ASIAN INFRASTRUCTURE INVESTMENT BANK

ICS2023-IND
August 2024

Sovereign-backed Financing

Project Document
P000795 Republic of India
Kochi Metro Rail Project - Phase II

Currency Equivalents
(As of January 30, 2024)

Currency Unit – Indian Rupee (INR)
INR1.00 = USD0.012
USD1.00 = INR83.11

Borrower's Fiscal year
April 1 – March 31

Abbreviations

AFC	Automatic Fare Collection
AFD	Agence Française de Développement
AIIB	Asian Infrastructure Investment Bank
ATM	Automated Teller Machine
ATO	Automatic Train Operation
ATP	Automatic Train Protection
ATS	Automatic Train Supervision
BB	Building Block
CAAA	Controller of Aid Accounts and Audit
CAG	Comptroller and Auditor General
CAPEX	Capital Expenditures
CATC	Continuous Automatic Train Control
CBI	Computer based Interlocking
CBTC	Communications-based Train Control
CCTV	Close Circuit Television
CESMP	Contractor's Environmental and Social Management Plan
CO2	Carbon Dioxide
CPI	Consumer Price Index
CRA	Climate Risk Assessment
CW	Civil Works
DCF	Discounted Cash Flow
DDC	Detailed Design Consultant
DED	Detailed Engineering Design
DP	Director (Projects)
DPR	Detailed Project Report
E&M	Electrical and Mechanical
E&S	Environmental And Social
ECap	Economic Capital
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EMP	Environmental Management Plan
ENPV	Economic Net Present Value
ERP	Entity Relationship Diagram
ESEL	Environmental and Social Exclusion List
ESMP	Environmental and Social Management Plan
ESP	Environmental and Social Policy

ESS	Environmental and Social Standards
EWS	Economically Weaker Sections
FAD	Finance and Accounts Department
FDI	Foreign Direct Investment
FIRR	Financial Internal Rate of Return
FM	Financial Management
FNPV	Financial Net Present Value
FRP	Fiber Reinforced Plastic
FS	Feasibility Study
GBV	Gender-based Violence
GC	General Consultant
GDI	Gender Development Index
GDP	Gross Domestic Product
GESI	Gender Equality and Social Inclusion
GHG	Greenhouse Gas
GII	Gender Inequality Index
GOA	Grade of Automation
GOI	Government of India
GOK	Government of Kerala
GPN	General Procurement Notice
GPS	Global Positioning System
GRM	Grievance Redress Mechanism
HH	Head Hardened
ICAI	Institute of Chartered Accountants of India
IDC	Interest During Construction
IFI	International Financial Institution
IGBC	Indian Green Building Council
IMF	International Monetary Fund
IND AS	Indian Accounting Standards
INR	Indian Rupee
IOCT	international open competitive tendering
IP	Indigenous People and Internet Protocol
IPT	Intermediate Public Transport
IR	Intermediate Results
IT	Information Technology
JICA	Japan International Cooperation Agency
JLN	Jawaharlal Nehru
KfW	Kreditanstalt für Wiederaufbau
KMRL	Kochi Metro Rail Limited
K-RAIL	Kerala Rail Development Corporation Limited
KSRTC	Kerala State Road Transport Corporation
KYC	Know Your Counterparty
LARR	Land Acquisition, Rehabilitation and Resettlement
LED	Light Emitting Diode
LEG	Legal Department
LGBTQI+	Lesbian, Gay, Bisexual, Transgender, Queer, and Intersexual
M&E	Monitoring and Evaluation
MDB	Multilateral Development Bank
MIS	Management Information System

MOF	Ministry of Finance
MOHUA	Ministry of Housing and Urban Affairs
MRT	Metro Rail Transit
NAV	Noise and Vibration
NCCAP	National Climate Change Action Plan
NCT	National Competitive Tendering
NDC	Nationally Determined Contributions
NMT	Non-motorized transport
O&M	Operation and Maintenance
ODA	Official Development Assistance
OFC	Optical Fiber Communication
OHS	Occupational Health and Safety
OPEX	Operational Expenditures
PA	Paris Agreement
PAA	Paris Agreement Alignment
PAP	Project Affected People
PDS	Project Delivery Strategy
PFS	Project Financial Statements
PHPDT	Peak Hour Peak Direction Trips
PIM	Project Implementation Manual
PIR	Procurement Instructions for Recipients
PIU	Project Implementing Unit
PP	Procurement Plan
PPM	Project-affected People's Mechanism
PPP	Public Private Partnership
PPQ	Project Prioritization and Quality
PT	Project Team
PWD	Persons with Disabilities and Public Works Department
R&R	Rehabilitation and Resettlement
RBI	Reserve Bank of India
RCP	Representative Concentration Pathway
RESCO	Renewable Energy Service Company
RMF	Results Monitoring Framework
RORO	Roll-on/roll-off
ROW	Right-of-Way
RP	Resettlement Plan
RS&T	Railway Systems and Trains
SAP	System Applications and Products in Data Processing
SAs	Standards on Auditing
SCADA	Supervisory Control and Data Acquisition
SDDR	Social Due Diligence Report
SEAH	Sexual Exploitation, Abuse and Harassment
SEZ	Special Economic Zone
SIA	Social Impact Assessment
SPB	Strategy, Policy, and Budget
TETRA	Terrestrial Trunked Radio
UN	United Nations
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change

USD	United States Dollar
VOC	Vehicle Operating Cost
WEO	World Economic Outlook

CONTENTS

1. SUMMARY SHEET

Project No.	P000795
Project Name	Kochi Metro Rail Project - Phase II
AIIB Member	Republic of India
Borrower	Republic of India
Project Implementation Entity	Kochi Metro Rail Limited (KMRL)
Sector Subsector	Transport Urban Transport
Alignment with AIIB's thematic priorities	Green infrastructure and Private Capital Mobilization
Project Objective	The project's objective is to improve urban mobility on the Jawaharlal Nehru (JLN) Stadium – Smart City corridor via Kakkanad in Kochi.
Project Description	The project will support the implementation of Phase II of Kochi Metro, which will include the construction of an elevated, electrified metro rail system of 11.2 km and 11 stations along the JLN Stadium – Smart City corridor, serving Kakkanad area, a densely populated and fast-growing employment hub. It will finance (i) the design and build of a viaduct structure, stations, and tracks; and (ii) procurement and installation of systems, including signaling, telecommunications, auxiliary main substation, traction and power supply facilities.
Implementation Period	Start Date: Q3 2024 End Date: Q4 2027
Expected Loan Closing Date	Q4 2027
Cost and Financing Plan	Project cost: USD229.88 million Project financing plan: AIIB loan: USD122.32 million GOI contribution: USD40.76 million GOK contribution: USD66.80 million
Size and Terms of AIIB Loan	USD122.32 million AIIB's standard interest rate for sovereign-backed loans.
Co-financing (Size and Terms)	No
Environmental and Social Category	Category A
Risk (Low/Medium/High)	Medium
Conditions for Effectiveness	Legal opinion on the Loan Agreement received.
Key Covenants	• To retain and maintain the General Consultant (GC) throughout the project implementation. • To engage an independent third-party monitoring agency, acceptable to AIIB by March 2025, to verify project environmental and social (E&S) compliance

	and report every six months throughout the project implementation. • To engage the chartered accountant firm appointed by the Comptroller and Auditor General (CAG)'s Office no later than six months after the end of each fiscal year to conduct the external audit of the Project Financial Statements (PFS) in accordance with Section 5.09 of the General Conditions.
Conditions for Disbursement	The Project Implementation Manual (PIM) to be prepared by KMRL and approved by AIIB.
Retroactive Financing (Loan % and dates)	All eligible expenditures under the project, incurred in compliance with AIIB's procurement policies and guidelines and in respect of which payments were made not more than 18 months prior to the date of the loan agreement, up to 30 percent of the loan's amount.
Policy Assurance	The Vice President, Policy and Strategy, confirms an overall assurance that AIIB is in compliance with the policies applicable to the project.
Economic Capital (Ecap) Consumption	USD13.89 million ECap Ratio: 14.12 percent
Project Approval	President

President	Jin Liqun
Acting Vice President and Director General	Rajat Misra, Public Sector Clients, Region 1
Manager	Andrés Pizarro, Principal Investment Officer
Team Leader	Tomás Herrero Diez, Investment Officer
Team Members	Purnendu Pathak (Procurement Specialist) Jurminla Jurminla (Senior Procurement Specialist) David Rollinson (Senior Environment Specialist) Siva Rama Krishna Sastry Jyosyula (Senior Social Development Specialist) Alberto Alcubilla (Senior Investment Solutions Specialist) Shodi Nazarov (Financial Management Specialist) David Hartcher (Senior Finance Officer) Christopher Damandl (Senior Counsel) Kezia Paladina (Associate Counsel) Md. Towshikur Rahman (Investment Associate) Shiwen Dong (Admin Assistant)

2. CONTEXT

1. **Macroeconomic Context.** The population in India has grown more than threefold since 1950, resulting in a young population of over 1.4 billion,[1] offering a sizeable labor force and a booming consumer market. The country is one of the world's largest economies, powered by a mix of agriculture, manufacturing, and services sectors. Despite the setback caused by COVID-19, which resulted in an economic contraction of nearly 5.8 percent in 2020, the economy rebounded strongly to 7.2 percent in 2022.[2] The anticipated rate of increase for the Gross Domestic Product (GDP) is estimated to be 5.9 percent in 2023 and 6.3 percent in 2024.[3] In addition, noticeable progress has been observed in reducing extreme poverty, with estimates suggesting that between 2011 and 2019, the portion of the population living in extreme poverty (defined as living below USD2.15 per person per day) was halved.[4] India has an aspiration to achieve high middle-income status by 2047.[5] Nevertheless, the issue of inequality continues to endure, as seen by a Gini index of approximately 35 for the preceding two decades.[6] Despite encouraging employment trends since 2020, the employment to population (15+) ratio in 2022 is still less than 50 percent and concerns linger about job quality, wage growth, and women's underrepresentation in the workforce.[7] Recognizing these challenges and to spur economic growth and unleash India's full potential, in 2018, the Government of India (GOI) suggested way forwards and reforms focused on four sections: (i) economic drivers, (ii) infrastructure, (iii) inclusion, and (iv) governance.[8]

2. **Urbanization of India.** India's urbanization is gaining pace as a result of the country's improving economic situation. From 1990 to 2022, the urban population has steadily increased, growing from 26 to 36 percent, bringing the total number of urban dwellers to a whopping half a billion.[9] It is projected that by 2035, India's urban population will reach 675 million, representing 43 percent of the entire population.[10] This swift urbanization is amplifying the importance of cities as living spaces and economic hubs. Cities in India make up just 3 percent of the country's territory, yet they account for a staggering 60 percent of its GDP.[11] In recent years, urbanization has improved living standards and employment prospects. However, these opportunities have also led to challenges, such as traffic congestion, air pollution, and income inequality.[12]

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[1] World Population Review; India; 2023 (live, consulted in September 2023); (link).
[2] The World Bank; "*GDP Growth (annual %) – India*"; 2023; (link).
[3] International Monetary Fund; *"World Economic Outlook"*; 2023. (link).
[4] World Bank Poverty and Inequality Portal and Macro Poverty Outlook, Spring 2023; (link).
[5] The Indian Express; "*Express View: India's Road to 2047*"; 2023; (link).
[6] The World Bank; "*Gini Index – India*"; 2023; (link).
[7] 46 percent. Source: The World Bank; "*Employment to population ratio, 15+, total (percentage) (modeled ILO estimate) - India*"; 2023; (link).
[8] The first section on drivers focuses on the engines of economic performance in macroeconomic terms, the second section on infrastructure deals with the physical foundations of growth, the section on inclusion deals with the task of investing in the capabilities of all of India's citizens, and the final section on governance delves deep into how the tasks/business of GOI can be streamlined and reformed to achieve better outcomes. Source: NITI Aayog; "*Strategy for New India@75*"; 2018; (link).
[9] World Bank; Databank; (link).
[10] United Nations; "*Habitat's World Cities Report*"; 2022 (link).
[11] NITI Aayog, Asian Development Bank; *"Cities as Engines of Growth (TA-9508: Strengthening the States for broad based urban development, Executive Summary)"*; 2022; (link).
[12] J. Colmer; "*Urbanization, Growth, and Development: Evidence from India*"; London School of Economics; (link).

3. **Indian Transport Context.** India's transport sector encompasses diverse modes, including road, rail, air, and waterways. Due to rising urbanization, economic expansion, and demographic boom, this sector has seen substantial growth and modernization over the last years. India's road network (more than 6 million km)[13] forms the backbone of the country's transport system through connecting cities, towns, and villages with its vast network The Indian Railways (renowned for its extensive rail network spanning 68,103 km[14]) serves as a vital transport mean facilitating the movement of millions of individuals and substantial amounts of cargo. The extensive navigable inland waterways network (15,519 km[15]) also offers tremendous potential for effective commercial transport. As of 2018-19, about 152,000 public buses catered to about 60 million trips per day in the country.[16] It is projected that, based on the current average passenger ridership per bus, an additional 460,000 buses will be needed to meet the urban public transport demand by the year 2031.[17] This need is in addition to various other modes of public transport. Currently, there are 20 Indian cities with functioning metro rail services covering a length of 895 km and allowing approximately 10 million passengers to avail this metro service per day.[18] This dearth of public transport has led to traffic congestion and high private vehicle ownership, resulting in increased road fatalities[19] and CO_2 emissions (in 2020, the transport sector was responsible for approximately 13 percent of all national emissions,[20] with 90 percent of them originating from road traffic[21]). Over the last decade, GOI has been working on various initiatives to modernize and improve the sector (e.g., conversion to electric mode, enhancement of last-mile connectivity, or integration of multimodal solutions for seamless transportation).

4. **Kochi[22] Urbanization.** Kochi, a port city located in the southwest coastal area of India, is the commercial capital of the state of Kerala. After the economic reforms introduced by GOI in the early 1990s, the city's growth has been propelled and benefited from its strategic location to become a thriving commercial hub. Since 2000, the service sector has boosted the city's economy.[23] The establishment of technology parks (like

[13] It includes (i) national highways (144,634 km); (ii) state highways (186,908 km); and (iii) other roads (5,902,539 km). Source: Ministry of Road Transport and Highways; "*Year End Review*"; 2022; (link).
[14] The World Bank; "*Rail lines (total route-km)- India*"; 2023; (link).
[15] Transport Research Wing, Ministry of Ports, Shipping and Waterways; *"Statistics of Inland Water Transport 2021-22"*; 2023; (link).
[16] Ministry of Road Transport and Highways, Transport Research Wings; *"Review of the Performance of State Road Transport Undertakings for 2017-18 & 2018-19"*; 2023; (link).
[17] Klynveld Peat Marwick Goerdeler (KPMG); *"Reimagining public transport in India"*; 2017; (link).
[18] The Times of India; "*One Crore Passengers Riding Metro Systems per Day in India*"; October 27, 2023; (link)
[19] In 2021, more than 400,000 road accident was recorded, where the fatalities were more than 1.5 million. Source: Ministry of Road Transport and Highways; *"Road Accidents in India 2021"*; 2022; (link).
[20] 307.86Mt out of 2.42 giga tons of CO_2 emissions. Source: ClimateWatch; "*Historical GHG Emissions*"; accessed in June 2023; (link).
[21] The International Council on Clean Transportation; *"Decarbonizing India's Road Transport: A Meta-Analysis of Road Transport Emissions Models*"; 2022; (link).
[22] The referred area is Greater Cochin Development Area and consists of the Greater Cochin Development Authority (GCDA), including Kochi Municipal Corporation, and Goshree Islands Development Authority (GIDA). The entire area spreads over approximate 730 square km and comprises of one corporation, 9 municipalities and 29 panchayats (a local government body at the sub-urban/rural level of India). Source: Urban Mass Transit Company Limited for KMRL; "*Draft Comprehensive Mobility Plan Report*", 2023.
[23] Fortune India; *"For Kochi, past and present make the future perfect"*; 2021; (link).

the Infopark,[24] in 2004) has turned Kochi into a burgeoning IT hub, drawing skilled professionals and creating high-quality employment opportunities. This economic growth led to a rapid urbanization process. Over the last two decades, the population of the city increased from 1.4 to 2.4 million and the population density increased from 2,935 to 5,400 people per square km.[25] Sustainable management of this growth is imperative to contribute to Kochi's prosperity and livability.

5. **Kochi Transport Network.** The city is integrated with India's National Highway System,[26] facilitating connectivity to major cities and several state highways.[27] The urban road network comprises major arterial roads, such as Mahatma Gandhi Road, Chittoor Road, and Marine Drive Road. The Kochi International Airport handles both domestic and international flights, while the railway system links Kochi to nearby towns and cities. Kochi's transport infrastructure, while comprehensive, lacks sufficient high-capacity urban public transit systems. The public transport network currently consists of (i) public buses[28], (ii) one metro rail line (28.2 km and 25 stations), [29] (iii) two water metro lines, [30] (iv) ferry and roll-on/roll-off (RORO) service[31], and (v) intermediate public transport (IPT)[32], for convenient short-distance options. A good portion of Kochi resides in the lowest elevation range of 0-3 m above mean sea level, and approximately 8.6 percent of the total area falls within the very high- and high-risk flooding zone, exposing its transport infrastructure to cyclones, floodings, and other climate risks.[33]

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[24] Infopark, located in the Kakkanad area, is a state-of-the-art technology park that has become a symbol of Kochi's emergence as a major IT and business hub in India. It was established with the aim of fostering the growth of the information technology industry in Kerala and attracting leading IT companies from around the world. Since its establishment, it has created more than 51,000 employees. Source: Infopark; "*Annual Report*"; 2020-2021; (link).

[25] Source for 2001 data: Office of the Registrar General and Census Commissioner, Ministry of Home Affairs, GOI; *"Table A-04: Towns and Urban Agglomerations Classified by Population Size Class in 2011 with Variation Between 1901 and 2011 - Class I (Population of 100,000 and Above)";* 2011 (link). Source for 2022 data: Demographia; "*Demographia World Urban Areas, 18th Annual*"; July 2022; (link).

[26] It is integrated with the following highways: NH 544, NH85, NH 66, NH 966A, and NH 966B.

[27] Some of the major state highways are SH 1, SH 15, SH 16, SH 41, SH 63, SH 66.

[28] At present, city bus services are provided mainly by private operators and Kerala State Road Transport Corporation (KSRTC) for Kochi and satellite towns. A total of 148 services across 49 routes are operated by KSRTC during the morning peak while private buses operate 421 services covering roughly 8,500 km of road network. Source: Urban Mass Transit Company Limited for KMRL; "*Draft Comprehensive Mobility Plan Report*", 2023.

[29] This is as of September 2023, and it includes 27.2 km and 24 stations under operation and 1 km and 1 station being constructed. Source: KMRL; "*Kochi Metro Rail Phase II (JLN Stadium to Infopark via Kakkanad). AIIB Mission. Day 1*"; September 11, 2023.

[30] It is a water-based transport system that aims to connect 10 islands in Kochi and will include 15 routes and 38 jetties (with 2 routes and 5 jetties in operation since February 2021). The total planned route length is 76 km with an expectation of 34,000 daily ridership. It will have 8 to 15 minutes headway and be operated through highly energy efficient 78 boats. The project is being supported by Kreditanstalt für Wiederaufbau (KfW), which is the main German development bank. Source: Swarajya; *"Explained: Why India's First Water Metro Is A Game Changer For Urban Mobility With Innovative, Inclusive And Sustainable Approach?";* 2023; (link); and KMRL; "*Kochi Water Metro. Connecting Lives, Connecting Miles*"; presented on September 13, 2023.

[31] Ferry Services are used by 12,000 to 15,000 passengers daily, available in Ernakulam, Willington Island, Fort Kochi and Vypin with a frequency of 15 minutes. Two RORO services are available connecting Fort Kochi and Fort Vypin, but these services are intermittently operational.

[32] IPT is privately-run 3-seater intermediate modes of transport providing point to point connectivity. In Kochi, roughly 10 percent of the trips are made by IPT modes (auto-rickshaws, shared auto-rickshaws). Source: Urban Mass Transit Company Limited for KMRL; "*Draft Comprehensive Mobility Plan Report*", 2023.

[33] K. Sowmya; C. M. Jon; N. K. Srivastava., 2014, "*Urban Flood Vulnerability Zoning of Cochin City, Southwest Coast of India, Using Remote Sensing and GIS,*" Journal of the International Society for the Prevention and Mitigation of Natural Hazards, Vol. 73, issue 0921-030X.; (link).

6. **Kochi Metro Rail Phase I**. This is a relatively recent addition to Kochi's transport network, construction of which was started in 2013. Phase I of the Kochi Metro from Aluva to Petta is operational.[34] Subsequently, it was expanded from Petta to S N Junction,[35] and from S N Junction to Thrippunithura.[36] The average daily ridership has been growing over 2023 (in September 2023, it was 91,288[37]). Phase I stands out due to several distinctive features. A portion of Phase I was made accessible to the public in a very short span of four years from the project's commencement, making it one of the fastest completed metro in India.[38] It has also championed inclusivity by employing 23 individuals from the transgender community to manage counters and undertake housekeeping duties at stations. In addition to that, it has also indirectly facilitated the creation of employment for another 500 workers from Kudumbasree[3940]. Kochi has also been honored with the "*City with most Sustainable Transport System*" by the Union Ministry of Housing and Urban Affairs in 2021.[41] This accolade acknowledges Kochi's efforts in integrating sustainable modes of transport like Kochi Metro Rail, Water Metro and e-mobility. In October 2017, Kochi Metro was also awarded the Best Urban Mobility Project in India by the Urban Development Ministry, as part of the Urban Mobility India (UMI) international conference.

7. **Kochi Metro Rail Phase II**. The transport services provided by Phase I prove to be insufficient in meeting the escalating demand spurred by the above-described rapid urbanization. Recognizing this, the Government of Kerala (GOK), is now undertaking Phase II of Kochi Metro Rail from Jawaharlal Nehru (JLN) Stadium to Smart City via Kakkanad in Kochi (11.2 km and 11 stations). Aligned with KMRL's mission and vision, and considering the trajectory of urban growth, GOI extended a request to the Asian Infrastructure Investment Bank (AIIB) to support financing Phase II.[42] GOK is also planning Phase III from Aluva to Angamaly (with a link to Kochi International Airport at Nedumbassery) (the Detailed Project Report {DPR} preparation is in progress).[43]

3. PROJECT DESCRIPTION

A. Project Overview

8. **Project Objective.** The objective of the project is to improve urban mobility on the JLN Stadium – Smart City corridor via Kakkanad in Kochi.

9. **Project Description.** The project will support the implementation of Phase II of the Kochi Metro Rail. It will include the construction of an 11.2 km elevated and

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[34] It consists of 25.2 km, 22 stations and 1 depot in Mutton. From Aluva to Palarivattom (13.4 km) was opened to passengers on June 17, 2017. The remaining portions were opened to passengers gradually over a span of three years, with the last section open to the public on September 7, 2020.
[35] It consists of 2 km and 2 stations, and it was commissioned on September 1, 2022.
[36] It consists of 1 km and 1 station and was commissioned on March 6, 2024.
[37] KMRL.
[38] Deccan Chronicle; *"Kochi Metro creates national record"*; 2017; (link)
[39] In Malayalam language, the name Kutumbashree means "prosperity of the family". Kudumbashree is the poverty eradication and women empowerment program implemented by the State Poverty Eradication Mission (SPEM) of GOK.
[40] The Hindu; *"Many firsts for Kochi Metro: vertical gardens, open-loop cards and more"*; June 17, 2017; (link)
[41] The Times of India; *"Kochi city wins national honour"*; 2021; (link)
[42] The related Posing Letter was received by AIIB on June 20, 2023.
[43] It is expected to consist of 19.90 km and 14 stations.

electrified metro rail system and 11 metro stations along the JLN – Smart City corridor which serves the Kakkanad area, a densely populated and fast-growing employment hub. The project aims to provide seamless and last-mile connectivity through multi-modal integration by combining the metro rail system with the neighboring jetties of Kochi Water Metro, feeder bus, and e-autorickshaw services. Other interventions planned under/related to the project include the construction of Non-motorized Transport (NMT) infrastructure and transit-oriented development (TOD). The project will provide a computer-based Automatic Fare Collection (AFC) system with a contactless smart token/card, and deploy a Communication based Train Control (CBTC) System. The power supply system will be monitored and controlled from a centralized Operation Control Center using a modern Supervisory Control and Data Acquisition (SCADA) system. AIIB´s contribution will finance part of the civil works (viaduct structure, stations, and tracks), and the procurement and installation of systems (including signaling, telecommunications, auxiliary main substation, traction, and power supply facilities).

10. **Expected Results.** The following indicators will be monitored to assess the achievement of the **project's objective**:

- Public transport *journey time* (in minutes) from JLN Stadium to Smart City.
- *Number of passengers* transported daily by the Kochi Metro Rail (Phase II). This indicator will be disaggregated by gender[44] to monitor the number of female passengers transported daily by the Kochi Metro Rail (Phase II).
- Percentage of the trains reaching the end stations within 3 minutes from the scheduled time on the corridor of Phase II (*reliability*).

11. The project **intermediate results (IR) indicators** will be measured periodically[45] during project implementation to verify that the project is progressing in accordance with the implementation plan. The IR indicators are:

- *Km* of elevated viaduct constructed for Phase II of the Kochi Metro Rail.
- *Number of stations* constructed with barrier-free, gender-responsive and climate-resilient features.
- *Percentage* of the track works completed.
- *Percentage* of the systems installed.

The Results Monitoring Framework (RMF) is provided in the Annex 1.

12. **Expected Beneficiaries.** Overall, 2.4 million inhabitants[46] of the project area are expected to benefit from improved urban mobility. In addition, the enhanced connectivity will increase economic opportunities and prospects. In particular, the new metro passengers, who are the regular commuters along the corridor, will be the potential primary beneficiaries as they will enjoy faster, more reliable, and better-quality transport means. Existing riders from Phase I corridor will also benefit from expanded coverage. The additional metro line will provide network effects which are, essentially, a larger proportion of origin and destinations served by the system benefitting all the users. The secondary beneficiaries will be the inhabitants living nearby in residential buildings and

[44] KMRL has recently initiated a pilot project, in cooperation with the Cochin University of Science and Technology, to estimate the percentage of female users based on the information collected by the Close Circuit Television (CCTV) and using artificial intelligence. This pilot is expected to be expanded to Phase II.
[45] The monitoring frequency for each indicator is provided in the Annex 1.
[46] Urban Mass Transit Company Limited for KMRL; "*Draft Comprehensive Mobility Plan Report*", 2023.

the commercial establishments along the proposed corridor, as the project will help to lessen traffic congestion on the existing transport network and increase the value of their properties and commercial activity. Furthermore, the project will also support universal accessibility, allowing the elderly, women, children, and persons with disabilities (PWD) to use the metro.[47]

B. Rationale for AIIB Involvement

13. **Strategic Fit for AIIB.** The project is highly aligned with the AIIB's (i) Corporate Strategy, (ii) Transport Strategy, (iii) Sustainable Cities Strategy, and (iv) Strategy on Mobilizing Private Capital for Infrastructure Strategy.

- *Corporate Strategy*. The project is aligned with two of AIIB's thematic priorities: (i) Green Infrastructure and (ii) Private Capital Mobilization. The project is considered a Green Infrastructure as it will provide a new line of electrically-powered public transport, that will contribute to a shift of passengers from other public and private transport modes to it, alleviating road congestion, which will consequently reduce greenhouse gas (GHG) emissions, air pollution and noise in Kochi, in particular, along the JLN – Smart City corridor. Furthermore, part of the power required for the operation of the stations is proposed to be met through solar power plants [48] installed on the stations' rooftops. A public-private partnership (PPP) scheme will be implemented for AFC, and TOD schemes will be pursued along the corridor.
- *Transport Sector Strategy*. The proposed project will contribute to achieving seamless multimodal integration across the Kochi transport system. The project will be interconnected to Phase I of the Kochi Metro Rail, the Water Metro, existing feeder bus routes, the NMT infrastructure, and the newly proposed semi-high speed rail corridor (Thrivananthapuram to Kasaragod).[49] In addition, the contactless smart token/card currently used for Phase I and the Water Metro will be also adopted for Phase II to ensure seamless integration.
- *Sustainable Cities Strategy*. The proposed project will enhance urban mobility in a rapidly growing metropolitan area, which is one of the priorities of this strategy. It will also improve basic infrastructure supply and city resilience by expanding the current metro system. Furthermore, the development of a TOD strategy along the metro corridor is envisaged.
- *Mobilizing Private Capital for Infrastructure Strategy.* A PPP scheme will be adopted for AFC,[50] which will facilitate fiscally constrained governments to deliver urban infrastructure.

[47] For further details on the measures proposed, see Section 4.E. and Annex 4.
[48] This will be funded with GOK/GOI's contributions.
[49] This a project proposed by Kerala Rail Development Corporation Limited (K-RAIL), which is currently pending of GOI's approval (the DPR was prepared in June 2020). The total length of the project is 529.45 km spanning from Thiruvananthapuram to Kasaragod (via Kollam, Chengannur, Kottayam, Ernakulam, Kochi Airport, Thrissur, Tirur, Kozhikode, and Kannur). The total expected cost of this project is USD7.6 billion. Sources: (i); Systra for KRAIL; DPR titled "*Semi High Speed rail Corridor (Thiruvananthapuram to Kasaragod"*; June 2020; and (ii) The Hindu; *"Kerala revises its plan for semi-high speed rail line";* July 2023; (link).
[50] For further details on the AFC model, see the Financing Plan in the Section 3. E.

14. **Paris Agreement Alignment (PAA).** The project is aligned with the Paris Agreement (PA)'s goals in terms of mitigation (building block {BB}1) and adaptation (BB2)[51] as justified below.

- *BB1.* Electric urban mobility projects, as Phase II of Kochi Metro Rail, are considered universally aligned for BB1.
- *BB2.* The project is also deemed aligned for BB2 as (i) the climate risk and vulnerability context is established in the Environmental Impact Assessment (EIA) and the Environmental Due Diligence Report (EDDR); (ii) climate adaptation and resilience measures to address the identified material physical climate risks were proposed in the EDDR and will be integrated into the forthcoming Detailed Engineering Designs (DEDs); and (iii) the operation and its components are not inconsistent with the national/broad context for climate resilience as outlined in India's Nationally Determined Contribution (NDC),[52] India's Long-Term Low-Carbon Development Strategy[53], and the Kerala State Action Plan on Climate Change (2023 – 2030).[54] Please refer to Annex 5 for further information.

15. **Value Addition by AIIB.** Beyond the provision of financing, AIIB will bring its accumulated experience and technical knowledge on preparing and implementing similar metro projects in Asia, and India.[55] AIIB's participation will strengthen the project by contributing to:

- enhance KMRL's technical and project management capacity in preparing and implementing large infrastructure projects consistent with Multilateral Development Bank (MDB)'s standards;
- strengthen the preparation and implementation of E&S instruments, while building KMRL's E&S management capacity;
- assess the climate vulnerability and risks to guide the selection of appropriate climate adaptation measures to be integrated into the DEDs of the project to deliver climate-smart rail-based infrastructure;
- improve procurement document quality, strengthen competition, and achieve a greater value for money following AIIB's Procurement Policy;
- bring innovative solutions to promote multi-modal integration and last-mile connectivity; and
- leverage private capital for the implementation of AFC and provide guidance for planning and implementing TOD strategies.

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[51] The assessment was conducted using the methodologies proposed in the (i) "*BB1 and BB2 Technical Note. Joint Multilateral Development Bank (MDB) Assessment Framework for Paris Alignment for Direct Investment Operations*"; November 2021; (link); (ii) AIIB; "*Guidance Note on Assessing Financing Operations' Alignment with the Paris Agreement at AIIB. Version 1.0*"; June 2023.

[52] GOI; "*India's Updated First Nationally Determined Contribution Under Paris Agreement (2021-2030) Submission to United Nations Framework Convention on Climate Change (UNFCCC)*"; August 2022, (link).

[53] One of the priorities of this Strategy is promoting climate adaptation in urban designs. Source: Ministry of Environment, Forest and Climate Change (GOI); *"India's Long-Term Low-Carbon Development Strategy";* Submission to the United Nations Framework Convention on Climate Change; 2022; (link).

[54] Directorate of Environment and Climate Change, Department of Environment, GOK; "*Kerala State Action Plan on Climate Change 2023-2030*"; 2022; (link).

[55] E.g., (i) Chennai Metro Rail Phase 2 Project – Balance Corridor 5 (USD438.75 million, approved in April 2023); (ii) Mumbai Urban Transport Project 3A – Station Improvement (USD100 million, approved in October 2023); (iii) Haryana Orbital Rail Corridor (HORC) Part A Project (USD128 million, approved in December 2022); (iv) Chennai Metro Rail Phase 2 Project - Corridor 4 (USD356.67 million, approved in September 2021); (v) Delhi-Meerut Regional Rapid Transit System (USD500 million, approved in October 2020); or (vi) Mumbai Urban Transport Project - Phase III (USD500 million, approved in September 2019).

16. **Value Addition to AIIB.** The proposed project will be the first time AIIB's financing to KMRL. The rail-based mass rapid transit system supported by the operation will be fully integrated with the Kochi Water Metro. Consequently, the operation will enable building AIIB's knowledge on intermodality between rail- and water-based urban transport systems. In addition, the operation will increase AIIB's experience in urban mass transport and contribute to the achievement of the AIIB's above-mentioned thematic priorities and strategies. The successful implementation of the project could lead to other investment opportunities with KMRL, such as Phase III of the Kochi Metro Rail, some urban regeneration projects in Kochi or rail- and water-based metro projects (to be prepared and implemented by KMRL) in other Indian cities.

C. Lessons Learnt and Reflected in the Project Design

17. The project's design is informed by experiences from implementing metro and railway projects in and outside India, financed by AIIB and other international financial institutions (IFIs). Lessons are also drawn from KMRL's experience in designing and implementing Phase I of the Kochi Metro. Relevant lessons incorporated into project preparation include:

- *Land Acquisition and Utility Shifting:* One of the pressing reasons for the implementation delay of Phase I stemmed from the delay in completing land acquisition and utility shifting. Learning from Phase I, KMRL has already initiated and made substantial progress in both areas for Phase II.
- *First- and Last-mile Connectivity:* One of the reasons identified for the lower-than-expected ridership of Phase I was the lack of adequate infrastructure and services to access the system.[56] Phase II considers intermodal integration of feeder services as well as the development of NMT infrastructure.
- *Interoperability:* For a smoother integration and reduced costs of operation and maintenance (O&M), some of the systems and the trains utilized will be the same for both Phase I and Phase II. For further details, see the Section 4. A.
- *Civil and Track Works:* Considering the recent floods and the maritime environment of Kochi, Phase II will include drainage improvements in turnout areas, redesigning base plates for better insulation, using galvanized steel structures for corrosion resistance, and introducing non-corrosive roof sheet gutters. In addition, a strong emphasis will be placed on water management to facilitate rainwater harvesting, waterproofing, and appropriate drainage.
- *Communication:* The communication system will be enhanced by optimizing the fiber optic cable network, introducing Passenger Information Display System (PIDS) at the street level, integrating CCTV with the existing security control room, and providing Surge Protection Device (SPD) for telecom data to protect against lightning/surge. Harder materials will be used for AFC gate flaps and enhanced QR readers will be installed on AFC gates to improve ticket readability.
- *Rolling Stock:* Several actions are considered to improve the durability and reliability of train equipment. This includes the use of suitable seats (may be metal seats instead of Fiber Reinforced Plastic {FRP} seats) and addressing certain hardware failures (e.g., those related to Advanced Protection System (APS), antenna mountings, saloon light, CCTV, and PIDS).

[56] Systra and Quadrant Conseil for KMRL and the Agence Française de Développement (AFD); "*Ex-post Evaluation of Kochi Metro Project (Phase I)*"; November 18, 2021.

D. Components

18. The project comprises three components as indicated below. While AIIB will finance only part of components 1 and 2, component 3 will be solely financed by the local funds from India.

- **Component 1 – Civil Works (CW)**. This will support the design and build of 11.2 km of elevated viaduct, 11 stations, tracks, and other related civil works (including barrier-free, gender-responsive, and climate-resilient features).[57] Specifically, this component will finance the (i) design and build of 11.2 km of viaduct and 11 stations; (ii) architectural finishes for all stations; (iii) design and build for track work; (iv) construction of the entry/exit structures for all stations; (v) construction of KMRL staff quarters; and (vi) implementation of NMT works.
- **Component 2 – Railway Systems and Trains (RS&T)**. This will support the procurement, installation, and commissioning of systems, including (i) traction and power supply facilities, as well as SCADA; (ii) auxiliary main substation; (iii) electrical and mechanical (E&M) works; (iv) telecommunications; (v) security control; and (vi) AFC. This component will also finance the design, procurement, installation, and commissioning of (vii) lift(s), (viii) escalator(s); and (ix) the procurement of 5 new trains.
- **Component 3 – Design and Implementation Support**. This will support the procurement of five consultancy assignments in support of project implementation, including: the (i) GC, (ii) Detailed Design Consultants (DDCs) for the stations; (iii) DDC for the traction systems, (iv) proof consultants for power supply and distribution systems, and (v) independent safety assessor.

E. Cost and Financing Plan

19. **Project's Cost**. The estimated cost of the project is USD229.88 million, with a loan from AIIB of USD122.32 million, a GOI contribution of USD40.76 million, and a GOK contribution of USD66.80 million.

20. **Financing Plan**. The Phase II financing structure will mirror the same approach as that of Phase I. This will include public sector financing (from GOK and GOI), and an official development assistance (ODA) loan (from AIIB). In February 2023, a tripartite Memorandum of Understanding (MOU) was signed among GOI, GOK, and KMRL to articulate, among others, the detailed financing terms, and mechanisms, as summarized in the paragraphs and table below:

- The loan will be used to cover 82 percent of the contract amount for item (i), 50 percent of the contract amount for item (ii) and 73 percent of the contract amount for item (iii) of Component 1; 49 percent of the contract amount for Component 2; and the front-end fee.
- GOI's and GOK's contributions[58] will cover the remaining costs for the 3 proposed components (except for the AFC), the land acquisition and resettlement costs (including compensations, livelihood restoration programs),

[57] For further details on these features, please refer to the sections 4. E. and 4. F.
[58] GOK will release funds for Phase II under the Major Infrastructure Development Project (MIDP) Fund through re-appropriation basis as and when funds are solicited by KMRL based on capital budgeting requirements. GOI will release its portion based on the physical progress of works.

utility shifting, taxes, duties, the commitment fee, and the interest during construction (IDC).

Table 1. Project Financing Plan *(USD million)*

Item	Total	GOI	GOK	AIIB
Component 1 (CW)	148.75	22.33	18.12	108.30
Component 2 (RS&T)	60.47	18.43	28.33	13.71
Component 3	5.95	0.00	5.95	0.00
Land Acquisition & Resettlement	9.95	0.00	9.95	0.00
Front-end Fee	0.31	0.00	0.00	0.31
Commitment Fee and IDC	4.45	0.00	4.45	0.00
Grand Total	**229.88**	**40.76**	**66.80**	**122.32**

Source: KMRL.

- The project also includes a PPP element for the installation and operation of AFC, which is expected to be entirely implemented by the same private consortium responsible for Phase I. This consortium is led by Axis Bank Ltd. (an Indian bank) and includes ASIS Technologies Ltd. (a Turkish technological company) and AGS Transact Technologies Ltd. (an Indian IT firm). The contract was signed between KMRL and Axis Bank Ltd. on June 10, 2015, for Phase I, and it is expected to be expanded to also cover Phase II. The private consortium is expected to cover the costs for the procurement and installation of the AFC infrastructure for Phase II (approximately USD5.64 M).[59]

F. Implementation Readiness and Arrangements

21. **Implementation Period.** The project's implementation period is expected to run from Q3 2024 to Q4 2027.

22. **Implementation Readiness.** The DPR for Phase II was prepared in September 2014, subsequently revised in September 2016,[60] in February 2018 (to align it with the Metro Rail Policy of 2017)[61], and in January 2019 (to update the cost estimation and the economic and financial analyses). GOI approved the project tentatively in February 2019, and finally in November 2022. The Housing and Urban Development Corporation (HUDCO) has already provided a loan to KMRL (guaranteed by GOK) of almost USD10 million for land acquisition. In 2023, GOI released around USD12 million, and GOK has committed to match that contribution during the first half of 2024 to initiate the project's implementation. Approximately 83 percent of the land needed for road widening[62] and to construct the viaduct and 45 percent of the land needed for the construction of the stations have been already acquired. It is expected that all the land will be taken over by KMRL during the first half of 2024. As of January 2024, 54 percent of the utility shifting work has been implemented and the balance is expected to be completed by August 2024. Five contracts have already been awarded (and the related firms/contractors

[59] For Phase I, the consortium also covers the O&M costs for 10 years, and, in compensation, it will receive 4 percent of the fare box revenues. The same approach is expected to be followed for Phase II.
[60] To align it with costing guidelines issued by MOHUA.
[61] Ministry of Housing and Urban Affairs (MOHUA); "Metro Rail Policy"; 2017; (link).
[62] About 6.15 km of road widening is required, with 50 percent already completed as of January 2024.

mobilized), including the GC (in July 2023), the DDC for the stations (in April 2023) and traction (in May 2023), and the civil contractor for the construction of the entry/exit structure for SEZ and Kakkanad stations (in March 2023) and Chittethukara, Kinfra Park, and Infopark stations (in October 2023), for which the civil works are ongoing. In September 2023, KMRL invited tenders (under advance procurement) for the largest package (around USD118.4 million), which corresponds to the design and build contract for the viaduct and the station main box. It is expected that the contract will be ready for award by loan effectiveness. All these activities will contribute to achieving high project readiness for implementation and meeting GOI's readiness criteria.

23. **Implementation Arrangements.** KMRL will be the implementing entity for the Phase II. KMRL is a joint venture public sector company of GOI (50 percent) and GOK (50 percent), which was established in 2011 with a mandate to implement, operate, and maintain the Kochi Metro Rail project(s) following the orders of the Planning Commission[63] and GOI. KMRL has identified a team of key staff (headed by the current Director Projects {DP}) that will be responsible for the day-to-day implementation of the project. This team will include multi-disciplinary staff representing, among others, technical, procurement, environmental, social, financial management (FM), and monitoring and evaluation (M&E) areas. It will also include staff who were seconded to Delhi Metro Rail Corporation (DMRC) during the procurement and implementation of Phase I, so that the technical know-how and lessons learnt will be capitalized. KMRL will also recruit additional staff/consultants, as and when required, to work as part of this team. GC shall support KMRL in the implementation of the project. GOI and GOK will not only contribute to funding the project, but they will also support KMRL in obtaining necessary approvals and clearances and meeting regulatory compliances and providing policy and regulatory support at central and state levels, respectively. In addition, KMRL's Board of Directors (which includes representatives from GOI, GOK and KMRL) will conduct quarterly review meetings to oversight the implementation progress. PIM has been prepared by KMRL[64] to clearly describe the roles and responsibilities of all the agencies engaged during implementation and the essential workflows for key project activities.

24. **Procurement Arrangements.** KMRL will be responsible for procuring all the packages under the project. KMRL has a team of experienced procurement staff and will be supported by GC. A Technical Evaluation Committee (TEC) constituted within KMRL, will evaluate the tenders. The AIIB's Procurement Policy (January 2016, as revised in June 2024) and the Directive on Procurement Instructions for Recipients (PIR) (July 2024) will be followed for all the packages that will receive AIIB's financing. The contracts shall be procured following international open competitive tendering (IOCT)[65] and national competitive tendering (NCT)[66] as set out in sections 2.11.2 and 2.11.5 of the PIR, respectively. There will be no restriction on the source of providing the goods, works, and services from any countries in the IOCT contracts, and domestic preference or purchase preference shall not apply to IOCT.

[63] This has been replaced by the National Institute for Transforming India or NITI Aayog.
[64] PIM's approval by AIIB is expected within 3 months from the loan's signature date.
[65] IOCT shall be followed for any works contract estimated to cost USD40 million or higher, and any goods contract estimated to cost USD3 million or higher.
[66] NCT tendering shall be followed for works contracts estimated to cost less than USD40 million, and any goods contract estimated to cost less than USD3 million.

25. **FM Arrangements**. KMRL will be responsible for the overall project FM and disbursements. The accrual basis accounting system will be followed for project accounting. KMRL will maintain project accounts and have custody of supporting documents. The project's financial progress will be reported quarterly through Interim Unaudited Financial Reports (IUFRs) to be submitted within 45 days of each quarter's end. KMRL will present the project's audited financial statements for each year of project implementation within nine months following the end of the fiscal year.

26. **E&S Monitoring and Supervision Arrangements.** KMRL will be responsible for the overall coordination, supervision, and monitoring of the project's E&S aspects. KMRL will establish an E&S team to manage E&S aspects associated with the design, implementation, and monitoring of the project. KMRL will submit bi-annual E&S monitoring reports to AIIB during implementation.[67] KMRL will be required to engage an independent third-party monitoring agency to verify project E&S compliance and report to AIIB every six months. The monitoring reports will be based on field reviews and internal E&S monitoring reports prepared by KMRL with assistance from the GC and contractors.

27. **M&E Arrangements.** The project results will be monitored by KMRL based on RMF described in the Annex 1. During the implementation stage, KMRL will appoint, at least, one M&E Specialist, who will be responsible for preparing implementation progress and performance reports on a semiannual basis. The progress reports will be due within 30 days of each reporting period.

28. **AIIB's Implementation Support.** During the implementation stage, AIIB will conduct: (i) missions on a semiannual basis to review the status of implementation progress, any pertaining issues that may require management attention or any expected material change; (ii) several review meetings between missions; and (iii) further technical site visits, when needed.

4. PROJECT ASSESSMENT

A. Technical

29. **Project Design.** Phase II will comprise an elevated and electrified rail-based mass transit system. This stretch will be 11.2 km long with 11 stations spanning from JLN Stadium to Smart City corridor via Kakkanad in Kochi. Following is a description of the rationale for choosing this technical solution and its key attributes:

- ***Ridership/Passenger Demand.*** The proposed project intends to construct a new metro line to reduce the travel time for the increasing traffic demand caused by a fast-growing employment hub in Kakkanad, and the urban expansion along Phase II corridor. The ridership estimates for Phase II were initially established

[67] These reports will capture, among others, the actual resettlement impacts and progress, and the mechanisms and facilities set up by KMRL to assist project affected people (PAP) in restoring their livelihoods.

in 2014,[68] and were subsequently updated in the DPR of 2018.[69] For the DPR preparation, several surveys, including classified traffic volume counts surveys, origin-destination surveys, and speed and delay surveys, were conducted in the influence area. AIIB reviewed and updated the estimated ridership data for Phase II to reflect that the operation is expected to start in 2027 (instead of 2023 as per the DPR) and consider the current performance of Phase I.[70] Ridership is estimated to expand by 4.5 times over a 26-year period beginning from 2027[71] (Table 2). Since Phases I and II will operate concurrently, the operation of Phase II will have a noteworthy impact on the entire corridor as it will further complement and influence the ridership of Phase I (known as the network effect).

Table 2. Daily Projected Average Ridership for Phase II *(Number of Passengers)*

2027	2048	2052
62,211	214,021	270,809

Source: AIIB PT based on the DPR Revised, JLN Stadium – InfoPark via Kakkanad, February 2018.

- ***Alignment*.** The first DPR (September 2014) evaluated two options,[72] and the alignment from JLN Stadium Station to Infopark via Kakkanad[73] was deemed more suitable due to several factors: (i) it is approximately 1 km shorter compared to other alternatives, (ii) it serves densely congested areas such as Palarivattom, Chembmukku, Vazhakaal, Padamughal, and (iii) it connects Phase I at the midpoint of the Aluva-Petta corridor, which is advantageous from a train operation perspective (for further details, see the graphic provided in the Annex 6). The alignment's geometrical design adheres to international practices used in similar metro systems with a standard gauge of 1435 mm, considering a maximum permissible speed of 80 km/h. The alignment features two parallel lines, each in one direction, and will be equipped with ballast-less tracks.
- ***Stations.*** Phase II will share the JLN Stadium Station with Phase I, and both will share the Muttom Depot. Phase II will have the following eleven stations: (i) Palarivattom JN, (ii) Alinchuvadu, (iii) Chembumukku, (iv) Vazhakkala, (v) Padamughal; (vi) Kakkanad JN, (vii) Kochin SEZ, (viii) Chittethukara, (ix) Kinfra, (x) Infopark 1, and (xi) Smart City. The station locations were chosen to effectively cater to the major passenger catchment areas and destinations and facilitate seamless integration with other transport modes. All the stations will be elevated, having an average inter-station spacing of 974 m, with platforms of 81 m suitable for 3 coach rakes. The platforms will be constructed in accordance

[68] Using a CUBE model by M/S RITES (a domestic consultancy firm), the final ridership estimate was submitted to KMRL in 2016 in the revised DPR.
[69] By Urban Mass Transit Company Ltd. (UMTC). This revision was required to reflect the instructions of the 2017 Metro Rail Policy.
[70] The updated model considered (i) a trip rate of 2.1 for the base year and 2.5 for the horizon year; (ii) an annual growth rates for the population and employment of 2.81 percent and 2.19 percent, respectively; (iii) an increase of mode share in favor of public transport to 61 percent; and (iv) the actual ridership of Phase I, which is lower than estimated in the respective DPR. Source of (ii) and (iii): Urban Mass Transit Company Limited for KMRL; "*Draft Comprehensive Mobility Plan Report*", 2023.
[71] The DPR proposed 2023 as Phase II's opening year. This has been adjusted to be 2027 considering the current project's status.
[72] The other option was from the Kalamassery Station to Infopark via Kakkanad. The section from Kakkanad to Info Park is common in both the alternatives. Although it would require less land acquisition due to wider and open roads, it would have been longer by 1 km, and would not serve some heavily populated area.
[73] In the area of Kakkanad, the district headquarters and major residential, commercial, and industrial hubs, like Special Economic Zone (SEZ), are located.

with Indian Green Building Council (IGBC) certification standards.[74] Additionally, the stations will be situated above the central median, with the rail level positioned 12.5 m higher than the road level. All the stations will be equipped with ticketing system having AFC gates, ticket and recharge counters, passengers' information systems, toilets, access control systems, auxiliary substation, as well as passenger stairs, escalators, and lifts. The stations will be designed in an all-inclusive and accessible manner giving due consideration to the gender, age, and health parameters of the commuters.

- ***RS&T.*** State-of-the-art railway systems will be implemented. To achieve a headway of 90 seconds, the project will implement a CBTC system for signaling and train control. Other features will include Computer-Based Interlocking (CBI) and Light Emitting Diode (LED) fixed signals at interlocked stations for safer and more efficient operation of train movements at junctions, stations, and signaling points. KMRL will use Grade of Automation (GOA) 2 technology (automatic train operation {ATO} with drivers), compatible with a driverless mode (GOA 3) in the future. For telecommunications, the project will incorporate Fiber Optics-based Data Transmission System (FOTS), Terrestrial Trunked Radio (TETRA), CCTV, Public Address System (PAS), PIDS, Master Clock System (MCS), and Centralized Digital Recording System (CDRS). The power supply system will be monitored and controlled from a centralized Operation Control Center using a cutting-edge SCADA system with intelligent remote terminal units. The implementation of rooftop solar panels under the Renewable Energy Service Company (RESCO) model is also being considered. The proposed system will incorporate a computer-based AFC system. Seven trains (21 coaches) will be needed to operate Phase II, with five of them to be provided from Phase I and the remaining two trains[75] to be procured under the project (using GOK/GOI funds). The planned rolling stock will have the electric regenerative braking system, which will regain the maximum possible energy and pump it back to the system.
- ***Interoperability between Phase I and Phase II***. To facilitate a seamless integration between Phase I and II, some of the systems and trains to be utilized in Phase II will be procured from the same vendor that provided them for Phase I, following a single source selection process (GOI/GOK will entirely fund these packages without AIIB's contribution). Similarly, as the same company will be responsible for the AFC's implementation and operation for both phases, the system for Phase II will be seamlessly compatible with the contactless smart token/card type ticketing used in Phase I and the Water Metro.
- ***Intermodal Integration.*** The design accounts for integration of feeder services catering to key catchment areas, facilitating first- and last-mile connectivity. The

[74] The certification implies that the newly constructed infrastructure has taken deliberate measures toward sustainable living and that it has met the required environmental standards set by the IGBC.
[75] Five trains will be procured under the project with three of them to be deployed for the extension of Phase I and the remaining two trains in Phase II.

services include the feeder bus system,[76] the Water Metro,[77] IPT,[78] and the public bicycle.[79] As mentioned above, the metro service will additionally offer connectivity to the proposed Kerala Semi High Speed (Thiruvananthapuram to Kasaragod, named as silver line) near Infopark. Several criteria were considered for integrating these services, including the positioning and reach of the stations, the availability of various ways of access and dispersal, the duration and destination of trips, the presence of footpaths and pedestrian facilities, the location of bus stops, and the provision of parking and pick-up/drop-off sites.

- ***TOD.*** KMRL has prepared a TOD Action Plan to achieve a compact, dense, and diverse development along the metro corridor in Kochi. The Plan has an emphasis on promoting walkability, cyclability, public transport, and multi-modal integration to enable people to live, work, and recreate in closer proximity to the metro corridor. The Plan proposes a comprehensive implementation strategy, including the identification of potential public/semi-public sites for re-development for increased densification.[80] This Plan, along with the related Value Capture Financing (VCF) proposal, is under consideration by GOK.[81]
- ***Barrier-free Design.*** Kochi Metro is purposefully designed to eliminate obstacles in stations, accesses, and trains, providing easy access for individuals with physical or sensory disabilities, as well as other vulnerable groups. This includes the elderly, children, pregnant individuals, PWD, and those who are sick or injured, ensuring a safe and easy experience within the system.
- ***Depot.*** Muttom Depot, currently being used for Phase I, has sufficient capacity to accommodate the additional trains for Phase II operation and, hence, it is proposed to be also utilized for the trains of Phase II.

30. **Operational Sustainability.** KMRL is responsible for covering the expenditures for O&M for Phase I and Phase II. The deployment of the same systems and rolling stock for Phase I and Phase II will contribute to lower O&M costs. KMRLs' efforts to generate non-fare box revenue for Phase I (e.g., station area rental, product advertising, name rights, poster display) are outstanding, as evidenced by the fact that non-fare box revenue accounted for approximately 30-35 percent of overall income in FY2022-23 and FY2023-24.[82] KMRL is also attempting to expand the ridership by providing innovative fare schemes and products.[83] All these initiatives have been adopted to make the operation of Phase I sustainable and will be also implemented for Phase II. Phase I could be considered a healthy set-up as its operation generates a surplus (most of the

[76] KMRL has already provided four e-buses to connect the Aluva Metro Station with the Kochi International Airport, and two other e-buses between Kalamassery Metro Station and other major traffic generation points.
[77] This mode will be integrated with Phase II through the jetties of Kakkanad and Infopark.
[78] 105 e-autos will be added to the feeder fleet (already purchased). For Phase I, 15 charging points for electric vehicles have been made available at Aluva, Edapally, Kaloor, Kalamassery and Vyttila.
[79] KMRL has constructed 2.8 km of dedicated cycle track and launched 400 public cycles all over the metro stations and major points of Kochi, through subscription-based rentals using MyByk app (for further details, see this link). On an average, around 500 trips are being made each day using this system. KMRL has allowed passengers to carry bicycle inside the train as well.
[80] The implementation strategy has been firstly prepared for Phase I and subsequently, it is expected to be expanded to also cover Phase II.
[81] The request was submitted by KMRL to the Transport Department of GOK in May 2023 (the letter reference is KMRL/FIN/VCF/2023-24/262).
[82] 32.35 percent for FY2022-23 and 29.50 percent for FY2023-24 (till November 2023). Source: KMRL.
[83] For example, flexi fare, student pass, vidya pass, and group booking.

metro systems worldwide do not even cover operational costs). However, due to the payment of construction loan's interest and the assets' depreciation, there is a deficit, which is covered by GOK. To reduce GOK's financial burden, KMRL intends to implement a number of TOD actions,[84] which could generate a total potential revenue of approximately USD2.3 billion[85] along the Phase I corridor and USD0.5 billion along the Phase II corridor,[86] The implementation of these actions is pending of GOK's approval. However, in case KMRL fails to meet the O&M expenses, GOK is expected to cover the potential deficit. For Phase II, this is established in the above-mentioned tripartite MOU signed among GOI, GOK, and KMRL.[87]

B. Economic and Financial Analysis

31. **Economic Analysis**. Phase II is deemed economically viable, with the economic internal rate of return (EIRR) and economic net present value (ENPV) estimated to be 15.25 percent and USD220 million, respectively.[88] The economic analysis was undertaken at constant prices and took into account both the "without project" and "with project" scenarios over a 30-year period (4 years of construction and 26 years of operation). The project's quantifiable benefits will accrue from: (i) travel time savings (85.69 percent), (ii) reduction in vehicle operation cost (VOC) (8.01 percent), (iii) savings from accident reductions (0.43 percent); (iv) savings from emission reduction (2.10 percent); (v) savings due to reduced road stress (1.41 percent) and (vi) the residual value (2.36 percent). The economic costs include infrastructure capital costs, O&M costs, and capital replacement costs.[89] A sensitivity analysis has been conducted by (i) increasing up to 25 percent in costs; (ii) decreasing up to 25 percent in benefits; (iii) reducing up to 25 percent in ridership, and (iv) combined increasing 25 percent in cost and decreasing 25 percent in benefits. In all the scenarios, the project is still economically viable. For further details, see Annex 2.

32. **Financial Analysis**. To evaluate the financial results of Phase II, two types of revenue generation (fare box revenue and non-fare box revenue) were considered as inflows (positive cash flows), whereas the investment (including taxes, escalation, interest fees, and contingencies[90]) and operating costs were considered as outflows (negative cash flows). Farebox revenue was calculated based on passenger-km for the specified segment by calculating the average fare per passenger-km and factoring in future fare increases.[91] Non-fare box revenue from all the sources is estimated to be approximately 19.5 percent[92] of the total revenue. Staff salaries, energy prices, and repair and maintenance costs have all been considered when calculating O&M costs.

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[84] They include various VCF mechanisms such as (i) a property value (i.e., the fair value) increase around the metro stations, which would increase the collection from the stamp duty/registration charges; (ii) a luxury tax to be levied on buildings with a plinth area larger than 278.90 m^2; and (iii) a one-time development charge for new buildings constructed on the metro corridor.

[85] National Transportation Planning and Research Centre and Urban Mass Transit Company Limited for KMRL; *"Transit Oriented Development Action Plan for Kochi: Revenue Estimation and Implementation Report"*.

[86] DPR Revised, JLN Stadium – InfoPark via Kakkanad, February 2018.

[87] This is stated in the paragraph (D) (vii) (b) of the 2017 Metro Rail Policy and in the MOU mentioned above.

[88] Considering a discount rate of 9 percent.

[89] For equipment (electrical, rolling stock and signaling and telecom) added during the operation period.

[90] Excluding land and the PPP element.

[91] An increase of 5.6 percent annually was considered based on the average inflation rate of the last decade.

[92] Sources include station naming rights, advertising rights, rentals in the station area (kiosks and Automated Teller Machine {ATM} terminals), and property development at the metro station.

The replacement costs took into account the expense of additional rolling stock and the replacement of electrical and signaling and telecom assets. Based on all these assumptions and considering the financing model of Phase I,[93] the financial analysis indicates that the financial internal rate of return is 4.98 percent for Phase II. This evaluation covers a 26-year cash flow projection, with a 4-year construction phase. Annex 2 provides further details.

C. Fiduciary and Governance

33. **Procurement**. Based on the assessment of KMRL's procurement capacity conducted by AIIB, it was found that KMRL has experience with bilateral agencies but limited with MDBs. KMRL has prepared a Project Delivery Strategy (PDS), along with the Procurement Plan (PP). The PDS outlines details of procurement arrangements, including capacity assessment, tendering, and contracting strategies, assessment of operational factors affecting procurement, supply market assessment, procurement risks, proposed mitigation measures, and prior review thresholds for the project.[94] Based on the outcome of the overall assessment of the procurement process, the procurement risk is assessed as “medium”. All contract packages for AIIB-financed activities under the project will be procured, based on the Bank‘s standard procurement documents, using the GOK’s e-tendering portal, which can facilitate efficiency, economy, and transparency. The portal has been designed, developed, and hosted by the GOI’s National Informatics Centre (NIC). E-tendering portals designed and developed by NIC for various borrowers are being used by MDBs.

34. **Financial Management.** The FM assessment (conducted during the appraisal stage) covered the system of accounting, budgeting, the flow of funds, financial reporting, auditing, and internal controls at KMRL. Based on the results of the assessment, the residual FM risk is considered “medium”. The following measures were agreed upon between KMRL and AIIB: (i) PIM should include FM chapters;[95] (ii) KMRL will include the audit of the AIIB-funded contracts in the scope of the regular audit exercise of its current internal auditor;[96] and (iii) KMRL’s finance team will work closely with the Bank to prepare the first IUFR and the Statement of Expenditure (SOE) before obtaining approvals from KMRL’s management.

35. KMRL has a Finance and Accounts Department (FAD) staffed with 13 people at different levels. Almost all of them are qualified chartered and cost accountants. KMRL has confirmed that it will assign three of its senior-level finance staff to implement the project's financial aspects.

36. The KMRL’s finance team prepares the annual budget with the executing departments. The Board of Directors approves the budget. The budget execution is recorded in the Management Information System (MIS), and monthly reports are

[93] For further details, please refer to Financing Plan provided in the Section 3. E.
[94] All works contracts costing USD15 million or above and goods contract costing USD4 million or above shall be subject to the Bank’s prior review.
[95] This will address administrative procedures and processes for project implementation, including definitions of responsibilities for annual and interim financial reporting and management of funds.
[96] KMRL does not have a specific audit unit, but it recruited a chartered accountant firm to provide internal audit service. The auditor prepares quarterly internal audit reports.

generated. In addition, a note on budget versus actual figures is prepared. KMRL has confirmed that a similar approach will be applied to prepare the proposed project budget.

37. KMRL uses the System Applications and Products in Data Processing (SAP) Entity Relationship Diagram (ERP) for its accounting. All purchase orders and vendor payments are run through SAP. A dedicated internal team is available for maintenance and minor modifications of the accounting program. A separate firm is onboarded for performing major configurations, change requests, and modifications in SAP. There are daily backups of accounting records. KMRL has confirmed that the SAP ERP will also be used for Phase II. Accounting records will be kept in KMRL and stored for at least eight years per the Income Tax Act and the internal documentation retention policy. KMRL has its developed Chart of Accounts, and it will be used for the project's purpose with some modifications to reflect disbursement categories, project components, and sources of financing.

38. KMRL also uses the SAP ERP to produce the financial reports following Indian Accounting Standards (IND AS). The SAP ERP does not support the generation of project-specific financial reports like IUFR and annual Project Financial Statements (PFS). Therefore, KMRL will use the information from SAP's generated reports and fill out the Excel version of IUFR and PFS, which shall be presented in English.

39. For project purposes, KMRL will engage the CAG's appointed chartered accountant's firm to conduct the external audit of the PFS in accordance with Section 5.09 of the General Conditions, and following Standards on Auditing (SAs) as recommended by the Institute of Chartered Accountants of India (ICAI). KMRL will furnish audited financial statements (and any accompanying Management Letter) to AIIB no later than nine months after the end of each fiscal year.

40. **Disbursements.** AIIB will handle all project disbursements according to its disbursement procedures. Disbursements will follow the transaction-based method and comprise the advance, direct payment, and reimbursement procedures, including reimbursements under the retroactive financing procedure. Further details will be described in the Disbursement Letter. The withdrawal applications will be reviewed and approved by the Aid, Accounts, and Audit Division, headed by the Controller of Aid, Accounts and Audit (CAAA), which is the division within the Department of Economic Affairs (DEA), Ministry of Finance (MOF), entrusted with the responsibility for the withdrawal of the loan proceeds for all the funds provided by ODA where India is the recipient. A Designated Account (DA) to receive advance funds from AIIB will be established in USD and will be opened by MOF and CAAA will manage it. To facilitate the payments in local currency, KMRL will open a separate bank account for the loan in the local currency in its current commercial bank. For retroactive financing,[97] all eligible expenditures under the project incurred in compliance with the agreed procurement procedures[98] and in respect of which payments were made no earlier than 18 months before the date of the loan agreement can be claimed from AIIB. This will be restricted

[97] Retroactive financing is expected to be needed to cover the advance payment of a number of contracts and other items under the largest contract (design and build for the viaduct and the station main box), which are expected to be implemented from the beginning of the project in 2023 to the loan's signature date.
[98] The activities to be retroactively financed must be also aligned with the Bank's Environmental and Social Policy (ESP).

to 30 percent of the AIIB loan's amount. KMRL will prepare and submit a withdrawal application to AIIB indicating the bank account to receive retroactive funds (which will not be the same as DA).

41. **Governance and Anti-corruption.** AIIB is committed to preventing fraud and corruption in its funded initiatives. It gives the utmost importance to ensuring that AIIB-funded projects are carried out in precise accordance with the 2016 Policy on Prohibited Practices. Staff from the AIIB will regularly oversee its implementation. AIIB reserves the right to investigate, directly or indirectly through its agents, any alleged corrupt, fraudulent, collusive, coercive, or obstructive practices, and misuse of resources and theft relating to the project and to take necessary measures to prevent and address any issues in a timely manner, as appropriate. AIIB will also oversee activities related to the preparation of tender documents and the evaluation of tenders/proposals under AIIB financing. The specific requirements pertaining to these measures will be outlined in the Loan and Project Agreements and the project's tender documents.

42. AIIB's Know Your Counterparty (KYC) initial assessment revealed that neither KMRL nor GOK/GOI, were subject to any adverse news reports. India's score on the Transparency International Corruption Perception Index scale for the past five years (2018-2022) is approximately 40 out of a possible 100, with lower scores denoting greater levels of corruption.[99] In the World Bank's Worldwide Governance Indicators on Control of Corruption scale, India's Governance between (2016 and 2021) has ranged between -0.31 and -0.29 with the scale ranging from -2.5 (weak) to 2.5 (stable).[100]

D. Environmental and Social

43. **E&S Policy (including Standards) and Categorization.** AIIB's ESP, including the Environment and Social Standards (ESSs) and the Environmental and Social Exclusion List, will apply to AIIB-financed activities under the project. ESS 1 (Environmental and Social Assessment and Management) and ESS 2 (Involuntary Resettlement) are applicable to the project. The project has been categorized as "A" based on the E&S impacts due to civil works in a densely urbanized environment, land acquisition, occupational health and safety (OHS), vehicular traffic, pollution, dust, noise, and vibration anticipated in and around the project's footprint.

44. **Instruments.** Metro projects in India do not require statutory environmental clearances as per national laws. An EIA report, including an Environmental Management Plan (EMP), was prepared in January 2020 to meet the safeguards requirements of potential IFI lenders. In compliance with the GOI and GOK Land Acquisition, Rehabilitation and Resettlement (LARR) policies, and after conducting statutory public hearings and establishing cut-off dates, four social impact assessment (SIAs)/resettlement plans (RPs),[101] covering the project areas, were prepared and approved by the competent authority of GOK to facilitate the land acquisition. Based on the review of the existing instruments, progress of land acquisition and assessments of KMRL's capacities, it was found that the prepared instruments adequately address the

[99] Transparency International; "*Corruption Perceptions Index; India*"; 2022; (link).
[100] Worldwide Governance Indicator (link).
[101] (i) SIA for Ernakulam - Kakkanad village, (ii) SIA for Ernakulam - Edappally South & Vazhakkala villages, (iii) SIA for land acquisition for the construction of the stations, and (iv) SIA for land acquisition for widening of Public Works Department (PWD) road.

project risks and impacts, consultations, and management approaches, albeit with minor gaps mainly in the areas of noise and vibration studies, climate assessments, and livelihood support to eligible PAP. To further align them with AIIB E&S requirements, KMRL prepared (i) an EDDR for the EIA (including additional chapters to cover climate change, noise and vibration, institutional arrangements, and mitigation plans), and (ii) a Social Due Diligence Report (SDDR) for the social aspects. EDDR and SDDR include respective action plans. The E&S instruments prepared are aligned with AIIB's ESP.

45. **Stakeholder Engagement, Consultation, and Information Disclosure.** During EIA, SIAs/RPs, EDDR and SDDR preparation, KMRL/GOK consulted PAP. The statutory process of SIA requires extensive consultation at various levels, including a mandatory public consultation. These processes and proceedings are documented in the SIA reports. The consultations will continue during project implementation. SIAs/RPs are disclosed on the website of the Ernakulam District.[102] In addition, for Phase II, EIA, SIAs/RPs, EDDR, SDDR (in English with summaries in Malayalam) are also disclosed on KMRL's and AIIB's websites.

46. **Environmental Aspects.** The project will yield environmental benefits, notably reducing air pollution from traffic congestion. There is no forest area or notified eco-sensitive zone within 500 m of the proposed Right-of-Way (ROW). No wildlife habitat or notified eco-sensitive zone under Wildlife Act of 1972 is present within the 10 km radius area of proposed ROW, except for the Managlavanam Bird Sanctuary, which is present at 3 km from the JLN Station. The project activities are assessed to have no adverse risks and impacts on the Sanctuary, as it is already surrounded by extensive urban activity and the construction or operation stages of the project will not lead to additional negative impact. The construction activities on site will likely result in the loss of 669 trees, which will be mitigated through 1:10 compensatory planting and other measures set out in the EDDR. During the construction phase, other negative impacts of the project will be temporary and reversible, including air pollution and the disposal of construction residues, which will be addressed as per EMP. Given that the initial EIA lacked a vibration assessment as well as quantified noise during construction and operation, these studies were undertaken as part of EDDR. To enhance the viability of the noise assessment (given that the EIA's baseline was undertaken in June 2019), further noise baseline sampling was carried out in November 2023. The cumulative noise and vibration assessment found no significant impact along the alignment both in construction and operational phases, with representative sensitive receivers considered for the assessment. A set of measures to mitigate and minimize the noise and vibration impacts was proposed, integrated into the designs, and considered in the financing plan. They may be subject to change after the contractor's assessment and implantation of the contractors' Environmental and Social Management Plan (CESMP),[103] when the exact construction methodology and any minor alignment changes will be known. Contractors' scope will include implementing noise and vibration mitigation measures during construction as well as the implementation of identified measures for additional

[102] The documents are available on this link.
[103] To address the potential future noise and vibration risks, relevant actions will be added to the CESMP, and an appropriate noise monitoring plan will be in place. Furthermore, the environmental action plan prepared as part of the EDDR set out various further studies that need to be completed by the contractor, including additional noise assessment during the preparation of the DEDs to further assess the need for mitigation measures, such as noise barriers for specific locations.

receptors. A traffic management plan has already been developed in collaboration with the Police and the Motor Vehicles Department. This has been communicated to the District Collector and Commissioner of Police in August 2023 to facilitate easing of traffic during the construction phase.

47. **Social Aspects.** The project's design predominantly aligns with the existing road medians to minimize the acquisition of private and public lands. The ROW required is 22 m (if the metro alignment is running along the existing road) and 16.5 m (when it is off the existing road). Land acquisition at certain locations is required for the purposes of ROW (6.15 Km out of 11.2 Km, 50 percent widened so far), including the off the road viaduct portion and to construct the entry and exit buildings for accessing the elevated metro stations. The land acquisition is being carried out in four stages for a total area of 4.05 Ha, which is linearly distributed across the 11.2 km length in multiple parcels. The due diligence concluded that the process was well publicized and the PAPs as well as communities are well aware of the project, entitlements and grievance channels. About 50 percent of the total land acquisition is completed,[104] and the remaining land is expected to be acquired during the first half of 2024. There is sufficient land available to initiate project works. The rehabilitation and resettlement (R&R) compensation is based on the R&R policy of GOK (2017), which entails 15 mutually exclusive compensations, and aligned with AIIB's ESP. R&R packages are declared for two stretches and fully disbursed to one stretch. In the SDDR, the compensations paid were assessed and it was concluded that the process to determine the market value, valuation of assets (including trees), calculating the final award value are carried out transparently and according to the relevant policies and as such meets the replacement cost principle for land as well as assets.[105] The due diligence identified 16 action points regarding social aspects, including requesting the government for indexation of R&R compensation, gender, labor and working conditions, livelihoods, ongoing monitoring and supervision, and an action plan was agreed. A livelihoods support plan is included in the SDDR, which will be further enhanced based on the additional needs identified during implementation. KMRL will mobilize budget for implementation of the plan. The ongoing process will be closely monitored by PT.

48. **Community, OHS, Labor and Employment Conditions.** KMRL will stipulate and monitor adequate health and safety measures for the workers, and tendering documents include requirements on how contractors will address health and safety issues. KMRL will also require contractors for civil works to comply with all applicable labor laws and regulations. EDDR includes OHS provisions as well as templates for the OHS Management. Impacts and risks associated with migrant labor influx are assessed to be low. However, KMRL will require contractors to implement and enforce workers' codes of conduct to mitigate gender-based violence (GBV)- and sexual exploitation, abuse and harassment (SEAH)-related risks that may arise. As the project's works will be implemented in dense urban areas, and in proximity to residential properties,

[104] The land acquisition progress for the four sections is as follows: (i) Palarivattam to Kakkanad (2.01 Ha): it is fully completed in all respects and impacted 353 titleholder PAPs and 84 PAPs eligible for R&R; (ii) JLN stadium to Palarivattam (0.36 Ha): it is nearing completion, with 59 title holder PAPs and 24 PAPs eligible for R&R; (iii) Kakkanad to Info Park Expressway Entrance (0.01 Ha): it is in advanced stage, with no PAPs eligible for R&R; and (iv) entry exit at station buildings (1.65 Ha): it is in early stages.

[105] There are a number of pending court cases (most of them, pertaining to enhancement of compensation), which are expected to not significantly jeopardize land acquisition. For further details, see SDDR.

measures focused on traffic management, community health and safety will be also implemented. Contractors will be required to submit site-specific Community Health and OHS Management Plan for review and approval by KMRL before works commencement.

49. **Grievance Redress Mechanism (GRM).** PT reviewed the existing customer care, grievance channels and management processes at KMRL. KMRL already has several channels for grievance/feedback submission including (i) a toll-free helpline, (ii) written feedback forms (available at stations' customer cares), (iii) an email, (iv) a WhatsApp chat bot, (v) social media channels, (vi) station controller (SCR) mobiles, and (vii) Metro Promo Center. KMRL has an established escalation process for addressing complaints received from these channels. For instance, for Phase 1B works, the construction-related grievances are received at the field/site office. These complaints are then examined by a technical team comprising KMRL Field Officer (Deputy General Manager rank), the Project Management Consultant (PMC) and the contractor. If the complaint is not resolved at the field level, it is escalated to the General Manager (Projects), who will examine the complaint and will provide a suitable resolution. For Phase II, the GRM is already functioning with a similar structure, which has been further strengthened by taking into account the lessons learnt from Phase I. A dedicated grievance form has been already made available for Phase II on KMRL's website,[106] and these grievances are being handled by respective designated officials and the resolution feedback is/will be provided through the website/direct communication. With these additional measures, the GRM is found to be meeting AIIB's requirements, including submission of grievances anonymously, workplace's concerns, and workers' concerns. All the land acquisition and compensation-related grievances are addressed by the district authority competent for the implementation of overall land acquisition, awards, and payment of compensation. Locally appropriate public consultation and disclosure processes were and will be used to disseminate information about the GRM.

50. **Project-Affected People's Mechanism (PPM).** AIIB's Policy on the Project-affected Peoples Mechanism (PPM) applies to this project. The PPM has been established by AIIB to provide an opportunity for an independent and impartial review of submissions from project-affected people who believe they have been or are likely to be adversely affected by AIIB's failure to implement the ESP in situations when their concerns cannot be addressed satisfactorily through the project-level GRM or the processes of AIIB's Management. For information on how to make submissions to the PPM, please visit the PPM website.[107]

E. Gender Equality and Social Inclusion

51. KMRL has implemented significant gender initiatives over the last years that include women employment not only in the management, but also as train operators, station controllers, or engineers. As above-mentioned, through Kudumbashree, KMRL engaged transgender people in facility management services at stations, such as housekeeping, security, and ticketing. Phase II possesses the potential to make a significant contribution towards the promotion of gender equality and the empowerment of women. The allocation of personnel for frontend customer facilitation is intended to

[106] The form is available at this link.
[107] The PPM's website is available at this link.

be sourced from the Economically Weaker Sections (EWS) category, mirroring the approach employed in Phase I. In addition, Phase II includes the implementation of gender-inclusive amenities, such as designated areas for women and passengers with special needs, the installation of breastfeeding pods at stations, and the provision of diaper changing tables. The project will promote social inclusion as it seeks to address in its design the access issues of marginalized and vulnerable groups, such as (i) PWD, (ii) the elderly, (iii) children, and (iv) members of the lesbian, gay, bisexual, transgender people, queer, and intersexual (LGBTQI+) community. Within KMRL, incidents of sexual harassment at the workplace are addressed by and internal committee which also conducts regular sessions with staff on women safety at workplace. For further details, see Annex 4.

F. Climate Change

52. The project inherently supports climate change mitigation by encouraging the shift from road-based private transport to more sustainable alternatives with reduced GHG emissions. In terms of climate change adaptation, EIA, the preliminary climate and geological risk screening (by using Aware) and EDDR identified several climate-related hazards, including floods, increased precipitation, high temperature, increased wind speed, and water unavailability. A set of adaptation measures to be included into the DEDs to address these risks were proposed in the EDDR, as listed in Annex 5. The project can be considered 100 percent climate mitigation finance as its main activity (urban public transport) is included in the list of eligible activities under the "*Common Principles for Climate Mitigation Finance Tracking*"[108] and complies with the necessary criteria for this category as it demonstrates a modal shift towards a lower carbon mode achieving net savings of 123,700.8 tCO2/year in the first year of operation.[109] In addition, the climate adaptation finance of this project has been estimated at 15 percent because as above-mentioned, it includes a number of structural adaptation measures.[110] Consequently, the project can be tagged as 100 percent climate finance.

G. Risks and Mitigation Measures

53. Based on the assessment, an overall "medium" risk rating has been assigned to the project, mainly due to the risks pertaining to potential delays in land acquisition, the GOI and GOK budget allocation, potential time and cost overruns and E&S impacts during construction and operation. The identified risks and the proposed mitigation measures are presented in the table below.

[108] Joint MDB Group; "*Common Principles for Climate Mitigation Finance Tracking*"; December 5, 2023; (link).
[109] This has been estimated in EDDR.
[110] E.g., elevated plinth level on stations and elevated footpaths/walkways tackling the risk of increasing floods and the head-hardened steel rail tracks tackling the risk of high temperatures. The climate adaptation percentage has been calculated using the proportional approach set up on the following document: Joint MDB Group; "*Joint Methodology for Tracking Climate Change Adaptation Finance*"; 2022; (link).

Table 3. Summary of Risks and Mitigation Measures

Risk Description	Assessment	Mitigation Measures
Program/Project Preparation Risks		
Technical designs		
▪ Lack of quality assurance mechanism for designs and works.	Low	▪ KMRL will be supported by DDC and GC to prepare and supervise the designs preparation. ▪ AIIB will be actively engaging with KMRL, GC and design build contractors to finalize the designs to adequate quality.
Program/Project Implementation Risks		
Implementation capacity		
▪ Limited staffing and experience of KMRL in certain areas.	Low	▪ KMRL will be supported by GC and some individual consultants may be hired to strengthen the team.
Land acquisition		
▪ Delay in land acquisition.	Medium	▪ More than 50 percent of land required for the project has been acquired and the remaining land is being acquired. ▪ Funds are already deposited with the land acquisition authority.
Financial management		
▪ Timely GOI and GOK budget allocation and fund release. ▪ Absence of specific project FM Manual may lead to shortcomings in the application and use of project funds. ▪ Finance staff's limited experience with MDB's requirements may lead to inadequate financial reporting at the initial stage.	Medium	▪ AIIB will closely monitor the budget allocation from GOI and GOK and undertake implementation review missions biannually. ▪ KMRL has developed FM chapters under PIM. ▪ KMRL's finance team will agree the final draft of the first IUFR SOE with the Bank's FM Specialist.
Procurement of large and complex packages		
▪ Complex and large civil works packages to be procured. ▪ Limited competition for RS&T packages.	Low	▪ GC will support the development of robust tender documents. ▪ KMRL's Phase I experience will add value. ▪ Universal procurement will be adopted following AIIB's Procurement Policy.
Time and cost overrun		
▪ Delay in implementation due to unforeseen reasons.	Medium	▪ Phase I is already constructed and operated by KMRL. GC and contractor joint experience under the guidance of KMRL will be useful to execute the project in a timely manner.
E&S impacts during construction and operation		

Risk Description	Assessment	Mitigation Measures
▪ Due to the urban environment of the project, impacts are expected to the surrounding community including traffic congestion, dust, noise, and vibration.	High	▪ The contractors will be required to prepare site-specific management plans to mitigate the impacts, which will be approved by KMRL prior to commencement of works. ▪ A traffic management plan has already been prepared and communicated to the District Collector and Commissioner of Police to facilitate easing of traffic during construction. ▪ Noise and vibration impact during the operation will be mitigated through enhanced designs, as necessary, and following the mitigation measures outlined in the EDDR and CESMP.

Annex 1: Results Monitoring Framework

Project Objective			Improve urban mobility on the corridor from the JLN Stadium to Smart City via Kakkanad in Kochi.						
Indicator Name	**Unit of Measure**	**Baseline Year (2023)**	**Cumulative Target Values**				**End Target (2027)**	**Monitoring Frequency**	**Responsible Party**
			2024	**2025**	**2026**	**2027**			
Project Objective Indicators									
1. Public transport journey time from JLN Stadium to Smart City	Minutes	60	NA	NA	NA	NA	25	At the end of the project	KMRL
2. Passengers transported daily along the corridor of Phase II (women)	Number	0	NA	NA	NA	NA	62,211 (31,106)	At the end of the project	KMRL
3. Trains reaching the end stations within 3 minutes from the scheduled time on the corridor of Phase II	Percentage	0	NA	NA	NA	NA	98	At the end of the project	KMRL
Intermediate Results Indicators									
1. Elevated viaduct constructed for Phase II	km	0	0	5	9	11.2	11.2	Bi-annual	KMRL
2. Stations constructed with barrier-free, gender-responsive and climate-resilient features	Number	0	0	2	8	11	11	Bi-annual	KMRL
3. Track work completed	Percentage	0	0	20	80	100	100	Bi-annual	KMRL
4. Systems installed	Percentage	0	0	0	50	100	100	Bi-annual	KMRL

Annex 2: Economic and Financial Analysis

A. Economic Analysis

1. *Methodology.* The conventional cost-benefit analysis method was used for the evaluation of the economic viability of the project. The situation predicted to occur with the project ("with project" scenario) and the situation expected to occur if the project is not implemented ("without project" scenario) were compared. The evaluation period over which the construction and operations were assessed was 30 years (4 years of construction and 26 years of operation), with 2023 as the base year as the construction started that year.

2. *Economic Costs*. These include the capital cost of infrastructure and rolling stock, the O&M cost of the metro system, and the capital replacement cost.

- *Capital Expenditure*. According to the revised DPR, the financial capital investment for Phase II is estimated at USD235.5 million (2019 price level). After excluding the contingencies, central and state taxes, interest fees, and price escalation, but including the land cost (both public and private), and resettlement and rehabilitation costs, the required expenditure stands at USD187.7 million. The final economic cost was derived as USD189.3 million after (i) updating this financial cost to the 2023 price level,[111] and (ii) converting the financial cost to economic cost using a conversion factor.[112] Based on the experience of similar metro projects, roughly 60 percent of the expense was phased out for the initial two years of the construction period.
- *O&M Cost*. Staff wages, routine maintenance expenses,[113] and energy costs[114] were considered under this cost. All O&M costs were further escalated[115] to the 2023 price level (operation starting period) and then were assumed to be constant throughout the evaluation period. As for the capital expenditure, the whole O&M financial cost was converted to economic cost using a conversion factor.[116]
- *Capital Replacement Cost*. This is required for the replacement of equipment due to wear and tear over the project's lifetime. To meet rising demand, the addition of 6, 3, 9, and 15 rolling stocks to the system has been planned for the years 6, 11, 16, and 21, respectively, after the operation begins. A replacement of 25 percent of electrical and 50 percent of signaling and telecom assets will be

[111] Using a 5 percent escalation factor based on the approach followed in the 'Chennai Metro Rail Phase 2—Balance Corridor 5' project.
[112] 0.83 was used as prescribed in the Appraisal Guidelines for Metro Rail Project Proposals, issued by MOHUA.
[113] The staff cost and maintenance cost were estimated based on the following document: Ministry of Urban Development; "*The Report of the Sub-Committee on Operations and Maintenance Systems for Metro Railways*"; November 2013.
[114] In line with Phase I, 52 percent of the total demand has been estimated to be covered by solar energy, with the remainder to be provided by the Kerala State Electricity Board (KSEB).
[115] For staff cost, an escalation rate of 5 percent per annum was used considering the pay revision and increase in dearness allowance following KMRL's current practice. For routine maintenance and energy costs, escalation rates of 3 and 1.3 percent were used, respectively. Source: KMRL based on Phase I experience.
[116] 0.83 was used as prescribed in the Appraisal Guidelines for Metro Rail Project Proposals, issued by MOHUA.

required in year 18. This financial cost was also converted to economic cost using a conversion factor.[117]

3. *Economic Benefits*. The main benefit of the introduction of Phase II is in the form of travel time savings. Furthermore, the economic returns took into account the savings in VOC, accident reduction, pollution reduction, reduced road stress, and residual value.[118]

- *Value of Time (VOT) Savings*. This benefit will stem mainly from (i) time savings for modal shift passengers compared to the 'without project' scenario, and (ii) time savings for passengers riding on other modes due to less congestion. The unit VOT for working and non-working passengers was estimated using the GDP-based technique.[119] The occupancy factor[120] and average trip length data were obtained from the contemporarily developed comprehensive mobility plan (CMP) report. The mode-wise speed vehicle data was revised considering the speed of similar modes in cities with similar demographics. The speed of the metro was considered 34 km/hour,[121] and for the 'with project' scenario, the modeling yielded a 1 to 2 km/h increase in speed for the other modes.
- *VOC Savings.* This benefit will accrue primarily because of a reduced number of private vehicles utilized due to the modal shift towards public transport, and smoother operation of other modes resulting from less congestion. As a conservative approach, only the VOC savings due to the absence of vehicles were considered. The mode-wise VOC data (2016-17) was obtained from the DPR.[122]
- *Benefits due to Accident Reduction.* The project will contribute to reducing the number of accidents due to passenger mode shift from private to public transport. The benefits were estimated by taking into account the cost of (i) damaged vehicles, (ii) injury, and (iii) fatal accidents. These indicative costs, in the 2004 price level,[123] have been obtained from the guideline of MOHUA. The data (2022) for accident cases,[124] including the number of fatalities and injuries were used to compute the benefits.
- *Benefits due to Pollution Reduction.* With fewer vehicles on the road and less congestion, air pollutants released will be significantly reduced. The MOHUA guideline provides the volume of pollutants (i.e., CO, HC, NOX, PM, CO_2) emitted for different modes as well as the treatment cost. [125] The savings for each pollutant were calculated considering the travel length saved by diverted vehicles.

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[117] 0.83 was used as prescribed in the Appraisal Guidelines for Metro Rail Project Proposals, issued by MOHUA.
[118] The following economic factors established per MOHUA were utilized: VOT savings (1.0), VOC savings (0.9), accident reduction savings (0.9), emission saving (1.0), and infrastructure maintenance cost savings (0.87).
[119] Working passenger (USD1.11 per hour) and non-working passenger (USD0.33 per hour).
[120] Two-wheeler (1.49); average car and taxi (2.78); auto (2.45); and bus (38.9).
[121] This is aligned with the current operational speed of Phase I (34.07 km/h) and the Operational Plan for Phase II.
[122] Two-wheeler (USD0.02 per km); car (USD0.06 per km); auto (USD0.03 per km); and bus (USD0.16 USD per km).
[123] This was updated to 2023 price level using a 5 percent escalation factor (as prescribed per MOHUA).
[124] KMRL. Source: Kerala Police Statistics.
[125] The treatment cost for CO_2 considered was the midpoint value from: AIIB "*Guidance Note on Cost Benefit Analysis of Projects*"; July 2023.

- *Reduced Road Infrastructure Cost.* As traffic congestion on the roads will decrease, the need for maintenance or expansion of existing road infrastructure will also decrease. An indicative cost of USD0.07 per vehicle km [126] was considered and corresponding savings were estimated using the total length saved owing to the diverted vehicles.
- *Residual Value.* Only the civil works (i.e., viaduct, station, staff quarter, and NMT works) were taken into account with an assumption that those would be depreciated in 50 years. The straight-line depreciation method was used for the calculation.[127]

Table 1: Annual Benefits and Costs *(USD million)*

Evaluation Year	Economic Capex	Economic O&M Cost	Economic Capital Replacement Cost	VOT Savings	VOC Savings	Benefits due to Accident Reduction	Benefits due to Pollution Reduction	Reduced Road Infrastructure Cost	Residual Value	Net Benefit
2023	(43.5)	-	-	-	-	-	-	-	-	**(43.5)**
2024	(77.6)	-	-	-	-	-	-	-	-	**(77.6)**
2025	(37.9)	-	-	-	-	-	-	-	-	**(37.9)**
2026	(30.3)	-	-	-	-	-	-	-	-	**(30.3)**
2027	-	(6.7)	-	14.8	3.1	0.2	0.6	0.5	-	**12.5**
2028	-	(6.8)	-	16.7	3.3	0.2	0.7	0.6	-	**14.7**
2029	-	(6.8)	-	18.9	3.5	0.2	0.7	0.6	-	**17.2**
2030	-	(6.9)	-	21.3	3.8	0.2	0.8	0.7	-	**19.9**
2031	-	(7.0)	-	24.0	4.0	0.2	0.9	0.7	-	**23.0**
2032	-	(7.0)	(6.0)	27.0	4.3	0.3	0.9	0.8	-	**20.3**
2033	-	(7.1)	-	30.4	4.6	0.3	1.0	0.8	-	**30.1**
2034	-	(7.1)	-	34.1	5.0	0.3	1.1	0.9	-	**34.3**
2035	-	(7.2)	-	38.3	5.3	0.3	1.2	0.9	-	**38.9**
2036	-	(7.3)	-	43.0	5.7	0.3	1.3	1.0	-	**44.1**
2037	-	(7.3)	(3.0)	48.2	6.1	0.3	1.4	1.1	-	**46.8**
2038	-	(7.4)	-	53.9	6.5	0.4	1.6	1.1	-	**56.1**
2039	-	(7.5)	-	60.4	7.0	0.4	1.7	1.2	-	**63.2**
2040	-	(7.7)	-	67.6	7.5	0.4	1.9	1.3	-	**71.0**
2041	-	(7.8)	-	75.6	8.0	0.4	2.0	1.4	-	**79.7**
2042	-	(7.9)	(9.0)	84.5	8.6	0.5	2.2	1.5	-	**80.3**
2043	-	(8.0)	-	94.4	9.2	0.5	2.4	1.6	-	**100.1**
2044	-	(8.1)	(11.0)	105.5	9.8	0.5	2.6	1.7	-	**101.0**
2045	-	(8.3)	-	117.7	10.5	0.6	2.8	1.8	-	**125.2**
2046	-	(8.4)	-	131.4	11.2	0.6	3.1	2.0	-	**139.9**
2047	-	(8.5)	(15.0)	146.6	12.0	0.6	3.3	2.1	-	**141.3**
2048	-	(8.6)	-	163.5	12.9	0.7	3.7	2.3	-	**174.4**
2049	-	(8.7)	-	182.3	13.8	0.7	4.0	2.4	-	**194.5**
2050	-	(8.9)	-	203.2	14.8	0.7	4.3	2.6	-	**216.8**
2051	-	(9.0)	-	226.4	15.8	0.8	4.6	2.8	-	**241.4**
2052	-	(9.1)	-	252.1	16.9	0.8	5.0	3.0	62.8	**331.6**

Source: AIIB PT.

[126] DMRC; *"Detailed Project Report for Ahmedabad Metro Rail Project Phase I"*; 2014.
[127] Same amount of depreciation was deducted over a period of 50 years.

4. *Results and Sensitivity Analysis*. Initially, the estimated EIRR and ENPV were 16.24 percent and USD49 million, respectively.[128] The calculation was further updated during the appraisal where the following key changes were made: (i) the update of the ridership data considering Phase I performance and the first year of operation, (ii) the use of constant cost and price for the evaluation period, (iii) the reduction of the speed of the mode-wise vehicle for both 'with metro' and 'without metro' scenario, and (iv) inclusion of residual value. According to the updated calculation, the project is economically viable, with an EIRR of 15.25 percent. The overall ENPV is approximately USD220 million[129]. A sensitivity analysis was carried out with the following scenarios: (i) a 25 percent increase in costs; (ii) a 25 percent decrease in benefits; (iii) a 25 percent reduction in ridership, and (iv) a combinedly 25 percent increase in cost and 25 percent decrease in benefits. The project remains viable in all scenarios.

Table 2: Summary of Sensitivity Analysis

Particulars	EIRR	ENPV (USD million)
Base Scenario	15.25%	220
25 percent Increase in Cost	13.15%	167
25 percent Decrease in Benefits	12.25%	101
25 percent Reduction in Ridership	14.00%	168
Combination of 25 percent Increase in Cost and 25 percent Decrease in Benefits	10.34%	47

Source: AIIB PT.

B. Financial Analysis

5. The financial viability of the project was assessed taking into account the financial costs (capital, O&M, and additional capital cost), and revenues (farebox and non-farebox). The evaluation period was considered for 30 years, including 26 years of operation and 4 years of construction. Initially, the estimated FIRR of the project was 6.69 percent.[130] During the appraisal, the calculation was slightly adjusted. Key changes made were (i) an update of the ridership data as mentioned above, (ii) an increase of fare unit rate by 5.6 percent[131] instead of 7.5 percent,[132] and (iii) an increase of all the costs annually until the end of the evaluation period.

6. *Financial Costs.* In line with the economic analysis, the following costs were identified: (i) capital cost (including the construction cost of the viaduct, stations, cost of rolling stock, electrical and mechanical systems), (ii) O&M expenses (i.e., staff, energy, and regular maintenance), and (iii) replacement cost for the rolling stock, and some equipment.

- *Capital Cost*. It considers factors such as escalation, interest fees, central and state taxes,[133] and contingencies. Land costs and expenses under the PPP

[128] DPR (a discount rate of 14 percent was utilized).
[129] Using a discount rate of 9 percent.
[130] DPR.
[131] Considering the average inflation rate of India for the last 10 years.
[132] 7.5 percent was the value utilized in the latest DPR.
[133] The tax rates are estimated keeping it aligned with other metro rail projects in India (applicable GST rates of 12 percent on various components, except for the rolling stock, which is considered as 5 percent).

element were excluded, as they do not entail direct financial outflows from KMRL. The capital cost, estimated at USD216.1 million, is based on the 2023 price level.

- *O&M Cost*. A 5 percent escalation for staff wages, 3 percent for maintenance, and 1.3 percent for energy prices were applied to align with the base year level of the evaluation period.[134] An additional 3 percent annual growth was assumed for staff wages and maintenance costs throughout the evaluation period.[135]
- *Replacement Cost*. An escalation of 5 percent was considered for the fifth year since the beginning of the operation. After that, the same unit price for the rolling stock was taken into consideration for the remainder of the period.[136]

7. *Revenues.* The following two revenue streams were considered for calculation.

- *Farebox Revenue.* This has been estimated considering the distance-based proportion of ridership number and an escalation of 5.6 percent. [137]
- *Non-fare box revenue.* The income from station naming rights, advertising rights, station area rentals, and property development at the metro stations are included in this revenue stream. As a conservative approach, only 3 stations were considered for station naming rights, and the lease charge was estimated as USD0.4 million per annum per station (lower than Phase I). The unit price for property development, station area rentals, and advertisement rights has been derived from Phase I. An escalation of 2.5 percent was taken into consideration throughout the evaluation period (since the actual escalation offered in Phase I contracts is 7.5 percent for every 3 years). The available area for advertisement rights and property development was considered to be let out in a phased manner. KMRL has also prepared a proposal for TOD activities which is currently under review by GOK. However, the estimated VCFs from the TOD activities have not been taken into account in this calculation.

Table 3: Annual Revenue and Financial Costs *(USD million)*

Period	Capital Cost	O&M cost	Replacement Cost	Farebox Revenue Payment to Pvt. Partner	Fare Box Revenue	Non Fare Box Revenue	Net Cash Flow
2023	(60.4)	-	-	-	-	-	**(60.4)**
2024	(107.7)	-	-	-	-	-	**(107.7)**
2025	(52.5)	-	-	-	-	-	**(52.5)**
2026	(42.0)	-	-	-	-	-	**(42.0)**
2027	-	(8.9)	-	(0.3)	6.4	5.1	**2.3**
2028	-	(9.3)	-	(0.3)	7.2	5.2	**2.8**
2029	-	(9.6)	-	(0.3)	8.0	5.6	**3.8**
2030	-	(9.9)	-	(0.4)	9.0	5.8	**4.5**
2031	-	(10.3)	-	(0.4)	10.1	6.3	**5.6**
2032	-	(10.7)	(7.2)	(0.5)	11.3	6.4	**(0.7)**
2033	-	(11.0)	-	(0.5)	12.6	6.9	**8.0**

[134] The staff cost has been escalated by 5 percent per year from 2013 onwards considering the escalation in manpower cost due to pay revision and increase in dearness allowance following KMRL's current practice. The escalation factors for O&M expense and energy rate are from Phase I's experience.
[135] This is because the annual increment of labor in India is 3 percent.
[136] The assumption taken was that the cost of rolling stock would stabilize eventually.
[137] The fare structure of Phase I has been kept constant since the beginning of its operation. However, the fare can be escalated based on the recommendation of the Fare Fixation Committee as per The Metro Railway (Operations and Maintenance) Act, 2002. According to the Fare Fixation Committee of DMRC, a yearly escalation of 7 percent or the increase in the operation cost, whichever is lower, is recommended.

Period	Capital Cost	O&M cost	Replacement Cost	Farebox Revenue Payment to Pvt. Partner	Fare Box Revenue	Non Fare Box Revenue	Net Cash Flow
2034	-	(11.4)	-	(0.6)	14.2	7.1	**9.2**
2035	-	(11.8)	-	(0.6)	15.8	7.6	**11.0**
2036	-	(12.2)	-	(0.7)	17.8	7.8	**12.6**
2037	-	(12.7)	(3.6)	(0.8)	19.9	8.4	**11.2**
2038	-	(13.2)	-	(0.9)	22.3	8.6	**16.8**
2039	-	(13.7)	-	(1.0)	24.9	9.2	**19.5**
2040	-	(14.3)	-	(1.1)	27.9	9.4	**22.0**
2041	-	(14.8)	-	(1.3)	31.3	9.7	**24.9**
2042	-	(15.4)	(10.8)	(1.4)	35.0	9.9	**17.3**
2043	-	(16.0)	-	(1.6)	39.2	10.2	**31.9**
2044	-	(16.6)	(13.2)	(1.8)	44.0	10.5	**22.8**
2045	-	(17.2)	-	(2.0)	49.2	10.8	**40.8**
2046	-	(17.9)	-	(2.2)	55.1	11.0	**46.0**
2047	-	(18.6)	(18.0)	(2.5)	61.7	11.3	**34.0**
2048	-	(19.2)	-	(2.8)	69.2	11.6	**58.7**
2049	-	(19.9)	-	(3.1)	77.5	11.8	**66.2**
2050	-	(20.7)	-	(3.5)	86.7	12.1	**74.7**
2051	-	(21.4)	-	(3.9)	97.2	12.4	**84.2**
2052	-	(22.2)	-	(4.4)	108.8	12.7	**95.0**

Source: AIIB PT.

8. *Outcome of the financial analysis.* The updated evaluation results show that Phase II has an estimated post-tax real FIRR of 4.98 percent. The sensitivity analysis indicates that the project would be financially viable if the growth rate in fare structure is greater than 2.24 percent.

Table 4: Sensitivity Analysis to the Growth Rate of the Fare Structure

Growth Rate	FIRR	Growth Rate	FIRR
Base (5.6%)	4.98%	3.0%	1.25%
0.0%	(4.64%)	4.0%	2.76%
1.0%	(2.31%)	5.0%	4.17%
2.0%	(0.41%)	6.0%	5.51%

Source: AIIB PT.

Annex 3: Sovereign Credit Fact Sheet

A. Recent Economic Development

1. India is a lower-middle-income country, with a GDP per capita of USD2379.2 and a population of ~1.4 billion in 2022.[138] India's economy grew at an average annual rate of 7.4 percent between FY2014 and FY2018 but slowed down in the years before the pandemic following disruptions due to demonetization, rollout of goods and services tax, rural distress, and stress in the financial sector.[139][140] India's GDP contracted by 5.8 percent in FY2020 (year ending in March 2021) on account of stringent lockdown restrictions imposed during the first half of the year. With increased mobility and favorable base effect, the Indian economy grew by 9.1 percent in FY2021 and 7.2 percent in FY2022. Even though the economy grew by 7.8 percent in the first quarter of FY2023, with waning of the pent-up demand from the lockdown, weakening of exports, and tighter fiscal and monetary policy impacting aggregate demand, the economy is expected to slow down.

2. Inflation averaged 6.2 percent in FY2020, primarily driven by food inflation due to supply side disruptions. As a response to the pandemic, the Reserve Bank of India (RBI) introduced measures to improve credit flow to the productive sectors. Policy rates remained unchanged with the RBI maintaining an accommodative stance between August 2020 and April 2022. Retail inflation averaged 6.7 percent in FY2022, well above the 4±2 percent inflation targeting band. Elevated food and fuel prices have contributed significantly to the rise in inflation which led the RBI to increase the repo rate by a cumulative 250 basis points between May 2022 and February 2023, which now stands at 6.5 percent. RBI expects inflation to moderate at ~5 percent in FY2023 due to easing of commodity prices. In April 2023, it decided to pause the tightening cycle while indicating a gradual withdrawal of the accommodative stance. From March to June 2023, inflation moderated and remained within the target band of 4±2 percent but spiked in July and August 2023 due to high food inflation but moderated to 5 percent in September 2023. The RBI maintained a pause in its October 2023 policy meeting.

3. A downturn in revenue due to economic slowdown and higher spending on the stimulus package resulted in the fiscal deficit widening significantly to 12.8 percent of GDP in FY2020. The overall deficit moderated to 10 percent in FY2021 on the back of strong revenue collection, that allowed capital expenditure to overshoot its target. The deficit in FY2022 was similar to FY2021 with both revenue and expenditure growing at over 13 percent. A decline in the federal government deficit in FY2022 was offset by an increase in the deficit of the states. From April to September 2023, the fiscal deficit reached 39.3 percent of the annual target, higher than the previous year. A moderation in the deficit and pickup in economic activity helped public debt to decline to 81 percent of GDP in FY2022.

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[138] The income group classification is based on World Bank criteria. Data from the World Economic Outlook (WEO), October 2023.
[139] Data are based on fiscal years. Fiscal year 2021 (FY2021) begins on April 1, 2021, and ends on March 31, 2022.
[140] On November 8, 2016, GOI announced withdrawal of the legal tender of INR500 and INR1,000 notes, which accounted for 86 percent of the value of currency in circulation, and introduction of new INR500 and INR2,000 notes.

4. After posting a surplus in FY2020, the current account reverted to a deficit of 1.2 percent of GDP in FY2021 as merchandise imports surged while services exports remained stagnant. Private transfers, including remittances, remained strong with a net inflow of USD 81.2 billion in FY2021. In FY2022 the current account deficit rose to 2.0 percent of GDP mainly due to higher merchandise trade deficit. Net receipts from services trade and remittances inched up during this period. Net foreign direct investment (FDI) inflows, at USD28 billion, decreased by 27 percent in FY2022 due to global uncertainties. The external debt stood at USD629.1 billion (18.6 percent of GDP) in June 2023. India's reserve holdings stood at USD586.1 billion as of October 27, 2023. Reserves remain adequate according to conventional measures.

5. In May 2023, Fitch and S&P affirmed India's outlook as stable, while retaining the BBB- rating. In June 2020, Moody's downgraded India's rating to Baa3 with a negative outlook but revised the outlook to stable in October 2021 and retained the same rating and outlook in August 2023.

B. Economic Indicators

6. The most relevant economic indicators are summarized in the table below:

Economic Indicators	FY2020	FY2021	FY2022	FY2023*	FY2024*
Real GDP growth	-5.8	9.1	7.2	6.3	6.3
Consumer Price Index (CPI) inflation (average, % change)	6.2	5.5	6.7	5.5	4.6
Current account balance (% of GDP)	0.9	-1.2	-2.0	-1.8	-1.8
General government overall balance (% of GDP)	-12.9	-9.6	-9.2	-8.8	-8.5
General government gross debt (% of GDP)	88.5	83.8	81.0	81.9	82.3
Public gross financing needs (% of GDP)	18.7	15.6	16.2	15.3	14.7
External debt (% of GDP)	21.5	19.5	19.6	19.8	-
Gross international reserves (USD billions) [1/]	579.3	617.6	578.4	586.1	-
Exchange rate (INR/USD, EOP) [1/]	73.5	75.8	82.2	83.3	-

Note: FY2022 ran from April 1, 2022, to March 31, 2023.
* denotes projected figures.
[1/]Reserves and exchange rate are sourced from RBI and pertain to late-October 2023.
Source: International Monetary Fund (IMF) World Economic Outlook July and October 2023, RBI, and IMF Country Report 22/386.

C. Economic Outlook and Risks

7. The economy is expected to grow at 5.9 and 6.3 percent in FY2023 and FY2024, respectively, according to IMF. A weakening of the global economy and lagged effect of monetary tightening as a response to fighting domestic inflation would curb demand in the second half of FY2023. Private consumption will be affected as higher inflation erodes away purchasing power. The GOI's subsidized food, fertilizer, and gas distribution will help offset some of the effects of high in flation. High policy rates may constrain investment spending. Agriculture growth may be subdued due to uneven monsoon and lower sown area while higher borrowing cost and commodity prices may impact the manufacturing sector.

8. Overall inflation is expected to moderate to ~5.5 percent in FY2023 due to the easing of commodity prices and softening of growth. In May 2022, the RBI indicated

withdrawal of its accommodative stance in response to sustained inflation and has maintained the same stance as of October 2023. Persistent domestic inflation and the fear of imported inflation through strengthening of the dollar may push the RBI to further raise interest rates in FY2023.

9. The GOI's fiscal deficit in FY2023 is expected to moderate slightly to 8.8 percent of GDP as tax revenues increase on the back of improved economic activity. The GOI's deficit is projected to moderate to 5.9 percent of GDP. Fiscal pressures could strengthen due to rising subsidy burden, hikes in policy rate increasing the cost of borrowing, and roll out of populist measures in a pre-election year.

10. The public debt is expected to remain around 82 percent of GDP in FY2023, similar to FY2022. In an environment of moderating nominal growth and higher interest rates, fiscal consolidation will be key to reduce public debt. Despite being high, India's public debt remains sustainable given favorable aided by having a long and medium maturity, being denominated in domestic currency, and primarily held by residents. India's external debt is expected to remain stable.

11. The current account deficit is projected at 1.8 percent of GDP for FY2023. A slower than expected export growth due to the global slowdown and a higher import bill may put pressure on the current account deficit. Remittances may remain strong as a depreciating rupee makes remittances more lucrative. Waning of global commodity price pressures and impetus to exports from some of the ongoing schemes would help current account deficit to moderate further.

Annex 4: GESI Assessment and Strategy

A. GESI Assessment in the Transport Sector in India and Kerala State

1. India is making progress towards gender equality, but disparities still persist. In the fabric of the Indian Constitution, gender equality is deeply stitched, as captured in Article 14 that promotes equality, Article 15 that prohibits discrimination, and Article 39 which emphasizes gender equality across political, economic, and social realms.[141] The Gender Development Index (GDI) has been steadily increasing in India from 0.759 in 2001 to 0.849 in 2021, but it remains still lower than the majority of the South Asian countries.[142] The World Economic Forum's "*The Global Gender Gap Index 2022*" ranks India 135th out of 146 countries, reflecting notable gender gaps.[143] The Gender Inequality Index (GII), with a score of 0.490 in 2021, also indicates a persistent gender gap, which is evident from the nearly 50 percent difference in labor force participation rates.[144] The representation of women in the country's formal transport sector is also quite negligible, accounting for less than one percent of the workforce.[145] Despite the fact that women in Indian cities rely on public transport more than men, these services are not customarily built considering their safety and specific travel needs.[146] The prevalence of harassment in public transportation is also concerning, as in 2021, nearly 56 percent of female passengers reported experiencing sexual harassment.[147]

2. Kerala State presents high levels of education among females, but they still face economic and security challenges, which GOK is trying to address. Kerala has the highest percentage of literate women in India (95.7 percent) among those aged 7 and older, compared to the national average of 70.3 percent.[148] However, the average wage and salary of females is 72 percent of that of males in Kerala.[149] The unemployment rate is also concerning, particularly for young women (age group 15-29 years), as it is more than double that of men (43.8 percent for women and 20.6 percent for men).[150] Kerala

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[141] GOI; "*The Constitution of India*"; May 2022; (link).
[142] GDI is measured based on the (i) life expectancy at birth; (ii) expected years of schooling; and (iii) estimated earned income. A high GDI value indicates low inequality between men and women, and vice-versa. For 2021, the GDI value for the world has been measured to be 0.958, the maximum for Barbados (1.034) and the minimum for Yemen (0.496). Source: United Nations Development Program (UNDP); "*Human Development Reports: Gender Development Index – India"*; 2023; (link).
[143] World Economic Forum; *"Global Gender Gap Report"*; 2023; (link).
[144] GII is based on the dimensions of (i) reproductive health, (ii) empowerment, and (iii) labor market participation. A high GII value indicates high inequality between men and women, and vice-versa. For 2021, the GII value for the world has been measured to be 0.465, the maximum for Yemen (0.820), and the minimum for Denmark (0.013). Source: UNDP; "*Human Development Reports: Gender Inequality Index – India"*; 2023; (link).
[145] A. Srija.; Confederation of Indian Industry; *"Employment Potential of the Road Transport Sector"*; 2015; (link).
[146] The World Bank; "*Toolkit for Enabling Gender Responsive Urban Mobility and Public Spaces: Volume 1 – The 'What to do' Note for Policymakers*"; 2022; (link).
[147] Observer Research Foundation; *"Women on the Move: The Impact of Safety Concerns on Women's Mobility*"; 2021; (link).
[148] National Statistics Office; *"Key Indicators of Household Social Consumption on Education in India"*; 2019; (link).
[149] For regular wage and salaried employees in the age group 15-59. Source: Department of Economics and Statistics, Thiruvananthapuram, Kerala; "*Gender Statistics 2017-18"*; 2019; (link).
[150] National Sample Survey Office; *"Annual Report: Periodic Labor Force Survey (PLFS) (July 2022 – June 2023)"*; 2023; (link).

has also the lowest women participation (5 percent) in the 17th Lok Sabha, 2019[151], whereas overall women participation was 14 percent.[152] Disturbingly, the crime rates against women in Kerala is high (82 per 100,000 population) in contrast to the national average 66.4.[153] This number is more alarming when it comes to the recorded rape cases, as Kerala ranks as the second State in India with 2,023 cases in 2019, increasing 256 percent from 2009.[154] The number of sexual harassment incidents on public buses over the past couple of years is also significant and has increased from 309 in 2021 to 443 in 2022.[155]

3. GOK had developed a robust regulatory framework and adopted a number of initiatives to bridge the gender gap in the State. In particular, in 2015, GOK introduced the "*Gender Equality and Women's Empowerment Policy for Kerala*".[156] The Kerala Municipality Bill 2009 and Kerala Panchayati Raj Bill 2009, which set aside 50 percent of seats for women in local governments, are significant steps toward strengthening the political engagement of women.[157] Several programs are also being conducted to improve the security of women in public spaces, such as (i) Pink Police Patrols under Kerala Police, (ii) Nirbhaya and Rakhsha app by Kerala Police,[158] (iii) She Taxis/Nirbhaya Autos, (iv) women drivers in KSRTC, and (v) GPS-enabled panic buttons in public transport vehicles.

4. In India, PWD face substantial obstacles to utilize public transport. For example, a survey recently conducted in Hyderabad showed that PWD faced numerous problems in accessing bus and railway transport services.[159] Similarly, an independent assessment on the disabled friendliness of transport facilities in Ludhiana (Punjab) concluded that the transport facility was far from being satisfactory enough to be called barrier-free.[160] With approximately 26.8 million PWD in India (and nearly 0.7 million PWD in Kerala), the need for inclusive policies and infrastructure is pressing.[161] GOI enacted the Rights of PWD Act in 2016, which flags the need of easy accessibility to transport services for PWD. Implementation efforts are evident through initiatives like

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[151] As per the provision of Article 79 of Indian Constitution, the Lok Sabha is composed of representatives of people chosen by direct election on the basis of Universal Adult Suffrage. The Constitution of India allows for a maximum of 550 members in the House, with 530 members representing the States and 20 representing the Union Territories.
[152] Ministry of Statistics and Programme Implementation; *"Women and Men in India 2022"*; 24th Issue; (link).
[153] The Hindu; "*Over 4.45 Lakh Crimes Against Women in 2022, One Every 51 Minutes*"; 2023; (link).
[154] India Today; "*India's 10 Most Dangerous States for Women*"; 2020; (link).
[155] The Times of India; *"More women in Kerala report sexual harassment cases in buses"*; 2023; (link).
[156] Gita. G., Pooja. P.; International Journal of Creative Research and Thoughts (ICJRT); *"Gender Equality in an Unequal World – The Story of Kerala"*; Volume 9, Issue 12 December 2021; ISSN: 2320-2882; (link).
[157] The Times of India; "Kerala Gives 50% quota for women in panchayat"; 2009; (link).
[158] The Nirbhaya app enables users to communicate with law enforcement authorities by sharing their locations and sending messages even in the absence of internet connectivity. Kerala Police's Raksha app includes emergency contacts, email addresses, and contact information for all important police officers. Based on the user's geolocation, the app can also locate the nearest police station and contact them.
[159] Lakshmi A..Y, Sureshkumar K., Sandya A.P; "*Barriers In Accessing Public Transport Services for Persons With Disabilities In Hyderabad, India*"; 3rd International Conference on Disability Inclusive Development; 2019; (link)
[160] Sharma R, Sharma MK, Singh A.; "*Evaluation of Disable Friendliness of Road Transport Facility in Ludhiana City of Punjab (India)*"; International Journal of Asian Social Science; 2015; (link).
[161] Department of Empowerment of Persons with Disabilities (Divyangjan) under Ministry of Social Justice and Empowerment, Government of India (link).

the Barrier-Free Kerala Project, where funds have been allocated for creating disabled-friendly roads and barrier-free footpaths.[162]

B. GESI Practices in KMRL

5. Women play a very relevant role at KMRL, and work within all its divisions. Even breaking stereotypes, they are outnumbering men in some traditionally considered male-oriented teams, such as operation and maintenance, facility management, and security.[163] On average, nearly twice as many women as men are working at each station of Phase I,[164] and some of them are mostly operated by women (e.g., the Muttom Station is entirely managed and run by female staff). KMRL has taken an unprecedented approach by employing 509 EWS women and 16 transgender people from the Kudumbashree Program[165] (as of December 2023), mainly for housekeeping, security, and ticketing in the stations of Phase I. Women representation at corporate level is smaller, with 17 percent of female officers at the KMRL's corporate office. [166] However, women staff are also taking part in KMRL's decision-making process, as among the top management cadre, one of the three functional directors and two out of ten general managers/heads of departments are women. An internal committee at KMRL handles workplace sexual harassment complaints and often holds staff training on women's safety at the workplace.

6. Several gender-responsive aspects are also visible in the design of the current trains and stations of Phase I. Dedicated seats are reserved for pregnant women and individuals with special needs. Child feeding cubicles, diaper change pods, and sanitary napkin vending machines are available at selected stations. Security measures have also been incorporated, such as the installation of CCTV cameras on both the trains and the station platforms, emergency intercoms integrated with panic alarm buttons on the trains, and a dedicated toll-free helpline. KMRL also conducts regular awareness campaigns on women's safety, both within the metro and in the community to educate women about their rights and how to protect themselves from violence.

C. GESI Strategy for Phase II

7. With above indicated initiatives, KMRL is being regarded as one of the pioneering agencies in India, that is not only promoting the women participation in their workforce, but also enhancing comfort and security for female metro users. Phase II will not only mirror Phase I's approach in terms of Gender Equality and Social Inclusion (GESI), but it will also include additional measures to contribute to bridge the GESI gaps identified above. The incorporation of gender-specific considerations will be considered in four specific areas which are:

- *Stakeholder Engagement*. KMRL has demonstrated a consistent commitment to promoting gender equity by actively seeking feedback, especially from female

[162] Office of Chief Commissioner for Persons with Disabilities (Divyangjan), Ministry of Social Justice Department; *"Annual Report 2021-2022"*; (link).
[163] These three divisions have 610 women and 557 men (as of December 2023).
[164] To operate the stations of Phase I (comprising stations control, facility management services, and security), there are 295 men, 570 women, and 16 transgender staff (as of December 2023).
[165] The GOK's poverty eradication and women empowerment program. For further details, see this link.
[166] At KMRL's corporate office, there are 89 women staff and 437 men staff (as of December 2023).

metro users not only during consultations to design the system, but also during surveys conducted during operation. According to a recent survey, among women users of Phase I, approximately 88 percent express a heightened sense of safety, security, and comfort when using the metro compared to other public transport modes.[167] For Phase II, stakeholder engagement, consultations and feedback survey activities will be continued in a similar manner, with meaningful participation of women with an objective to make the metro women-friendly and secured transport mode.

- *Project Engineering Design*. Phase II will provide comprehensive barrier-free and gender-responsive features, including, among others, (a) a priority area for women and passengers with special needs, (b) breastfeeding pods, (c) diaper changing tables, (d) accessible, and clean toilet for people with different needs, (e) vending machines with sanitary napkin, (f) CCTV cameras in every train and station platform, (g) proper signages, (h) accessible ramps and lifts, (i) passenger emergency communication system, and (j) emergency door release.
- *Construction Phase*. Though culturally women participation in construction work is not very prominent in Kochi, however, KMRL will encourage the contractors for inclusion of women in construction or construction supervision work. KMRL will ensure the equal wage and conducive environment for women.
- *Operation Phase*. KMRL intends to continue to collaborate with the Kudumbashree Program, by employing an additional 250 women staff and 10 transgender staff from the EWS category to provide facility management services. KMRL's internal committee will continue its efforts in addressing sexual harassment and engage with all staff to guarantee women's safety in their respective workplaces.

8. Under Phase II, the following two indicators will be assessed to track the project's contribution to GESI:

- Women passengers transported daily along the corridor of Phase II (target: 31,106); and
- Stations constructed with barrier-free and gender-responsive features (target: 11).

[167] Systra and Quadrant Conseil for KMRL and the Agence Française de Développement (AFD); "*Ex-post Evaluation of Kochi Metro Project (Phase I)*"; November 18, 2021.

Annex 5: Paris Agreement Alignment Assessment[168]

BB1 Assessment	
Criteria	**Assessment**
Uniform Assessment Criteria (UC)	
UC1: Checking if the project/economic activity included in the 'universally aligned list' of activities that have a positive or negligible impact on the climate.	Electric urban mobility projects, such as Phase II of Kochi Metro Rail, are considered universally aligned for BB1 as captured in the Joint MDB Universally Aligned List.
Results	***Aligned for BB1.***

BB2 Assessment	
Criteria	**Assessment**
Criterion 1: Establishment of Climate Risk and Vulnerability Context	
Step 1: Establishing the risk and vulnerability context.	The level of physical climate risk is considered medium. A detailed climate risk assessment was conducted in the scope of the EDDR. As noted in the EDDR, the project location is highly exposed to recurring floods, and moderately exposed to increased precipitation, high temperature, increased wind speed, and water unavailability. The increased precipitation in the past few years, coupled with cyclonic storms, have led to recurrent floods in the project location. An increase has also been projected for mean annual rainfall in both the near- and mid-term when compared to the historical period. The temperature projection indicates a potential increase of 1.3-1.8°C.[169] The climate risk assessment also suggests that the project location is considered to have moderate exposure to increased wind, and it might face future water stress.
Criterion 2: Definition of the Climate Adaptation and Resilience Measures	
Step 2: Identifying and integrating adaptation and climate resilience measures.	Given that the physical climate risk is considered material (medium), the following set of climate resilience measures have been identified and will be factored into the DEDs: (i) using head-hardened (HH) 1080 steel grade (UIC60) for tracks as this has superior mechanical properties with potential to resist thermal stress; (ii) keeping sufficient open areas for unrestricted and cross air circulation to minimize the high temperature effect on passengers; (iii) constructing an elevated viaduct and stations, which will be less vulnerable to urban floodings; (iv) providing rain water harvesting, and cross slope or camber in the viaduct superstructure design that permits runoffs to be channeled to road side drain to reduce impact of potential waterlogging on

[168] As above-mentioned, this assessment was conducted using the methodologies proposed in the (i) "*BB1 and BB2 Technical Note. Joint MDB Assessment Framework for Paris Alignment for Direct Investment Operations*" (November 2021); and (ii) AIIB; "*Guidance Note on Assessing Financing Operations' Alignment with the Paris Agreement at AIIB. Version 1.0*" (June 2023).

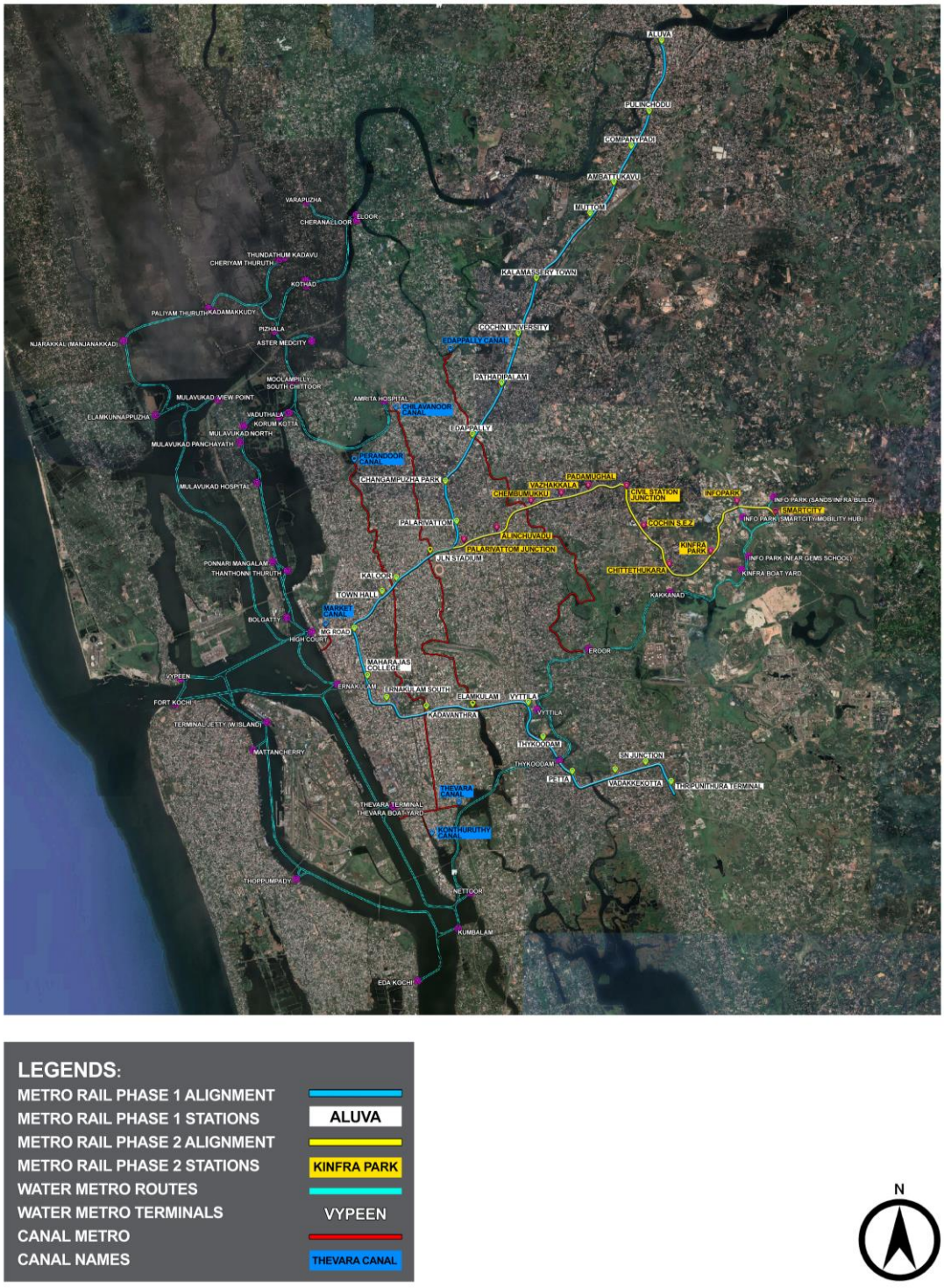
[169] The summer maximum temperature increases are estimated by 1.4°C under the Representative Concentration Pathway (RCP) 4.5 and 1.8°C under RCP 8.5 and the winter minimum temperature increases by 1.3°C under RCP 4.5 and 1.8°C under RCP 8.5. Source: Directorate of Environment and Climate Change, Department of Environment, GOK; *"Kerala State Action Plan on Climate Change 2023 - 2030"*; 2022; (link).

BB2 Assessment	
Criteria	**Assessment**
	viaduct from increased precipitation; (v) providing increased height to the NMT infrastructure to facilitate the accessibility of the metro's users during flooding events; and (vi) considering an extreme wind speed of 39 m/sec in the design to withstand potential increased wind.
Criterion 3: Assessment of Inconsistency with a National/Broad Context for Climate Resilience	
Step 3: Assessing potential inconsistency with broader climate resilience priorities.	As indicated above, the project is not inconsistent with India's broad context and policies for climate resilience, as outlined in India's NDC[170], India's Long-Term Low-Carbon Development Strategy[171], and the Kerala State Action Plan on Climate Change (2023 – 2030): • **NDC:** The project is not inconsistent with the stated priorities of NDC as it is a climate-friendly and clean intervention because it will contribute to reduce GHG emissions, air pollution and noise in Kochi, in particular, along the JLN – Smart City corridor. • **Long Term Low-Carbon Development Strategy:** One of the priorities of this Strategy is promoting climate adaptation in urban designs. This project is not inconsistent with that strategy given that a number of climate adaptation measures will be incorporated into the DEDs of this urban intervention. • **Kerala State Action Plan on Climate Change (2023 - 2030):** One of the main priorities of this Plan is promoting a shift from private to public transport. Hence, Phase II is not inconsistent with this Plan as it will contribute to increase public transport ridership and reduce private transport use.
Result	***Aligned for BB2.***

Project PAA	
PAA Result	***Aligned***

[170] GOI; "*India's Updated First Nationally Determined Contribution Under Paris Agreement (2021-2030) Submission to UNFCCC*"; August 2022, (link).
[171] Ministry of Environment, Forest and Climate Change Government of India; *"India's Long-Term Low-Carbon Development Strategy";* Submission to the United Nations Framework Convention on Climate Change; 2022; (link).

Annex 6: Graphic of the Metro Network of Kochi



Source: KMRL