

Ex-Ante Evaluation (for Japanese ODA Loan)
South Asia Division 1, South Asia Department, JICA

1. Name of the Project

Country: India

Project: Kolkata East-West Metro Project (IV)

L/A signing date: March 26, 2021

2. Background and Necessity of the Project

(1) Current State and Issues of the Urban Transport Sector in India

Rapid urbanization has progressed in India recently and the number of registered automobiles has also been increasing rapidly (from around 55 million vehicles in 2001 to approximately 230 million vehicles in 2016), yet the development of public transportation infrastructure has not progressed and traffic jams due to increasing demand for road traffic have been a serious problem in major cities such as in Delhi, Mumbai, Kolkata and Bengaluru, etc., aggravating economic losses and health damage due to automobile pollution such as air pollution/noise, etc.

In order to deal with the above problems, the Government of India in its “Metro Rail Policy” (latest version updated in 2017) has set forth a policy promoting the development of public transportation systems such as metro, rail and bus, etc. from the viewpoint of safety/energy efficiency, etc. in addition to mitigating traffic congestion and dealing with the demand for transportation due to recent economic growth. Construction of a metro system in the metropolitan area is particularly recommended to enable high-volume transportation without putting undue pressure on existing road capacity.

As of 2011, the Kolkata metropolitan area is India’s third most overpopulated city (after Delhi and Mumbai) with a population density of approximately 13,000 people per square kilometer. Public transportation depends heavily on road traffic, with 49% of traffic using public/private buses and 24% using automobiles, and the share of track-based rail transportation (suburban railways and trams, etc.) limited to 22%. Also, like India as a whole, the number of registered automobiles has also been increasing (from around 660,000 in 2001 to approximately 1.4 million in 2015), so the average vehicle speed on major urban roads is 18 km/h (as of 2014), with intensified traffic congestion (ranking 7th out of 278 cities in Asia as of 2019). In addition, like other metropolises such as Delhi and Bengaluru, the transport sector accounts for a significant volume of CO2 emissions, with PM2.5 readings measured at around 7 times higher than WHO standards, leading to a deteriorated urban environment and reports of associated health hazards.

The Kolkata Metropolis Traffic Improvement Master Plan formulated by the West Bengal State Government in 2001 in view of recent economic growth puts

emphasis on the construction of a mass transportation system for the purpose of promoting the shift from road traffic to rail transit, in order to deal with increasing traffic volume and aggravating environmental problems, and accordingly, the East-West Metro Project in Kolkata (hereinafter referred to as “the Project”) is positioned as a priority project in India’s urban transport sector to deal with increasing transport demand by constructing a mass transportation system in the Kolkata Metropolitan area, West Bengal State.

(2) Japan and JICA’s Urban Transport Sector Policy and the Positioning of the Project

Country Assistance Policy for India (March 2016) formulated by the Government of Japan sets “enhancing connectivity” as a priority area and states that with a view to de-bottleneck the infrastructure constraints to investment and growth, Japan will support development of transportation hub and network infrastructure in the areas of railways (including high speed railways and metros) to strengthen connectivity among major industrial cities and economic zones as well as regional connectivity. “Strengthening industrial competitiveness” through urban foundation maintenance, etc. is also set out as a priority area for assistance, together with the promotion of transportation infrastructure, etc. in major metropolitan areas by constructing metros, etc. with the aim of mitigating traffic congestion, optimizing passenger/freight transport and improving the urban environment, etc. Also, in order to eliminate the bottleneck in economic growth, the JICA Country Analysis Paper for India (March 2018) provides an analysis that, mainly in the industrial agglomeration areas such as special economic zones and economic corridors located in the six major metropolitan areas in India including Kolkata and the Delhi – Mumbai Industrial Corridor, cooperation for measures to deal with environment and climate change issues are being promoted as a means of support continuous, comprehensive growth, and it is necessary to promote regional economic development facilitation and logistics optimization, and to support infrastructure development including arterial railroad, urban railway, roads, and harbors which contribute to increased investment from the foreign capital. The Project is consistent with these policies and analyses.

The Project is also expected to contribute to the achievement of Goal 9 (Build resilient infrastructure, promote sustainable industrialization and foster innovation), Goal 11 (Make cities inclusive, safe, resilient and sustainable), and Goal 13 (Take urgent action to combat Climate change and its impacts) of the Sustainable Development Goals (SDGs), so the Project’s implementation is highly necessary.

(3) Other Donors’ Activities

There has been funding from the World Bank for Mumbai Urban Transport Project (approved in 2002 and 2010, total of USD 972 million) and the Eastern

Dedicated Freight Corridor Project (approved in 2011, 2014 and 2015, total of USD 2,725 million). There has also been support from the Asian Development Bank (ADB) for the Jaipur Metro Rail Project (approved in 2013, USD 157 million), and cooperative financing with the New Development Bank for the Mumbai Metro Rail System Project (Line 2A, 2B, 7; approved in 2019; approved amounts of USD 926 million from ADB and USD 260 million from co-financing). For the Kolkata East-West Metro Project, however, there is no assistance from other donors.

3. Project Description

(1) Project Objective

The objective of the Project is to cope with the increase of traffic demand in Kolkata metropolitan area by extending the mass rapid transit system, thereby promoting regional economic development and improving urban environment, through mitigation of traffic jams and decrease of pollution caused by increasing motor vehicles.

(2) Project Site/Target Area

Kolkata metropolitan area in West Bengal State (population: approx. 15 million)

(3) Project Components

- 1) Civil works (total length of approx. 16 km, underground section of approx. 10 km, elevated road section of approx. 6 km, 12 stations)
- 2) Railway track construction
- 3) Electrical/mechanical work
- 4) Signal/communication work
- 5) Automatic fare collection system
- 6) Station equipment-related
- 7) Procurement of rolling stock (84 cars)
- 8) Depot construction
- 9) Tunnel ventilation system
- 10) Station environmental management system
- 11) Consulting services (basic design/bidding assistance/construction supervision, etc.)

The fields covered by the ODA loan are civil works in the underground section of 1), the signal/communication system 4), the automatic fare collection system 5), electric parts necessary for rolling stock in the procurement of rolling stock 7), the tunnel ventilation system 9), the station environment management system 10), and consulting services 11).

(4) Estimated Project Cost

135,606 million yen (Yen Loan Amount of this tranche: 9,091 million yen)

(5) Schedule

March 2008 to June 2022 (172 months in total). The commencement of operation for all the lines (February 2022) shall be the time of the Project's completion.

(6) Project Implementation Structure

- 1) Borrower: The President of India
- 2) Guarantor: None
- 3) Executing Agency: Kolkata Metro Rail Corporation Limited (hereinafter "KMRCL")
- 4) Operation and Maintenance Agency: Operation and maintenance after the project completion will be taken over by the Metro Railway, Kolkata (hereinafter "MRK"), a department of Indian Railways, where some board members are working concurrently with KMRCL.

(7) Collaboration with Other Schemes and Donors

None.

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

1) Environmental and Social Consideration

- i) Category: A
- ii) Reason of Categorization: The Project falls into the railway sector and the influential characteristics, both being listed in the "Japan Bank for International Cooperation Guidelines for Confirmation of Environmental and Social Considerations" (established in April 2002).
- iii) Environmental Permit: Although preparation of an Environmental Impact Assessment (EIA) Report regarding the Project is not required under the domestic law in India, an EIA Report was prepared by the KMRCL and approved by the Environmental Department of West Bengal State in November 2006 based on the provisions of West Bengal State. Thereafter, revised versions of the EIA report were prepared in September 2007 and February 2017. (Approval of revised versions of EIA is unnecessary.)
- iv) Anti-Pollution Measures: There are planned measures to reduce noise, such as installing soundproof walls/soundproof pads. Regarding the impact on the ground during construction, loose ground and the inflow of groundwater will be prevented by adopting the shield construction method. Ground was softened in an area where there was an accident during tunnel construction, but the KMRCL stabilized the ground by means of immediate grouting and other measures. Note that the environmental management plan has been formulated with the support of consultants hired in the Project.
- v) Natural Environment: The target area of the Project is located in urban areas and it is assumed that the undesirable impact on the natural

environment is minimal, since the planned train track passes mostly along existing roads.

- vi) **Social Environment:** The land area required for the Project is 19.5 ha (private land of 0.75 ha, government-owned land of 18.3 ha, and land owned by the State Corporation of 0.44 ha). 490 homes and structures will have to be relocated due to the Project. The KMRCL has held consultations with those who are subject to land acquisition/resident relocation, and the procedures for land acquisition/resident relocation are to be completed by September 2018 based on the Land Acquisition Law and the resident relocation plan prepared by the KMRCL. Note that there was no particular dissenting opinion on the Project confirmed during the stakeholder consultations.
- vii) **Other/Monitoring:** In the Project, the contractors monitor noise, air quality, water quality, groundwater levels, and the KMRCL monitors land acquisition/resident relocation during construction, and no particular problems have been confirmed. MRK will monitor all of these after the commencement of the service.

2) Cross-Sectoral Issues:

- i) **Climate change:** The Project is thought to contribute to mitigation of climate change as it contributes to the reduction of greenhouse gas emissions by promoting a modal shift. Note that the application of a mass rapid transport system is included as one of the strategies relating to mitigation policy in India's Nationally Determined Contribution (NDC), and the Project is highly regarded. The mitigation effect of the Project on the climate change (rough estimate of GHG emission reduction) is forecast to be about 42,000 tons/year of CO₂ equivalent (as of 2027).
- ii) **Consideration for Disabilities:** In accordance with the domestic laws in India, consideration for usability for the elderly and persons with disabilities will be adopted for the station buildings/passenger cars (elevators, toilets, station announcement, braille blocks, wheelchair space, etc.), and customer care training for all frontline staffs including station staff and train crew is planned.
- iii) **Countermeasures for Infectious Diseases such as AIDS/HIV:** It has been confirmed with the KMRCL that contracts with construction businesses include implementation of AIDS countermeasures such as activities to make workers aware of prevention, etc.
Moreover, at the time of screening, the KMRCL agreed to a list of measures that must be taken when formulating projects and implementing projects (total of 36 items) to control COVID-19 infections. Items include the formulation and thorough adherence to behavior

patterns for preventing infections, providing contractual consideration for contractors when infections increase, etc.

3) Gender Category:

■GI(S) (Gender Activity Integration Project)

Activity Description / Reason for Classification:

In the Project, measures such as introducing women-only cars, setting priority seats for passengers needing assistance (including women), and installing CCTV cameras in station buildings/trains are being taken. Also, as well as ensuring same wages for men and women on construction sites and providing facilities for female workers, female personnel are also being appointed to management position of project implementation, so it is categorized as a Gender Activity Integration Project.

(9) Other Important Issues: N/A

4. Targeted Outcomes

(1) Quantitative Effects

1) Outcomes (Operation and Effect Indicators)

Indicator	Baseline (2007)	Target (2024) (2 years after Project completion)
Operating rate (% / year)	—	89.40
Running distance (thousand km / day)	—	27.59
Number of running train (number of running trains /day)	—	213
Volume of transportation (million passengers-km / day)	—	3.15
Income from passenger (million rupees / day)	—	9.09

(Section: Howrah Maidan Station – Salt Lake Sector-V Station)

(2) Qualitative Effects

Mitigation of traffic congestion in the Kolkata metropolitan area, improvement of urban environment through mitigation of traffic pollution by means of modal shift, improvements in convenience through punctuality in scheduled travel times, economic development of the Kolkata metropolitan area, and promotion of societal advances for women.

(3) Internal Rate of Return

Under the following preconditions, the Project's Economic Internal Rate of Return (EIRR) and the Financial Internal Rate of Return (FIRR) of the Project will be 11.0% and 1.6%, respectively.

[EIRR]

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

Benefits: Shortening effect on traveling time for the users of subway and roads, reduction of vehicle maintenance costs for road users, reduction of maintenance costs for road traffic infrastructure, traffic accidents decline and emission reduction effect of environmental pollutants.

Project Life: 30 years

[FIRR]

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

Benefits: Fare box revenue, advertisement revenue, and station commercial and front area development revenue, etc.

Project Life: 30 years

5. Preconditions and External Factors

(1) Preconditions: None

(2) External Factors: None

6. Lessons Learned from Past Projects and Application to the Project

Important lessons were obtained from the ex-post evaluation (evaluation year 2010) of the “Delhi Mass Rapid Transport System Project” ODA loan for India, namely that it is desirable to promote efficiently operating public transportation systems as a whole by mutual cooperation of public transportation systems to construct systematic urban transport rather than the competing relationship among them, and that it is important to establish a financially independent project implementation system of projects from the viewpoint of ensuring proper operation and maintenance.

Also, in the Project, an increase in the utilization rate is indispensable for reinforcing the financial aspect, and coordination with the Transport Department, Government of West Bengal will take place so that the subway line is not competing with the bus route. In addition, MRK is engaged in strengthening its financial structure by implementing relevant businesses such as station commercial areas and station-front areas.

7. Evaluation Results

The Project aims to cope with the increase of traffic demand in the Kolkata metropolitan area by expanding the mass rapid transportation system, thereby promoting regional economic development and improving urban environment, through relief of traffic congestion and decrease of pollution caused by increasing motor vehicles, and is consistent with the development issues and policies of India and the assistant policies and analysis of the Government of Japan and JICA. The Project is also expected to contribute to the achievement of Goal 9,

Goal 11, and Goal 13 of SDGs, so there is a great necessity for assisting with the implementation of the Project.

8. Plan for Future Evaluation

(1) Indicators to be Used

As indicated in section 4 above.

(2) Timing of the Next Evaluation

Ex-post evaluation: 2 years after the Project's completion

END