process for the loan for the construction phase of the Project.

(2) Timing

To be determined during the appraisal process for the loan for the construction phase of the Project.