

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

### Middle East Division 1, Middle East and Europe Department, JICA

#### 1. Basic Information

- (1) Country: Arab Republic of Egypt
  - (2) Project Site/Target Area: The southwestern part of the Greater Cairo Region (between 6th of October City (El-Ashghal Station) and the center of Cairo(El Fustat))
  - (3) Project Name: Greater Cairo Metro Line No. 4 Phase 1 Project (III)
- Loan Agreement: April 30, 2023

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

##### (1) Current State and Issues of the Urban Transportation Sector in Egypt

At a population of about 19.29 million (as of 2017), traffic congestion in the Greater Cairo Region (GCR) has become chronic due to the increase in population and number of cars, with concerns that traffic congestion will worsen further as urbanization progresses. The Egyptian government is pushing for development of satellite cities in GCR suburbs that will function as industrial and residential zones to help disperse the population, but the impact of traffic congestion due to metro Cairo's expansion has started to reach inter-city traffic.

In the "Sixth Five-Year-Plan for Economic and Social Development" (July 2006 to June 2011), the Government of Egypt announced efficient measures with the use of multiple traffic modes for increasing demand in the transportation sector as one of the main policies, and the government decided to enhance its engagement in subways in the Cairo metropolitan area. In addition, in Cairo Vision 2050, prepared by the the General Organization for Physical Planning, Ministry of Housing, Utilities and Urban Communities in 2007, a subway development plan for 15 lines to expand modes of transport in GCR was proposed, with Lines 3 and 4 positioned as particularly urgent projects in achieving this objective. Also, the Sustainable Development Strategy 2030, a long-term development strategy for the period up to 2030 as announced in February 2016, lists traffic congestion caused by the insufficient public transportation network as a transportation sector issue to achieve sustainable economic growth by 2030, positioning construction of Cairo Metro Line 4 as one of the mega projects to solve this issue.

##### (2) Japan and JICA's Transportation Sector Cooperation Policy and the

## Positioning of this Project

In the Country Assistance Policy for the Arab Republic of Egypt (September 2020), Japan lists "promotion of sustainable economic growth" as a priority area, under which "social and economic infrastructure development" to support the development of basic infrastructure, including urban transportation, is given as a priority development issue. In the JICA Country Analysis Paper for the Arab Republic of Egypt (March 2016), "Realization of Inclusive and Continued Growth" is listed as a priority area, and the Transportation/Traffic Development Support Project" is identified as a cooperative Project that contributes to the improvement of the development issue "Social/Economic Infrastructure Development." This is consistent with these policies and analysis to improve mass public transportation functionality and reduce road traffic dependence to ease traffic congestion.

### (3) Other Donors' Activity

Construction of Cairo Metro Line 1 (total length: 44 km) was funded by Agence Française de Développement (AFD), the European Investment Bank (EIB) and the European Bank for Reconstruction and Development (EBRD), with technical assistance provided by the French government (Fonds d'études et d'Aide au Secteur Privé). Since the opening of 29 km with Phase 1 in 1987, Phases 2 and 3 were opened in order, and the full line opened in 2002.

Construction of Cairo Metro Line 2 (total length: 21.6 km) was funded from the Egyptian budget. Since the opening of 8 km with Phase 1 in 1996, Phases 2, 3, and 4 were opened in order, and the full line opened in 2005.

Construction of Cairo Metro Line 3 (total length: 41.2 km) was funded by the AFD, European Union (EU) and EIB, with technical cooperation provided by the EU. Since the opening of 4.3 km with Phase 1 in 2012, another 7.7 km opened with Phase 2 in 2014, 17.7 km with Phase 3, and 11.5 km under construction with Phase 4, with the full line scheduled for 2024.

## **3. Project Description**

### (1) Project Outline

#### ① Project Objective

The objective of the Project is to meet with growing traffic demand and to relieve the worsening traffic congestion by constructing a subway in the southwestern part of the Greater Cairo Region (between 6th of October City (El-Ashghal Station) and to the center of Cairo (El Fustat)), thereby contributing to

promote economic activity in the Greater Cairo Region.

② Details of the Project

For Phase 1, approximately 18.8 km of Metro Line 4 will be built heading east from El Ashghal Station (origin station) and connecting to the Cairo city center (El Fustat), along with development of the electrical, mechanical, signal, and communication equipment and railcar stock procurement. The details are as follows:

A) Main Project

- (a) Subway construction work, west section (El Ashghal station to El Mesaha Square station): Approx. 14 km (tunnel construction, 12 underground station buildings, track work, etc.); international competitive bidding (bilateral, tied); contract awarded, construction underway
- (b) Subway construction work, east section (El Mesaha Square Station to turnaround point (El Fustat): Approx. 5 km (tunnel construction, 4 underground station buildings, track work, turntables, etc.); international competitive bidding (bilateral, tied); price under evaluation
- (c) Signal system procurement: Electrical and mechanical equipment (including Supervisory Control and Data Acquisition (SCADA)), signaling and communication equipment (including Operation Control Center (OCC)), track laying (including third rail), platform doors, automatic toll collection system, vehicle depot and vehicle maintenance yard construction, etc.; international competitive bidding (tied); contract awarded, start of construction scheduled
- (d) Railcar procurement: 184 railcars (23 8-car trains); international competitive bidding (tied); contract awarded, start of manufacturing scheduled

B) Consulting service (short list method, contract awarded)

- (a) Tender assistance
- (b) Construction management (including safety management, commissioning assistance, etc.)
- (c) Assistance for social and environmental considerations (assistance in preparing resettlement plans, implementation supervision, monitoring support, etc.)
- (d) Support related to operation, maintenance, and management systems and planning, etc.

③ Beneficiaries of the Project (Target Groups)

Direct beneficiaries (approx. 19.29 million ppl): Local residents along the subway line

Final beneficiaries (approx. 21.75 million ppl): Residents of GCR

(2) Total project cost: 552.465 billion yen (of which, this Loan amount is 100 billion yen)

(3) Project implementation schedule (cooperation period): Scheduled from March 2012 to March 2031 (228 months in total). The Project will be completed when the facilities are opened to serve the public (March 2029).

(4) Project Implementation Structure

1) Borrower: The Government of the Arab Republic of Egypt

2) Executing agency: National Authority for Tunnels (NAT)

(5) Collaboration with Other Schemes and Donors

1) Related aid activities by Japan

To date, JICA has helped in formulating master plans for overall development, such as the Cairo Regional Area Transportation Study (2002), the Strategic Urban Development Master Plan Study (SDMP), MISR National Transport Study (2012), the Quality and Cost Based Selection for the Transportation Development Plan (2021), and also provided support for feasibility surveys for individual projects, such as the Plan to Fund Operations for the Commercialization of Cairo Urban Toll Expressway (2005), the Feasibility Study on High Priority Urban Toll Expressways in Cairo (2007), and the Preparatory Survey on Greater Cairo Metro Line No. 4 Development (2008). In addition, the detailed design of this project was performed with ODA technical assistance (May 2012 to March 2015).

Furthermore, ODA loans were used to support construction of the Grand Egyptian Museum Construction Project (L/As signed 2006 and 2016; loan amounts of 84,247 million yen). The stations of this project are scheduled to connect with the museum, and the line is expected to make it easier for tourists to visit the pyramids and the Grand Egyptian Museum.

2) Aid Activities of Other Donors

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#### (6) Environmental and Social Consideration

##### 1) Environmental and Social Considerations

① Category: A

② Reason for the Categorization: The Project falls within the railway sector as defined by the JICA Guidelines for Environmental and Social Considerations (published in April 2010).

#### (7) Cross-cutting Issues :

① Climate change: Railways are more energy efficient than other transportation systems and have a higher greenhouse gas (GHG) reduction effect, and therefore rank as an important mitigation measure in the transport sector. This project will also help in reducing GHG emissions as a measure to mitigate climate change by enhancing the mass public transportation function through subway development, responding to increasing traffic demand and alleviating traffic congestion. The project's climate change mitigation effect (estimated GHG emission reductions) is approximately 75,886 tons/year of CO<sub>2</sub> equivalent (2030).

② Consideration for disabled people: Based on international standard standards, station buildings will be built to accommodate the elderly and disabled people (elevators, slopes, tactile walking surfaces for the visually handicapped people, toilets for disabled people, vending machines with wheelchair access, etc.).

③ COVID-19 measures: Construction workers at NAT project sites are required to comply with the Ministry of Health's COVID-19 countermeasures instructions, including vaccination against COVID-19.

#### (8) Gender Classification: [Gender Project] ■ GI(S) (Gender Informed (Significant))

<Activities/Classification Rationale> In order to ensure that women can use

the subway in safety and comfort, the Project includes installation of female-only train cars and changing rooms for female employees.

- (9) Other special notes: This is a STEP project. Japanese technology and products are to be introduced for escalators, elevators, and other civil engineering works items, as well as automated toll collection systems, platform doors, and other systems.

#### 4. Targeted Outcomes

##### (1) Quantitative Effects

Indicator	Standard value	Target (2031) [2 Years after Completion]
Volume of transportation per day (million man-km)	—	3,228
Number of running trains per day	—	396
Availability Factor (%)	—	90.1
Running distance (km/day)	—	54,490
Time required from origin to end point (mins.)	—	30.5

##### (2) Qualitative Effects

Alleviating traffic congestion in the urban area of Cairo, alleviating traffic and air pollution by modal shifts, improving convenience by ensuring punctual travel, economic development in the urban area of Cairo, and mitigating climate change.

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

Based on the following preconditions, the Economic Internal Rate of Return (EIRR) will be 8.4% and the Financial Internal Rate of Return (FIRR) will be 2.2%.

###### [EIRR]

Cost: Project cost (excluding taxes), operation and maintenance cost

Benefits: Reduced vehicle running costs, time required, and emissions (NO<sub>x</sub>, SO<sub>2</sub>, GHG, etc.)

Project life: 40 years

###### [FIRR]

Cost: Project cost, operation and maintenance expenses

Benefit: Fare revenue

Project life: 40 years

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

(1) Preconditions:

None in particular.

(2) External Factors:

None in particular.

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

Ex-post evaluations of the Delhi Regional Rapid Transit System Construction Project I-VI (2015) in India show the importance of factors such as improving convenience for transferring to other modes of transportation and stimulating latent demand through residential development along the train lines. In this project, the detailed design conducted with ODA technical assistance included examination of basic development plans for the surrounding areas for the four stations expected to serve as nodes of traffic, where safe and smooth transfers are required, proposing to NAT the project needed to make Cairo a desirable city in the future. In response, NAT, in cooperation with the governates of Giza and Cairo, is implementing development plans to ensure that monorail, bus, taxi and other transport modes at El Remaya Square, Marrioutiya, Giza Square, and other major stations are consistent with the regional development plans (such as examining the location of taxi stands and bus terminals and line changes between Cairo Metro Line 1 and 2).

## **7. Evaluation Results**

In GCR, chronic traffic congestion is worsening due to population growth from the advance of urbanization, excessive dependence on road-based public transportation (buses, taxis, etc.), and the rapid proliferation of automobiles.

Given the limited capacity of existing public transportation (buses, taxis, and railways) and the difficulty of significantly expanding the road network due to limited urban land and urban population concentrations, improving mass public transportation functionality to ease traffic congestion and reduce road traffic dependence is a pillar of the Egyptian government's economic and social development plans.

In addition, given that the project is deemed to contribute to SDG goals 9 (build resilient infrastructure), 11 (make cities and human settlements) inclusive, safe,

resilient and sustainable), and 13 (take urgent action to combat climate change), the need to support Project implementation is high.

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

(1) Indexes to be used for future evaluation(s)

As indicated in sections 4.

(2) Future evaluation schedule

Ex-post evaluation will be made in 2 years after the project completion.

END



## Attachment: Cairo Metro Line 4 Phase 1 Development Project Map

### Map of Egypt

