Report and Recommendation of the President to the Board of Directors

PUBLIC

Project Number: 52234-001
November 2022

Proposed Multitranche Financing Facility and Technical Assistance Grant
India: Chennai Metro Rail Investment Project

This is a redacted version of the document approved by ADB's Board of Directors. The document excludes information that is subject to exceptions to disclosure set forth in ADB's Access to Information Policy.

Asian Development Bank

CURRENCY EQUIVALENTS

(as of 2 November 2022)

Currency unit	–	Indian rupee/s (₹)
₹1.00	=	$0.012
$1.00	=	₹82.71

ABBREVIATIONS

ADB	–	Asian Development Bank
CMA	–	Chennai Metropolitan Area
CMRL	–	Chennai Metro Rail Limited
COVID-19	–	coronavirus disease
EIA	–	environmental impact assessment
EIRR	–	economic internal rate of return
EMP	–	environmental management plan
EWCDT	–	elderly, women, children, differently abled, and transgender people
FAM	–	facility administration manual
FIRR	–	financial internal rate of return
GESI	–	gender equality and social inclusion
GHG	–	greenhouse gas
JICA	–	Japan International Cooperation Agency
km	–	kilometer
km^2	–	square kilometer
LVC	–	land value capture
MFF	–	multitranche financing facility
OP1–OP7	–	operational priorities 1–7
SDG	–	Sustainable Development Goal
TA	–	technical assistance
TOD	–	transit-oriented development
WACC	–	weighted average cost of capital

NOTES

(i) The fiscal year (FY) of the Government of India and its agencies ends on 31 March. "FY" before a calendar year denotes the year in which the fiscal year ends, e.g., FY2023 ends on 31 March 2023.

(ii) In this report, "$" refers to United States dollars.

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[a] Outposted to the India Resident Mission.
[b] Outposted to the Bangladesh Resident Mission.

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INVESTMENT PROJECT AT A GLANCE

1. Basic Data — **Project Number:** 52234-001

Project Name	Chennai Metro Rail Investment Project
Country	India
Borrower	India
Country Economic Indicators	https://www.adb.org/Documents/LinkedDocs/?id=52234-001-CEI
Portfolio at a Glance	https://www.adb.org/Documents/LinkedDocs/?id=52234-001-PortAtaGlance
Department/Division	SARD/SATC
Executing Agency	Chennai Metro Rail Limited, Department of Special Initiatives, Government of Tamil Nadu

2. Sector

	Subsector(s)	ADB Financing ($ million)
✓ **Transport**	Urban public transport	780.000
	Total	**780.000**

3. Operational Priorities

- ✓ OP1: Addressing remaining poverty and reducing inequalities
- ✓ OP2: Accelerating progress in gender equality
- ✓ OP3: Tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability
- ✓ OP4: Making cities more livable
- ✓ OP6: Strengthening governance and institutional capacity

Climate Change Information

GHG reductions (tons per annum)	28,294
Climate Change impact on the Project	Medium

ADB Financing

Adaptation ($ million)	107.260
Mitigation ($ million)	672.740

Cofinancing

Adaptation ($ million)	0.000
Mitigation ($ million)	0.000

Sustainable Development Goals

SDG 1.5
SDG 5.4
SDG 9.1
SDG 11.2
SDG 13.a

Gender Equity and Mainstreaming

Effective gender mainstreaming (EGM) ✓

Poverty Targeting

Geographic Targeting ✓

4. Risk Categorization: Complex

5. Safeguards Categorization [Tranche 1] **Environment:** A **Involuntary Resettlement:** A **Indigenous Peoples:** C

6. Financing

INVESTMENT PROJECT AT A GLANCE

Modality and Sources	Indicative Tranches ($million)			Amount ($million)
	I	II	III	
ADB				**780.000**
Sovereign MFF-Tranche (Regular Loan): Ordinary capital resources	350.000	240.000	190.000	780.000
Cofinancing				**1,142.000**
Asian Infrastructure Investment Bank - MFF-Tranche (Loan) (Not ADB Administered)	795.000	0.000	0.000	795.000
New Development Bank - MFF-Tranche (Loan) (Not ADB Administered)	347.000	0.000	0.000	347.000
Counterpart				**1,723.500**
Government	1,339.400	191.500	192.600	1,723.50
Total	**2,831.400**	**431.500**	**382.600**	**3,645.500**

Note: Tranche 1 - An attached technical assistance will be financed on a grant basis by the Technical Assistance Special Fund (TASF-OTHERS) in the amount of $1,000,000.

Currency of ADB Financing: US Dollar

The government counterpart financing includes $689.5 million for ADB, $883.4 million for AIIB, and $150.6 million for NDB.

INVESTMENT PROJECT AT A GLANCE

7. Country Partnership Strategy

CPS	https://www.adb.org/documents/india-country-partnership-strategy-2018-2022

8. Investment Program Summary

The Chennai Metro Rail Investment Project will contribute to the expansion of the existing metro rail network in Chennai, the capital city of Tamil Nadu on the south-east coast of India. It will contribute to the development of three new metro lines, 3, 4, and 5, that will connect the central area of Chennai to major destinations in the south and west of the city. The investment project and the attached technical assistance project will improve the overall livability, inclusiveness, and competitiveness of the Chennai Metropolitan Area (CMA) by providing affordable alternative transport, enhancing non-farebox revenue generation, and enabling transit-oriented development, and first- and last-mile connectivity.

Impact: Urban mobility and livability in the Chennai Metropolitan Area improved

Outcome: Access to and connectivity of public transport in the Chennai Metropolitan Area improved

Outputs: (i) New metro lines completed, (ii) Multimodal and land use integration improved, and (iii) Non-farebox revenue mechanism strengthened

Implementation Arrangements: Chennai Metro Rail Limited and Department of Special Initiatives, Government of Tamil Nadu will be the executing agencies.

Project Readiness: The project readiness is high, as the complete scope to be financed by the MFF has been appraised by ADB. Geotechnical investigations have been completed and detailed design work is in progress. The COVID-19 pandemic has inevitably imposed impediments in the project preparatory activities of the Chennai Metro Rail Ltd (CMRL). However, the project schedule has been adjusted to allow for such delays.

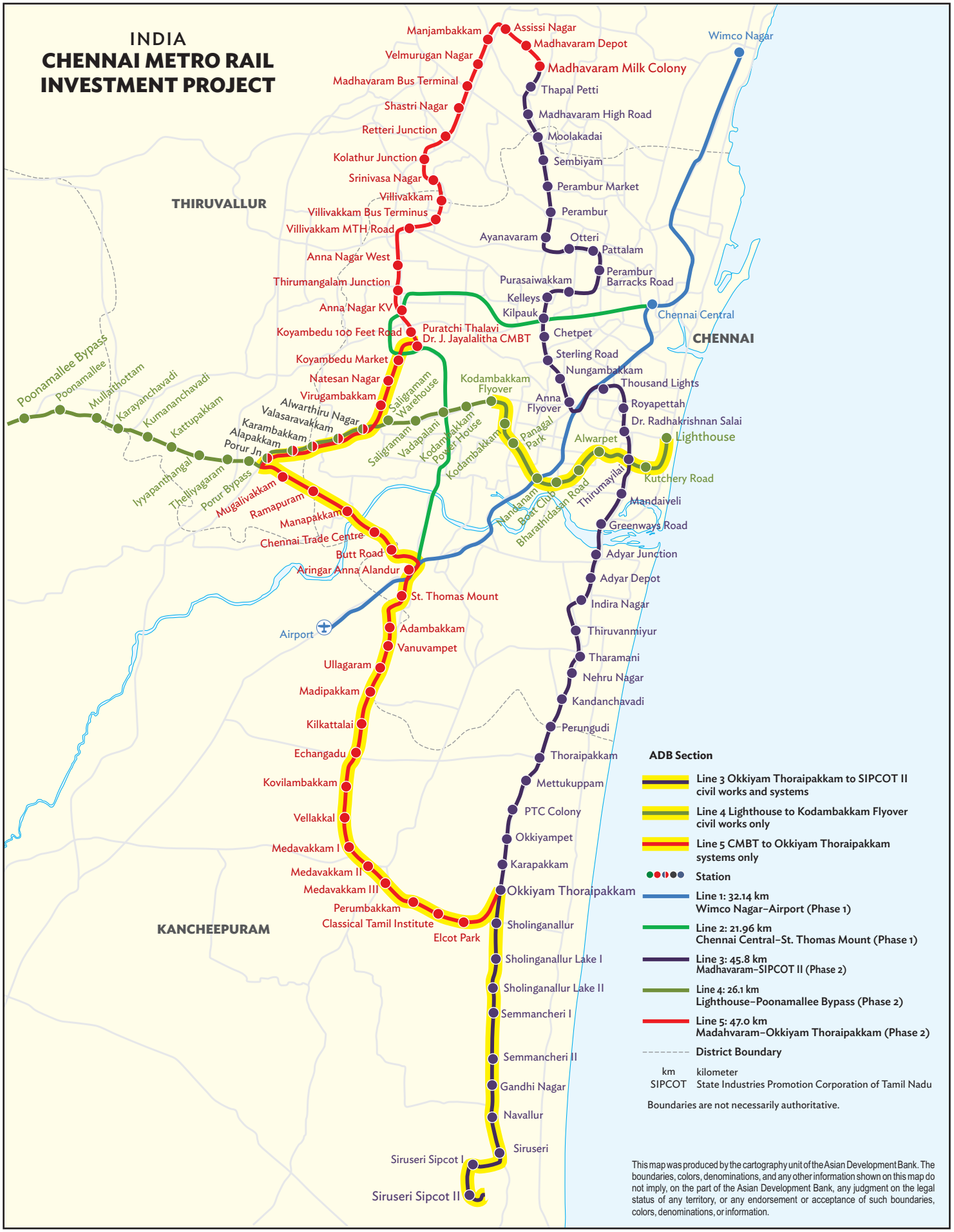
9. Indicative Tranche Approval Plan

Tranche	Estimated Approval	Estimated Completion
Tranche I	8 December 2022	31 December 2026
Tranche II	9 December 2024	29 December 2028
Tranche III	8 December 2026	31 December 2030

10. Project Data Sheet (PDS)

PDS [b]	http://www.adb.org/projects/52234-001/main

[a] Multitranche Financing Facility (MFF).
[b] Safeguard documents can be viewed by clicking the Document's hyperlink in the Project Data Sheet (PDS) page.


INDIA
CHENNAI METRO RAIL INVESTMENT PROJECT
THIRUVALLUR
CHENNAI
KANCHEEPURAM
Manjambakkam
Assissi Nagar
Madhavaram Depot
Velmurugan Nagar
Madhavaram Milk Colony
Madhavaram Bus Terminal
Thapal Petti
Shastri Nagar
Madhavaram High Road
Retteri Junction
Moolakadai
Kolathur Junction
Sembiyam
Srinivasa Nagar
Perambur Market
Villivakkam
Villivakkam Bus Terminus
Perambur
Villivakkam MTH Road
Ayanavaram
Otteri
Pattalam
Anna Nagar West
Perambur Barracks Road
Thirumangalam Junction
Purasaiwakkam
Kelleys
Anna Nagar KV
Kilpauk
Chennai Central
Koyambedu 100 Feet Road
Puratchi Thalavi Dr. J. Jayalalitha CMBT
Chetpet
Koyambedu Market
Sterling Road
Nungambakkam
Natesan Nagar
Thousand Lights
Virugambakkam
Kodambakkam Flyover
Anna Flyover
Royapettah
Alwarthiru Nagar
Saligramam Warehouse
Valasaravakkam
Dr. Radhakrishnan Salai
Karambakkam
Panagal Park
Alwarpet
Lighthouse
Alapakkam
Vadapalani
Porur Jn
Kodambakkam Power House
Kutchery Road
Kodambakkam
Thirumayilai
Iyyapanthangal
Mandaiveli
Thelliyagaram
Nandanam
Boat Club
Bharathidasan Road
Greenways Road
Porur Bypass
Mugalivakkam
Adyar Junction
Ramapuram
Adyar Depot
Manapakkam
Indira Nagar
Chennai Trade Centre
Thiruvanmiyur
Butt Road
Tharamani
Aringar Anna Alandur
Nehru Nagar
St. Thomas Mount
Kandanchavadi
Airport
Perungudi
Adambakkam
Thoraipakkam
Vanuvampet
Mettukuppam
Ullagaram
PTC Colony
Madipakkam
Okkiyampet
Kilkattalai
Karapakkam
Echangadu
Okkiyam Thoraipakkam
Kovilambakkam
Sholinganallur
Vellakkal
Sholinganallur Lake I
Medavakkam I
Sholinganallur Lake II
Medavakkam II
Semmancheri I
Medavakkam III
Perumbakkam
Semmancheri II
Classical Tamil Institute
Elcot Park
Gandhi Nagar
Navallur
Siruseri
Siruseri Sipcot I
Siruseri Sipcot II
Poonamallee Bypass
Poonamallee
Mullaithottam
Karayanchavadi
Kumananchavadi
Kattupakkam
Wimco Nagar
ADB Section
Line 3 Okkiyam Thoraipakkam to SIPCOT II civil works and systems
Line 4 Lighthouse to Kodambakkam Flyover civil works only
Line 5 CMBT to Okkiyam Thoraipakkam systems only
Station
Line 1: 32.14 km
Wimco Nagar–Airport (Phase 1)
Line 2: 21.96 km
Chennai Central–St. Thomas Mount (Phase 1)
Line 3: 45.8 km
Madhavaram–SIPCOT II (Phase 2)
Line 4: 26.1 km
Lighthouse–Poonamallee Bypass (Phase 2)
Line 5: 47.0 km
Madahvaram–Okkiyam Thoraipakkam (Phase 2)
District Boundary
km kilometer
SIPCOT State Industries Promotion Corporation of Tamil Nadu
Boundaries are not necessarily authoritative.
This map was produced by the cartography unit of the Asian Development Bank. The boundaries, colors, denominations, and any other information shown on this map do not imply, on the part of the Asian Development Bank, any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries, colors, denominations, or information.

I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on a proposed multitranche financing facility (MFF) to India for the Chennai Metro Rail Investment Project. The report also describes (i) the proposed tranche 1; and (ii) the proposed technical assistance (TA) for Enhancing Urban Mobility and Livability of the Chennai Metropolitan Area (CMA), and if the Board approves the proposed MFF, I, acting under the authority delegated to me by the Board, approve tranche 1 and the TA.[1]

2. The investment project will contribute to the expansion of the metro rail network in Chennai, the capital city of the state of Tamil Nadu. It will support the development of three new metro lines—3, 4, and 5—that will connect the central area of Chennai to major destinations in the south and west of the city. The investment project and the attached TA will improve the overall livability by providing an integrated transport system that is safe, affordable, and sustainable. It will promote inclusiveness and attract industrial competitiveness, which helps reduce poverty. By fostering a modal shift to less greenhouse gas (GHG)-emitting metro systems, the investment project will benefit climate change mitigation and, through appropriate design elements, improve climate change resilience.

II. RATIONALE

3. **Socioeconomic context.** The CMA is an industrial and commercial hub of south India, and a major cultural, economic, and educational center in the country. It is an urban agglomeration that encompasses Chennai City and adjacent urban centers, and extends across 1,189 square kilometers (km^2). The CMA registered an urban population of about 8.6 million in 2011, which is projected to reach 12 million by 2026[2] The urban residents and socioeconomic activities are concentrated in Chennai City, which covers just 175 km^2. By 2025, the city's population density is estimated to reach 57,880 per km^2, significantly higher than that of the CMA at about 10,375 per km^2.[3]

4. Chennai is the meeting point between two major economic corridors—East Coast Economic Corridor and Chennai–Bengaluru Industrial Corridor. It contributes a large portion to Tamil Nadu's state gross domestic product, which, from 2011 to 2019, grew at an annual average of 7.2% to ₹13.1 trillion (about $178.6 billion).[4] This economic growth has translated into a decline in poverty from 28.9% in 2005 to 11.3% in 2020.[5] Nonetheless, urban poverty remains an issue in Chennai since about 29% of its inhabitants live in slums, significantly more than the 17.4% average for Indian cities. Aggravating this problem is the coronavirus disease (COVID-19) pandemic, which undoubtedly altered Chennai's growth trajectory and progress in reducing poverty. However, with appropriate support to enhance resilience, sustainability, and urban livability, pre-pandemic growth trends are expected to resume thanks to the inherent economic potentials of the city's manufacturing and information technology industries as well as commercial and financial services.

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[1] Framework Financing Agreement (accessible from list of linked documents in Appendix 2) includes further details on MFF preconditions and the implementation framework.

[2] Chennai Metropolitan Development Authority. 2008. *Second Masterplan for Chennai Metropolitan Area, 2026*. Chennai.

[3] D. Hoornweg and K. Pope. 2016. Population predictions for the world's largest cities in the 21st century. *Environment and Urbanization*. 29 (1). pp. 195–216.

[4] Government of India, Reserve Bank of India. 2020. *Handbook of Statistics on Indian States*. New Delhi.

[5] Government of India, Office of the Registrar General & Census Commissioner. 2011. *Census: Population Enumeration Data*. New Delhi, and Government of India, NITI Aayog. *SDG India Index 2019* (accessed 14 September 2022).

5. **Sector context and challenges.** Being the center of economic activities in southern India, the CMA experiences a high level of urbanization, resulting in steep land prices and a tremendous pressure to improve basic urban infrastructure and facilities. Rapid urbanization, particularly in Chennai City with its high population density, and the scattered developments toward suburban regions have contributed to the uncontrolled expansion of the agglomeration. This consequently increased the average travel distance to major destinations in the central area[6] and, in the absence of an efficient, affordable, and accessible public transport system, led to an increasing dependency on private vehicles, particularly for business and commuting trips, which account for more than 80% of total trips in the CMA. [7]

6. **Impacts on urban livability.** The heavy accumulation of private vehicles in the congested urban road network, especially during busy periods, has a direct impact on the quality of urban living. Severe congestion and road safety issues have caused inefficiency and productivity losses. The average travel time in the CMA is projected to almost double by 2035.[8] Even though the number of crashes has declined from 7,580 in 2018 to 6,871 in 2019, Chennai's crash rate continues to rank highest among the million-plus cities in India.[9] Insufficient provision of basic urban infrastructure also curtails the overall mobility of the urban residents, especially pedestrians and nonmotorized vehicle users. Security issues, particularly for women and children, and physical barriers for elderly and differently abled people are strong concerns. Additionally, the transport sector has become the major producer of carbon dioxide emissions in the city (53%), significantly affecting ambient air quality and threatening the urban environment.[10] Among the world's 576 largest urban centers, Chennai is the third most at risk from exposure to pollution, dwindling water supplies, extreme heat stress, natural hazards, and vulnerability to climate change.[11] Characterized by high-density, unsanitary environments, Chennai's slums are also disproportionately vulnerable to the ongoing COVID-19 pandemic. Most middle- and high-income residents may have the flexibility to mitigate the impacts of the worsening urban conditions. However, less-resilient groups such as low-income residents and migrant workers—who tend to live in slums and other informal settlements—will remain exposed to the increasing risks associated with natural hazards, health and safety issues, air pollution, and climate change impacts. The CMA's deteriorating urban environment has eroded competitiveness and overall livability, prompting the need for an integrated approach to improving urban resilience; facilitating efficient, inclusive, and affordable urban mobility; and at the same time managing spatial growth in a more sustainable manner.

7. **Road map.** Improving urban livability requires not only the provision of road networks and road transport capacity but also an integrated, inclusive, and sustainable solution. The focus has to be on developing comprehensive urban measures underpinned by a planned approach that will reduce dependency on private vehicles, promote inclusiveness and competitiveness, and strengthen overall urban resilience. The Government of Tamil Nadu set a priority to create urban environments where walking and public transport systems are viable means to connect communities, and promote efficient use of high-value land parcels for economic activities. The

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[6] Chennai Metropolitan Development Authority. 2010. *Chennai Comprehensive Transportation Study Final Report – Executive version*. Chennai. The study recorded an increase in the average travel distance from 7.8 kilometers (km) in 1994 to 9.6 km in 2008.

[7] Chennai Metro Rail Limited (CMRL). 2018. *Comprehensive Mobility Plan for Chennai Metropolitan Area.* Chennai.

[8] L. Jajo. 2016. Growth and composition of road transportation in Chennai city. *International Journal of Social and Economic Research*. 6 (105). pp. 68–125.

[9] Government of India, Ministry of Road Transport and Highways. 2019. *Road Accidents in India*. New Delhi. Million-plus cities have a registered population of 1 million and more.

[10] S. Guttikunda and P. Jawahar. 2011. *Urban Air Pollution Analysis in India.* Delhi.

[11] Verisk Maplecroft. 2021. *Environmental Risk Outlook 2021*. The report evaluates cities with a population of more than 1 million. India has 13 of the world's 20 highest risk locations.

aim is to expand the current metro system while ensuring direct connectivity to other public transport services and transit-oriented development (TOD)-guided urban renewal. This will deliver socioeconomic benefits and improve livability thanks to reduced air pollution and GHG emissions; stronger safety; and better access to jobs, education, financial, and health services.

8. Chennai Metro Rail Limited (CMRL), a joint venture between the Government of India and the Government of Tamil Nadu, with equal equity holding, manages the development and operation of the metro system in the CMA.[12] With financial assistance from the Japan International Cooperation Agency (JICA) in 2009, CMRL began constructing the first phase (phase 1) of the metro development, comprising line 1 from Chennai Airport to Washermanpet (23.1 kilometers [km]) and line 2 from Central Station to St. Thomas Mount (22.0 km).[13] The two lines were opened progressively between 2014 and 2017, with an average ridership of about 113,000 passengers per day by February 2020. The low numbers (compared with the expected 220,000 passengers per day) are attributed to the system's limited coverage, lack of integration with other modes, and lack of first- and last-mile connectivity. Having completed lines 1 and 2, CMRL began preparing the next phase (phase 2) of the metro development—with new lines 3, 4, and 5—estimated at about $8,600 million. In 2019, the state government received financial assistance from JICA totaling about $2,600 million for the development of line 3 from Madhavaram to Sholinganallur (35.7 km) and for line 5 from Madhavaram to Chennai Mofussil Bus Terminus (16 km).

9. **Policy framework.** India's National Urban Transport Policy contains the government's vision to make cities more people-centered and more livable, and evolve them into an urban ecosystem that supports social and economic activities. The policy's objective is to ensure safe, affordable, fast, comfortable, reliable, and sustainable access to jobs, education, and services, to be achieved through a multipronged approach, which, among other things, encourages greater use of public and nonmotorized transport by offering central financial assistance. Subsequently approved and complementary policies also provide planning guidance on the transport sector's development, such as the Metro Rail Policy (2017) and the TOD Policy (2015). Guided by the national policies, the Government of Tamil Nadu approved the Comprehensive Mobility Plan for the CMA in 2018, which became the basis for the expansion of the Chennai's metro rail system (footnote 7). The mobility plan lays out the concept of transforming major road networks into mobility corridors, with TOD as the key strategy alongside high-capacity public transport systems.

10. **Strategic context.** The state government's initiatives to solve urban development issues are driven by Vision 2026, which projects Chennai as a prime metropolis that will be more livable, economically vibrant, and environmentally sustainable, and with better assets for the future generations (footnote 6). The MFF project,[14] which supports the government's initiatives, is in line with the Asian Development Bank (ADB) Strategy 2030 and five of its seven operational priorities (OP1–OP7): addressing remaining poverty and reducing inequalities (OP1); accelerating progress in gender equality (OP2); tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability (OP3); making cities more livable (OP4); and strengthening governance and institutional capacity (OP6).[15] ADB's long-term partnership with the city will help strengthen project sustainability to achieve the long-term goal of sustaining urban mobility, improving livability, and enhancing resilience in the CMA. The project is consistent

[12] CMRL is a special purpose vehicle created by approval of the state cabinet on 7 November 2007 for the execution of the entire Chennai metro development.
[13] The line 1 extension from Washermanpet to Wimco Nagar (9 kilometers) began operations on 14 February 2021.
[14] The MFF project preparation was funded under Technical Assistance to India for Strengthening Capacity to Design and Implement Transport Infrastructure Projects (TA 9761-IND).
[15] ADB. 2018. *Strategy 2030: Achieving a Prosperous, Inclusive, Resilient, and Sustainable Asia and the Pacific*. Manila.

with pillar 3 (inclusive provision of infrastructure networks and services) of ADB's country partnership strategy, 2018–2022 for India.[16] ADB support through the project also underlines ADB's strategy of helping develop economic corridors, such as the East Coast Economic Corridor, to create competitive industries that are employment- and skills-intensive and can absorb poor rural populations. Furthermore, engagements in higher-income states, such as Tamil Nadu, include supporting upstream strategic planning, policy reforms, and demonstration of innovation and efficient implementation that can be replicated in lower income states. The project will contribute to the United Nations Sustainable Development Goals (SDGs): SDG 1 (no poverty); SDG 5 (gender equality); SDG 9 (industry, innovation, and infrastructure); SDG 11 (sustainable cities and communities); and SDG 13 (climate action).[17]

III. THE INVESTMENT PROJECT

A. Impact and Outcome

11. The investment project is aligned with the following impact: urban mobility and livability in the CMA improved (footnote 7). It will have the following outcome: access to and connectivity of public transport in the CMA improved.[18]

B. Outputs

12. **Output 1: New metro lines completed.** The investment project will help finance civil works and system components of the metro lines 3, 4, and 5. For line 3, it will finance the civil works for the elevated section between Sholinganallur to State Industries Promotion Corporation of Tamil Nadu-2 (SIPCOT-2) (10.1 km), 9 stations along this section, and system components such as electrical and mechanical parts, traction and power supply, and telecommunication infrastructure. For line 4, the investment project will finance the civil works for the underground section between Lighthouse and Meenakshi College (10.0 km) and 9 stations along this section. For line 5, it will finance system components for the section between the Chennai Mofussil Bus Terminus to Okkiyam Thoraipakkam (31.0 km). All stations will have designs that are responsive to the needs of vulnerable population segments—elderly, women, children, differently abled, and transgender people (EWCDT)—as well as climate-resilient features.

13. **Output 2: Multimodal and land use integration improved.** The investment project will finance facilities to integrate the metro system with the existing bus and feeder services, forming multimodal interchanges along the metro corridors. The interchanges will include passenger information, drop-off and pick-up areas, bicycle facilities, and sheltered waiting areas, all EWCDT-responsive and climate-resilient. The investment project, through the attached TA, will assist CMRL in developing design concepts and an action plan to transform at least four multimodal interchanges into socioeconomic activity centers. This initiative, also called placemaking, will be complemented by enhanced first- and last-mile connectivity to any existing and planned land use developments in the vicinity of the interchange, facilitating TOD along the metro corridors.

14. **Output 3: Non-farebox revenue mechanism strengthened.** Fiscal consolidation and revenue management through domestic resource mobilization will be vital in Chennai's post-COVID-19 recovery. The investment project, through the attached TA, will support CMRL in

[16] ADB. 2017. *Country Partnership Strategy for India, 2018–2022—Accelerating Inclusive Economic Transformation*. Manila.
[17] United Nations. 2015. *Transforming Our World: The 2030 Agenda for Sustainable Development*.
[18] The design and monitoring framework is in Appendix 1.

improving its project planning and implementation capacities accordingly to enhance non-farebox revenue and reduce the burden on the state government budget. CMRL has implemented non-farebox revenue-generating measures since starting the operation of lines 1 and 2, mainly by renting out space to small-scale retailers and for advertisements. The investment project team will enhance these practices, encourage the participation of women, and explore other innovative measures based on known and implementable international practices of non-farebox revenue generation, such as land value capture (LVC) financing, particularly in connection with the TOD initiatives.

15. **Value added by ADB assistance.** More than providing transport infrastructure, ADB's support will pave the way for better integration between inclusive urban renewal measures and urban mobility improvements through TOD. Such integration will improve access to jobs and socioeconomic services, curb urban sprawling, and reduce dependency on motorized vehicles. Improving multimodal interchanges and transforming them into public amenities will not only enable seamless passenger access and transfer but also create a positive image of the area and attract private sector investments. It will reshape interchanges into people-centered attractions that contribute to economic regeneration in the area, and improve inclusiveness, competitiveness, and overall livability of the city. Combining such placemaking activities with TOD-related schemes, augmented by non-farebox revenue generation through LVC, will further revitalize the area and enhance inclusive urban resilience, particularly for the poor and other vulnerable groups. In addition, ADB involvement in the project would facilitate better coordination and interaction with development partners providing financial support during project preparation and implementation.

16. **Replication strategy.** ADB value addition seeks to demonstrate the benefits of integrating transport and urban planning components, which is key to maximizing the impacts of such a large-scale urban transport investment. Under separate ADB assistance, a similar multisector approach was introduced to the Delhi–Meerut Regional Rapid Transit System Investment Project and the Bengaluru Metro Rail Project.[19] The successful demonstration of this concept through these projects, as well as the proposed investment project will help inspire its replication, especially in other cities of similar size and characteristics. To assist mutual learning, development, and replication processes, the investment project, through the attached TA, will facilitate the dissemination of the planning concept, implementation experience, lessons, and challenges through knowledge products and with support from the Capacity Development Resource Center in ADB's India Resident Mission.

17. **Lessons.** The key challenge faced by CMRL during phase 1 was related to poor contractor performance in executing the engineering, procurement, and construction modality, particularly with regard to viable designs in the urban context. To avoid similar issues recurring in phase 2, CMRL has decided to complete the detailed design of key project components in advance, especially for civil works contracts. This approach will allow more control by CMRL in ensuring the application of uniform design standards and principles as well as in monitoring the overall project costs. Having gained experience from the implementation of phase 1, CMRL will further benefit from the timely mobilization of a general consultant to support overall project management, procurement and contract administration, financial management, and safeguard implementation. The general consultant is funded by the state government.

[19] ADB. India: Delhi–Meerut Regional Rapid Transit System Investment Project; and ADB. India: Bengaluru Metro Rail Project.

18. **Use of multitranche financing facility.** To achieve the intended outcome, the outputs are best delivered and financed by a time-sliced MFF.[20] The MFF will be implemented in three tranches using the time-slice approach for large, stand-alone projects. The required due diligence, including on safeguard aspects, was completed for the entire investment project, which facilitates high project readiness. The investment project involves three packages of civil works and four packages of system components, which will be procured under the first tranche and implemented simultaneously over a construction period of at least 5 years. The time-sliced MFF modality will enable the processing of tranches according to disbursement projections and the availability of counterpart funding, making the use of loan funds more efficient. Long-term engagement through the MFF will allow continuity in investment planning through tranches, and support for knowledge transfer and institutional reforms with regard to TOD and non-farebox revenue generation.

19. **Impact of COVID-19 pandemic.** The investment project will be implemented in 8 years, allowing sufficient time to account for possible delays in case of prolonged impacts of the COVID-19 pandemic. Regardless of COVID-19, the investment project remains highly relevant. The expanded metro system will facilitate the growth of economic activities long after COVID-19 through more efficient and affordable urban mobility, and better access to jobs and livelihood opportunities—particularly for lower-income groups, which are worst affected by the pandemic. The metro development, while adhering to government guidelines and health and safety protocols, will also create employment opportunities during construction and operation.

20. **Scope of tranche 1.** The investment project will finance the civil works and system components of new metro lines 3, 4, and 5. All contracts under the investment project are expected to be awarded under tranche 1. The first tranche will finance the first slice of the contract packages. The remaining tranches will gradually finance the same contracts as they progress, and the periodic financing requests will be issued based on disbursement projections. The last tranche is expected to be approved on or before 8 December 2027, considering the expected progress of the component under the investment project. Most of the capacity strengthening activities will be carried out during tranche 1 implementation.

C. Summary Cost Estimates and Financing Plan

21. The investment project is estimated to cost $1,469.5 million, including taxes and duties, physical and price contingencies, interest, and other charges during implementation (Table 1).

Table 1: Summary Cost Estimates
($ million)

Item			Amount[a]
A.	**Base Cost**[b]		
	1.	New metro lines completed	1,271.0
	2.	Multimodal and land use integration improved	5.1
	3.	Non-farebox revenue mechanism strengthened	0.5
		Subtotal (A)	**1,276.6**
B.	**Contingencies**[c]		**104.7**
C.	**Financial Charges During Implementation**[d]		**88.1**
		Total (A+B+C)	**1,469.5**

[a] Includes taxes and duties of $87.38 million. Such amount does not represent an excessive share of the investment project cost. The government will finance taxes and duties of $87.38 million through cash contribution.
[b] In 2022 prices as of 1 October 2022.

[20] Comparison of Financing Modality (accessible from the list of linked documents in Appendix 2).

[c] Physical contingencies computed at 5.0% for civil works and system components. Price contingencies computed at an average of 1.8% on foreign exchange costs and of 4.0% on local currency costs; includes provision for potential exchange rate fluctuation under the assumption of a purchasing power parity exchange rate.
[d] Includes interest, commitment charges, and any other financing charges for all sources of financing. Interest during construction for the ordinary capital resources loan has been computed at the 5-year United States dollar fixed swap rate plus an effective contractual spread of 0.50% and a maturity premium of 0.20%. Commitment charges for the ordinary capital resources loan are 0.15% per year to be charged on the undisbursed loan amount.
Source: Asian Development Bank estimates.

22. **Financing plan.** Considering the high capital investment in the metro infrastructure and the time required to achieve feasible returns, the government decided to seek sovereign borrowing to help finance the project. The government requested an MFF of up to $780.0 million from ADB's ordinary capital resources to help finance a part of the investment project. The MFF will consist of three tranches, the last of which is expected to be approved on or before 8 December 2027. Individual tranche releases will be subject to the government's submission of related periodic financing requests, execution of the related loan and project agreements for each tranche, and fulfillment of terms and conditions and undertakings set forth in the framework financing agreement. The first tranche of the MFF will finance part of civil works and system components of lines 3, 4, and 5. It will comprise a regular loan of $350.0 million, have a 25-year term, including a grace period of 5 years; an annual interest rate determined in accordance with ADB's Flexible Loan Product; a commitment charge of 0.15% per year; and such other terms and conditions set forth in the draft loan and project agreements. Based on the 5% annuity method, the average maturity is 16.87 years, and the maturity premium payable to ADB is 0.20% per year.

23. The summary financing plan is in Table 2. The government also requested financial assistance from the Asian Infrastructure Investment Bank and the New Development Bank, totaling $1,142 million, as parallel cofinancing for the remaining part of civil works and system components, rolling stock, signaling, and permanent ways. ADB will not administer these loans.

Table 2: Summary Financing Plan
($ million)

Source	Tranche (estimated year of PFR submission) 1 (2022)[a]	2 (2024)	3 (2026)	Amount	Share of Total (%)
Asian Development Bank					
OCR (regular loan)	350.0	240.0	190.0	**780.0**	**53.1**
Government of Tamil Nadu	305.4	191.5	192.6	**689.5**	**46.9**
Total	**655.4**	**431.5**	**382.6**	**1,469.5**	**100.0**

OCR = ordinary capital resources, PFR = periodic financing request.
[a] Non-Asian Development Bank administered parallel cofinancing of $795.0 million from the Asian Infrastructure Investment Bank, with its corresponding counterpart financing of $883.4 million; and $347.0 million from the New Development Bank, with its corresponding counterpart financing of $150.6 million, are excluded from the table.
Source: Asian Development Bank estimates.

24. Climate mitigation is estimated to cost $1,321.6 million and climate adaptation is estimated to cost $147.9 million under the investment project. ADB will finance 50.9% of mitigation costs and 72.5% of adaptation costs under the MFF.[21]

D. Implementation Arrangements

25. The implementation arrangements of the investment project are summarized in Table 3 and described in detail, including specific arrangements for tranche 1, in the facility administration

[21] Details are in Climate Change Assessment (accessible from the list of linked documents in Appendix 2).

manual (FAM).[22] CMRL has engaged a general consultant to support the implementation and coordination of overall activities under the phase 1 metro development, generally including project management, procurement, construction supervision, safeguard implementation, and financial management. The commitment of the government and the executing agency—to the use of the time-sliced MFF modality and the duration of the MFF—has been confirmed.

Table 3: Implementation Arrangements

Aspects	Arrangements		
Expected date by which the last tranche is to be approved	8 December 2027		
Estimated completion date	Multitranche financing facility: 31 December 2030; tranche 1: 31 December 2026		
Executing agency	Department of Special Initiatives of the Government of Tamil Nadu, acting through Chennai Metro Rail Limited		
Procurement	Open competitive bidding (international advertisement)	7 contracts	$805.2 million
Retroactive financing and advance contracting	Civil works and system components, for eligible expenditures incurred within 12 months prior to the loan signing, up to 20% of the loan amount.		
Disbursement	The loan proceeds will be disbursed following ADB's *Loan Disbursement Handbook* (2017, as amended from time to time) and detailed arrangements agreed between the government and ADB.		

ADB = Asian Development Bank.
Source: ADB.

26. **Project readiness.** Project readiness is high since the full scope to be financed by the time-sliced MFF was appraised by ADB. The detailed design has been substantially completed. The procurement of civil works contracts is under advance contracting. The COVID-19 pandemic inevitably imposed delays in the project preparatory activities of CMRL. However, the project schedule has been adjusted to allow for such delays.

IV. ATTACHED TECHNICAL ASSISTANCE

27. The attached TA will support CMRL in exploring the opportunities for TOD that the investment project can provide, and help create an enabling environment for its implementation, which in turn will create opportunities for generating non-farebox revenue, such as LVC. The TA team will also provide advisory support to CMRL and the general consultant for the planning and management of the metro system's multimodal integration, the identification of first- and last-mile connectivity needs of the city's significant informal settlements and low-income population, and targeted urban development initiatives. Through a demonstration program, the TA team will explore and recommend inclusive design concepts and an action plan to transform station areas into socioeconomic activity centers that facilitate TOD. Finally, the TA will serve to enhance non-farebox revenue with innovative measures, such as LVC linked to TOD.

28. The TA is estimated to cost $1,450,000, of which $1,000,000 will be financed by ADB's Technical Assistance Special Fund (TASF-other sources). The executing agency will be the Department of Special Initiatives of the Government of Tamil Nadu, acting through CMRL. A dedicated team within CMRL was formed to implement the TA, and to facilitate coordination with the government agencies concerned, such as Chennai Metropolitan Development Agency and Metropolitan Transport Corporation. CMRL will also provide support in the form of data collected from previous studies and other in-kind contributions. The TA will be implemented over 30 months, from January 2023 to December 2025. ADB will recruit an international consulting firm, a nongovernment organization engaged in urban developments, and an individual consultant as

[22] Facility Administration Manual (accessible from the list of linked documents in Appendix 2).

technical advisor. The recruitment will be carried out following the ADB Procurement Policy (2017, as amended from time to time) and staff instructions. The international consulting firm will be requested to submit a biodata technical proposal, following the quality- and cost-based selection method, with a 90:10 quality–cost ratio.[23]

V. DUE DILIGENCE

A. Technical

29. The detailed project report for the entire phase 2, which was approved by the Government of Tamil Nadu in 2018, provided sufficient basis and baseline information for further due diligence. All new metro lines and stations are constructed along the existing major road corridors to minimize land acquisition and other technical constraints associated with built-up areas. The use of various innovative approaches in the stations' design will help reduce land requirement, energy consumption, and accompanying operational costs. Additionally, the detailed design includes measures to reduce climate and disaster risks: high-quality steel rails that can withstand extreme heat, rainwater harvesting features to prevent flooding and conserve water, and elevated sections to avoid flooding and flood-related damage. The design also incorporates provisions to enhance inclusiveness, such as barrier-free access, tactile paving on footpaths, lifts, dropped curbs, and other facilities for EWCDT.

B. Economic and Financial

30. **Economic assessment.** The economic evaluation of the project was conducted following ADB guidelines. The project costs and benefits were compared under with-project and without-project scenarios, using a 9% discount rate and an economic internal rate of return (EIRR) as the decision criteria. The benefits were measured in terms of vehicle operating cost and travel time savings for both public transport users and road users, reduced road accidents, and reduced GHG emissions and air pollution. The EIRR of the project is estimated to be 15.93%, with a net present value of $4,060.8 million. A sensitivity analysis indicated that the EIRR remained above 9% under all scenarios, demonstrating that the project would remain economically viable even under adverse changes in costs and benefits.

31. **Financial assessment.** The financial evaluation of the project was conducted following ADB guidelines. It assessed the incremental costs and earnings that would accrue to CMRL as a result of the project and calculated the financial internal rate of return (FIRR). The project's weighted average cost of capital (WACC) was estimated to be 1.97%. The evaluation conservatively assumes that the traffic level will remain low in the first 5 years of operations but ramp up to the forecast estimates in the 6th year. The project revenues include farebox revenues from ticket sales and non-farebox revenues from advertisements and rentals at metro stations. The estimated FIRR of the net cash flows for the project is 1.19% in real terms, which is below the WACC. The profitability projections indicate an operational loss for the first year of operations, but the project is forecast to meet its operational viability thereafter. The project's earnings before interest, taxes, depreciation, and amortization (EBITDA) works out to about 56% of total revenue from the metro operations in fiscal year (FY) 2032, and increases thereafter. The government of Tamil Nadu considered phase 2 of the metro development critical to address the ongoing urban mobility challenges and justified the project decision based on its economic viability. The state government is committed to support CMRL for its debt service obligations, which was projected to the extent of ₹10,675 million (about $144.7 million) in 2 out of 25 years of the projection period.

[23] Attached Technical Assistance Report (accessible from the list of linked documents in Appendix 2).

32. **Sustainability.** CMRL will own, operate, and maintain the new metro lines. It is dependent on state government funding for the capital expenditures under phase 2. Any sovereign borrowing will be onlent through the central government, while nonsovereign borrowing is limited and/or backstopped by the state government. To mitigate the substantial financial sustainability risk (para. 31), an institutional mechanism is in place to ensure the metro's financial sustainability, i.e., any future operational loss will be backstopped by the state government, similar to phase 1. In FY2017, FY2018, and FY2020, CMRL was able to meet the operational costs (excluding depreciation and finance costs) from the operating revenue of phase 1. With ridership projected to continue increasing as phase 1 extensions and phase 2 sections become operational, and as network effects, interchange facilities, and first- and last-mile connectivity are enhanced, the metro is expected to play a more significant role in the entire transport network to meet travel demand in the CMA. Also, the project's TOD approach will remain mainstream in urban development in the medium and long term, which will further increase the ridership. Aside from guaranteeing reimbursement of cash losses to CMRL, the state government will collect incremental revenues through LVC along with TOD.[24] The attached TA will assist the state government in strengthening the LVC mechanism, which may involve various district and/or municipal agencies. The revenue from LVC will be credited as the benefit of urban transport projects, including the metro, to the state to enhance financial sustainability.

C. Governance

33. **Financial management.** The financial management assessment was conducted in line with ADB guidelines.[25] CMRL's relative strengths in financial management include (i) governance by a robust legislative framework; (ii) annual external audit by the comptroller and auditor general of India, and an independent firm of chartered accountants; (iii) direct nomination or appointment of board members and senior management by the central and state governments; (iv) presence of independent directors on the board; (v) organization-wide use of enterprise resources planning software; and (vi) implementation of a robust internal control structure based on a comprehensive study by an international firm of chartered accountants, and experience with disbursement and procurement processes and procedures of international development agencies in phase 1 of the metro. The financial management risk is *moderate*, mainly because of lack of experience in implementing ADB-funded projects, exposure to foreign exchange risk resulting in a qualified audit report on CMRL financial statements, contract-based staff, and an updated finance and accounting manual still requiring CMRL board approval. Key mitigation measures agreed with CMRL include training; board approval of the manual, including a comprehensive policy on foreign exchange risk management; and measures to ensure the retention of staff. At the project level, financial experts of the general consultant to be hired for support in project implementation, supervision, and monitoring will supplement CMRL's finance and accounting staff.

34. **Procurement and value for money.** Procurement of goods and works financed by ADB will be done following the ADB Procurement Policy and the Procurement Regulations for ADB Borrowers (2017, as amended from time to time). The procurement risk assessment found that CMRL has adequate procurement capacity for the investment project. CMRL has extensive experience in procuring contracts similar in nature and size from the phase 1 implementation, with financial assistance from JICA. Since CMRL has no experience with ADB procurement, the prior

[24] Office, residential, and retail spaces are expected to be developed along the TOD corridors. Detailed estimation of cluster-based development potential can be found in the detailed project report. CMRL. 2018. *Detailed Project Report*. Chennai.

[25] ADB. 2019. *Financial Analysis and Evaluation*. Manila; and ADB. 2015. *Financial Management Assessment*. Manila.

review method is considered appropriate to ensure that procurement activities are being carried out following the core principles of the ADB Procurement Policy and Procurement Regulations. CMRL will be supported by the general consultant. The project team has assisted CMRL to ensure value for money through strategic procurement planning at the outset of the procurement process. This includes (i) CMRL assuming the design risks for civil works packages, while providing flexibility for innovation in packages that require high technology inputs; (ii) applying open competitive bidding with international advertisement using an e-procurement system; (iii) making the contract sizes attractive to international bidders; (iv) applying multiple-contract qualification criteria for similar contracts; (v) carefully selecting bid evaluation criteria; (vi) including COVID-19-related health and safety compliance requirements in the bidding documents and in contract conditions; (vii) making robust contractual provisions to ensure healthy cash flow during contract implementation, including prompt progress payments, and additional advance payments for materials and plants; (viii) providing incentives to contractors to strive for early completion; and (ix) making provisions for standing dispute boards in civil works contracts, for prompt resolution of contractual disputes.[26]

35. Integrity due diligence was conducted. No significant integrity risks were identified. ADB's Anticorruption Policy (1998, as amended to date) was explained to and discussed with the government and CMRL. The specific policy requirements and supplementary measures are described in the FAM.

D. Poverty, Social, and Gender

36. **Poverty.** The new metro lines will improve connectivity and accessibility of the metro system while supporting the city's overall economic development. At opening, about 22,700 low-income residents per day will use the new metro lines. Over the project life, about $394.1 million of the overall project benefits accrue to the low-income metro users. The other benefit that accrues to low-income group is wages paid to low-skilled workers in connection with the construction works, estimated at about $673.8 million. At a broader level, economic activities, competitiveness, and the overall urban resilience will increase; at the local level, access to urban public and social services such as schools, health facilities, and workplaces will improve; in turn, economic growth and better delivery of social services will contribute to poverty alleviation.

37. **Gender equality and social inclusion.** The project is classified *effective gender mainstreaming*. CMRL conducted extensive public consultations and stakeholder engagement activities in preparing a gender equality and social inclusion (GESI) action plan.[27] The action plan integrates all the GESI initiatives of CMRL that build on its current effort to meet the state requirements. It includes a new, EWCDT-responsive project design; multimodal integration of the metro with EWCDT-responsive design features; and strengthened institutional capacity of the CMA for urban transport development, planning, and resilience, where GESI measures are integrated. The preparation of the GESI action plan involved extensive engagement and discussions with various stakeholders, and covered issues related to affordability, accessibility of the poor communities, public transport convenience, safety, and zero-tolerance of sexual harassment. In addition, perception surveys were undertaken and found that COVID-19 has disproportionately affected urban informal workers, which should be considered when assessing the affordability of traveling along the proposed corridors. The GESI action plan includes the conduct of a study on the feasibility of fare concessions for resource-poor women, students, and transgender and differently abled people during project implementation.

[26] Details are in Facility Administration Manual, para. 35 (accessible from the list of linked documents in Appendix 2).
[27] Gender Equality and Social Inclusion Action Plan (accessible from the list of linked documents in Appendix 2).

38. **Public health and safety.** The project will facilitate public education by providing EWCDT-sensitive, bilingual messages in coaches and metro stations to promote awareness of public health and safety; prevention of communicable diseases, including COVID-19 prevention; and zero tolerance of sexual harassment; and to communicate helpline numbers.

E. Safeguards

39. In compliance with ADB's Safeguard Policy Statement (2009), the safeguard categories of tranche 1 are as follows.[28]

40. **Environment (category A).** The alignments of all corridors are along busy roads within the CMA, with several sensitive receptors near the alignment. Because of the large-scale and heavy-duty construction works for the elevated and underground sections of lines 3 and 4, the project carries significant health and safety risks for the communities along the alignment, vehicle users on the roads, and the construction workers. Other expected construction-related impacts are noise and vibration, and disturbance to sensitive receptors, generation of large volumes of excavated waste, dust, and water pollution. Noise and vibration are also the main long-term impacts anticipated during the operation of the metro.

41. CMRL's current capacity is adequate to manage environmental risks. CMRL has prepared environmental impact assessments (EIAs) and package-specific environmental management plans (EMPs) for lines 3 and 4, an environmental due diligence report for line 5, and an environmental assessment and review framework, following ADB's Safeguard Policy Statement. Measures to avoid and mitigate all environmental impacts from construction and operation were included in the EIAs and EMPs. The EIAs for lines 3 and 4 and the environmental due diligence report for line 5 were disclosed on the ADB website in February 2022.[29] The EMPs were included in the bidding documents along with the safety, health, and environmental guidelines for metro projects in India. Consultations with affected communities and key stakeholders were held during project preparation to ensure that their inputs were considered in the project design, and appropriate mitigation measures were incorporated in the EMPs. This will continue during project implementation through regular consultation meetings, while the grievance redress mechanism will facilitate the resolution of complaints. Both will serve to gather feedback from the communities along the alignment.

42. **Involuntary resettlement (category A).** Based on a preliminary assessment, the project scope (para. 12) will entail the acquisition of 81,564 square meters of private land, impacting 3,430 affected households (12,192 affected persons). In total, 426 households will be physically displaced and 1,865 households will be economically displaced. Also, about 481,267 square meters of government land will be acquired. CMRL prepared a social safeguards framework and three resettlement plans, as required under the loan modality. The resettlement plans outline entitlements consistent with national and ADB safeguard requirements, summarize public consultations and information disclosure, describe the grievance redress mechanism, and stipulate institutional arrangements to ensure that the plans are implemented accordingly. Since related land acquisition and resettlement surveys were carried out with COVID-19-imposed restrictions in place, CMRL ensured that all required protocols were strictly followed for the safety

[28] ADB. Safeguard Categories.

[29] CMRL. 2022. *Environmental Impact Assessment: Chennai Metro Rail Investment Project Corridor 3*. Chennai (prepared for ADB); CMRL. 2022. *Environmental Impact Assessment: Chennai Metro Rail Investment Project Corridor 4*. Chennai (prepared for ADB); and CMRL. 2022. *Environmental Due Diligence Report: Chennai Metro Rail Investment Project Corridor 5*. Chennai (prepared for ADB).

of its staff, consultants, and the affected people. The latest information received from CMRL suggests that the acquisition of more than 90% of land is at an advanced stage. The overall land acquisition is expected to be completed in early 2023.[30] CMRL is found to have the capacity and the commitment to ensure that land acquisition and resettlement are carried out adequately and in accordance with national and ADB requirements.

43. **Indigenous peoples (category C).** The project will not affect indigenous communities as defined under ADB's Safeguard Policy Statement.

44. The project unit within CMRL will include a social, gender, and environmental management unit for the overall management of social and environmental safeguards under the investment project. It will be supported by the general consultant and its environmental and social safeguard experts. These experts will regularly monitor activities at the project sites. An external monitor for both environmental and resettlement activities will be recruited by CMRL to conduct third-party monitoring, validate the implementation of safeguard plans, and verify the reports submitted by the general consultant.

F. Summary of Risk Assessment and Risk Management Plan

45. Significant risks and mitigating measures are summarized in Table 4 and described in detail in the risk assessment and risk management plan.[31]

Table 4: Summary of Risks and Mitigating Measures

Risks	Mitigation Measures
Delayed implementation of project components funded by other funding agencies delays phase 2 metro operations.	The general consultant's support to Chennai Metro Rail Limited (CMRL) includes monitoring project components funded by all agencies. This will ensure early identification of any emerging issues, so that appropriate mitigation measures or resolutions can be taken and executed as early as possible, which will minimize the impact on the overall project schedule.
Technical challenges along the busy section in the central area	In addition to safeguard measures that were approved by the Asian Development Bank during project preparation, the project design includes measures based on actual site conditions to identify all possible difficulties in advance, including utility works and traffic diversions. The executing agency will be supported by experts and safeguard specialists provided by the general consultant to deal with technical issues during construction.
CMRL's financial sustainability is dependent on support from the state government to cover operational losses and debt service obligations.	The state government has given assurances that it will provide sufficient budget to CMRL, release funds on time, and support debt servicing to ensure the financial sustainability of metro operations. The loan agreements include financial covenants to limit CMRL's exposure to external debt, as well as periodic reviews of the fare structure to minimize losses.

Source: Asian Development Bank.

VI. ASSURANCES

46. The government and CMRL have assured ADB that the implementation of the investment project shall conform to all applicable ADB policies, including those concerning anticorruption measures, safeguards, gender, procurement, consulting services, and disbursement as described in detail in the FAM and loan documents.

[30] The latest status of land acquisition activities will be verified on or before project inception.
[31] Risk Assessment and Risk Management Plan (accessible from the list of linked documents in Appendix 2).

47. The government and CMRL have given certain undertakings for the MFF, which are set forth in the framework financing agreement. Specific covenants agreed by the government and CMRL with respect to individual tranches under the MFF are set forth in the draft loan agreement and project agreement for the respective tranches.

VII. RECOMMENDATION

48. I am satisfied that the proposed multitranche financing facility would comply with the Articles of Agreement of the Asian Development Bank (ADB) and recommend that the Board approve the multitranche financing facility to India for the Chennai Metro Rail Investment Project in an aggregate principal amount not exceeding the equivalent of $780,000,000, which comprises the provision of loans from ADB's ordinary capital resources, in regular terms, with interest and other terms to be determined in accordance with ADB's Flexible Loan Product; and is subject to such other terms and conditions as are substantially in accordance with those set forth in the framework financing agreement presented to the Board (including the last date for the final tranche to be approved by ADB, as described in paragraph 20).

Masatsugu Asakawa
President

15 November 2022

DESIGN AND MONITORING FRAMEWORK FOR THE INVESTMENT PROJECT

Impact the Investment Project is Aligned with

Urban mobility and livability in the Chennai Metropolitan Area improved (Comprehensive Mobility Plan for the Chennai Metropolitan Area, 2018)[a]

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks and Critical Assumptions
Outcome Access to and connectivity of public transport in the Chennai Metropolitan Area improved	By 2031: a. Average daily ridership of the overall Chennai metro rail system increased to 1.4 million passengers per day, disaggregated by sex (2020 baseline: 113,000 passengers per day) (OP 2.1.4, OP 4.1) b. At least 70% metro passengers perceived the metro service as reliable, efficient, and safe; disaggregated by sex (2022 baseline: not applicable) c. At least 20% of metro passengers at three new major metro stations used interchange facilities during peak hours, disaggregated by sex (2022 baseline: not applicable) d. Development-based LVC mechanisms replicated in other metro or mass transit projects (2022 baseline: not applicable) (OP 4.2.1) (OP 4.2.2)	a. CMRL's annual report b.–c. CMRL's post-opening survey d. CMRL's annual report	A: Lines funded by other development partners are completed and made operational without significant delays.[b] This includes (i) civil works for line 4 from Poonamallee Bypass to Meenakshi College, and for line 5 from Okkiyam Thoraipakkam to Chennai Mofussil Bus Terminus, and utilities for line 5 (Asian Infrastructure Investment Bank); and (ii) system components, ventilation system, lift and escalators, automated fare collection, platform screen door for line 4 (New Development Bank).
Outputs 1. New metro lines completed	By 2030: 1a. At least 20 kilometers of metro infrastructure with climate-resilient features constructed for lines 3 and 4 (2022 baseline: not applicable) (OP 1.3.1, OP 3.2.5, OP 4.1.2) 1b. 18 metro stations with EWCDT-responsive and climate resilient features constructed for lines 3 and 4[c] (2022 baseline: not applicable) (OP 1.3.1, OP 2.4.1, OP 3.2.5, OP 4.1.2, OP 2.5.2) 1c. System components comprising electrical and mechanical parts, traction and power supply, and telecommunication installed for lines 3 and 5. (2022 baseline: not applicable) (OP 4.1.2)	1a.–d. CMRL annual report and general consultant's report	R: Prolonged land acquisition and noncompliance with social safeguard requirements may delay project completion. R: Prolonged COVID-19 pandemic may undermine project implementation.

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks and Critical Assumptions
	1d. At least 40% of operational staff for the 18 new metro stations on lines 3 and 4 are women (2022 baseline: not applicable) (OP 1.2, OP 2.1)		
2. Multimodal and land use integration improved	By 2030: 2a. At least 18 bus stops with EWCDT-responsive and climate resilient features constructed and integrated with nearby metro stations (2022 baseline: not applicable) (OP 2.4.1, OP 2.5.2, OP 4.1.2) 2b. Placemaking measures, and first- and last-mile connectivity improvements replicated at four new metro stations on lines 3 and 4 (2022 baseline: not applicable) (OP 4.2.1) **Under transaction TA:** By 2025: 2c. Demonstration program for placemaking and first- and last-mile connectivity improvements in at least one existing metro station completed[d] (2022 baseline: not applicable) (OP 4.2.1) 2d. At least one recommendation report with action plans for TOD completed for adoption by relevant authorities (2022 baseline: not applicable) (OP 4.2.1)	2a.–d. CMRL annual report and Consultant's report	
3. Non-farebox revenue mechanism strengthened	**Under transaction TA:** By 2025: 3a. At least one non-farebox revenue business plan completed and adopted by CMRL (2022 baseline: not adopted) (OP 4.2.2) 3b. At least one recommendation report with action plans for LVC financing completed for adoption by CMRL and other relevant agencies (2022 baseline: not applicable) (OP 4.2.2)	3a.–b. CMRL annual report and Consultants' final TA report	

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks and Critical Assumptions
	3c. At least 60% of government staff participating in training (30% of them women) reported increased knowledge of non-farebox revenue generation, including LVC financing, urban resilience, and TOD (2022 baseline: not applicable) (OP 6.1.1)	3c. Post-training survey or evaluation	

Key Activities with Milestones

1. New metro lines completed

1.1 Complete detailed design by Q4 2022
1.2 Procure civil works and system packages by Q4 2022
1.3 Award all contracts by Q4 2023 and complete by Q2 2030

2. Multimodal and land use integration improved

2.1 Start recruiting TA consultants by Q1 2023 and mobilize by Q3 2023
2.2 Prepare concept design for multimodal integration, and first- and last-mile connectivity at four selected stations and complete by Q3 2024
2.3 Prepare concept design for placemaking demonstration program and complete by Q3 2024
2.4 Prepare recommendations and action plans for TOD and complete by Q3 2024
2.5 Roll out multimodal integration, first- and last-mile connectivity improvement, and placemaking at four selected stations and complete by Q2 2030
2.6 Operate multimodal interchange by Q4 2030

3. Non-farebox revenue mechanism strengthened

3.1 Prepare enhanced non-farebox revenue business plan by Q4 2023
3.2 Prepare recommendations and action plans for LVC and approve for implementation by Q4 2023
3.3 Prepare workshops and training program and implement by Q3 2024

Investment Project Management Activities

Recruit and mobilize general consultant by Q1 2022

Inputs

ADB: $780.0 million (loan)
ADB: $1.0 million (technical assistance grant from Technical Assistance Special Fund [TASF-other sources])
Government: $689.5 million

A = assumption; ADB = Asian Development Bank; CMRL = Chennai Metro Rail Limited; EWCDT = elderly, women, children, differently abled, and transgender people; LVC = land value capture; OP = operational priority; Q = quarter; R = risk; TA = technical assistance; TOD = transit-oriented development.

[a] Chennai Metro Rail Limited. 2018. *Comprehensive Mobility Plan for Chennai Metropolitan Area*. Chennai.

[b] The Asian Infrastructure Investment Bank and the New Development Bank will provide parallel financing totaling $1,142 million. The government will provide about $1,034 million in counterpart financing.

[c] Climate change features include larger dimension of drainage system and energy-saving features at stations. EWCDT-responsive features include (i) universally accessible route and emergency route for person in wheelchair, (ii) tactile paving, (iii) well-lit and monitored with CCTV camera, and (iv) other features that are mandatory under existing laws and regulations.

[d] A demonstration program will be carried out at Alandur Station, which is an existing station on line 1.

Contribution to Strategy 2030 Operational Priorities

The expected values and methodological details for all OP indicators to which this operation will contribute results are detailed in Contribution to Strategy 2030 Operational Priorities (accessible from the list of linked documents in Appendix 2).

Source: Asian Development Bank.

LIST OF LINKED DOCUMENTS

http://www.adb.org/Documents/RRPs/?id=52234-001-3

1. Framework Financing Agreement
2. Periodic Financing Request for Tranche 1
3. Sector Assessment (Summary): Transport
4. Comparison of Financing Modality
5. Facility Administration Manual
6. Contribution to Strategy 2030 Operational Priorities
7. Development Coordination
8. Financial Analysis
9. Economic Analysis
10. Country Economic Indicators
11. Summary Poverty Reduction and Social Strategy
12. Risk Assessment and Risk Management Plan
13. Attached Technical Assistance Report
14. Climate Change Assessment
15. Gender Equality and Social Inclusion Action Plan
16. Environmental Assessment and Review Framework
17. Resettlement Framework
18. Indigenous Peoples Planning Framework
19. Environmental Impact Assessment: Corridor 3
20. Environmental Impact Assessment: Corridor 4
21. Environmental Due Diligence Report: Corridor 5
22. Resettlement Plan: Corridor 3
23. Resettlement Plan: Corridor 4
24. Resettlement Plan: Corridor 5

Supplementary Documents

25. Financial Management Assessment
26. Climate Risk and Vulnerability Assessment