



**ASIAN INFRASTRUCTURE  
INVESTMENT BANK**

P000336  
December 15, 2022

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**Sovereign-backed Financing**

**Project Document  
of the Asian Infrastructure Investment Bank**

**P000336 Republic of India  
Chennai Peripheral Ring Road Sections II & III Project**

## Currency Equivalents

(As at date, December 15, 2022)

Currency Unit – Indian Rupee (INR)

INR1.00 = USD0.0121

USD1.00 = INR82.80

## Borrower's Fiscal year

April 1 – March 31

## Abbreviations

AADT	Annual Average Daily Traffic
AIIB (or the Bank)	Asian Infrastructure Investment Bank
CAAA	Controller of Aid Accounts and Audit
CMP	Comprehensive Mobility Plan
CPRR	Chennai Peripheral Ring Road
CSC	Construction Supervision Consultant
DFIL	Disbursement and Financial Information Letter
DPR	Detailed Project Report
E&S	Environmental and Social
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EMP	Environmental Management Plan
EPC	Engineering-Procurement-Construction
ESP	Environmental and Social Policy
ESSs	Environmental and Social Standards
GAP	Gender Action Plan
GBV	Gender-based Violence
GESI	Gender Equality and Social Inclusion
GDP	Gross Domestic Product
GHG	Greenhouse Gas
Gol	Government of India
GoTN	Government of Tamil Nadu
GRM	Grievance Redress Mechanism
HMPD	Highways and Minor Ports Department
INR	Indian Rupee
IRC	Indian Roads Congress
IUFRs	Interim Unaudited Financial Reports
JICA	Japan International Cooperation Agency
km	Kilometer
km <sup>2</sup>	Square kilometer
LARR	Land Acquisition, Rehabilitation & Resettlement
MDB	Multilateral Development Bank
NH	National Highway
OPEC Fund	OPEC Fund for International Development
p.a.	per annum

PAP	Project Affected People
PDS	Project Delivery Strategy
PIR	Procurement Instructions for Recipients
PIU	Project Implementation Unit
PMC	Project Management Consultant
PMU	Project Management Unit
PPM	Project-affected People's Mechanism
RP	Resettlement Plan
RPF	Resettlement Planning Framework
SEA	Sexual Exploitation and Abuse
SIA	Social Impact Assessment
SOE	Statement of Expenditures
TNHD	Tamil Nadu Highways Department
TNRIDC	Tamil Nadu Road Infrastructure Development Corporation
USD	United States Dollar
VOC	Vehicle Operating Cost
VOT	Value of Travel Time

## CONTENTS

<b>1. SUMMARY SHEET .....</b>	<b>V</b>
<b>2. PROJECT DESCRIPTION .....</b>	<b>1</b>
A. Project Overview .....	1
B. Rationale .....	2
C. Components .....	3
D. Cost and Financing Plan .....	5
E. Implementation Arrangements.....	6
<b>3. PROJECT ASSESSMENT .....</b>	<b>9</b>
A. Technical.....	9
B. Economic and Financial Analysis .....	10
C. Fiduciary and Governance .....	11
D. Environmental and Social.....	13
E. Risks and Mitigation Measures.....	17
Annex 1: Results Monitoring Framework .....	21
Annex 2: Detailed Project Description .....	23
Annex 3: Economic and Financial Analysis .....	27
Annex 4: Member and Sector Context.....	35
Annex 5: Sovereign Credit Fact Sheet.....	37
Annex 6: Gender, Social Inclusion, Gender-Based Violence .....	40

## 1. SUMMARY SHEET

Project No.	PD000336
Project Name	Chennai Peripheral Ring Road Sections II & III Project
AIIB Member	India
Borrower	Republic of India
Project Implementation Entity	State of Tamil Nadu and Tamil Nadu Road Infrastructure Development Corporation (TNRIDC)
Sector	Transport
Subsector	Road
Project Objective	To improve connectivity and road safety in the Chennai Metropolitan Area.
Implementation Period	Start Date: January 2023 End Date: December 2028
Expected Loan Closing Date	April 2029
Cost and Financing Plan	Project Cost: USD1,003 million <u>Financing Plan:</u> AIIB Loan: USD378 million (38%) OPEC Fund Loan: USD100 million (10%) Government of Tamil Nadu: USD525 million (52%)
Size and Terms of AIIB Loan	USD378 million Terms: Final maturity of 19 years, including a grace period of 5 years, at AIIB's standard interest rate for sovereign-backed loans.
Co-financing (Size and Terms)	OPEC Fund: USD100 million
Environmental and Social Category	A
Risk (Low/Medium/High)	High
Conditions of Effectiveness	a. Execution of the Co-financing Agreement on behalf of the Co-financier and the Borrower, and all conditions precedent to its effectiveness or to the right of the Borrower to make withdrawals under it (other than the effectiveness of this Loan Agreement) have been fulfilled; and b. Execution of the project Co-financiers' Agreement between the Bank and the Co-financier, and all conditions precedent to its effectiveness (except for the effectiveness of this Loan Agreement) have been satisfied.
Key Covenants / Conditions for Disbursement	Key covenant: To retain and maintain the Project Management Consultant, Construction Supervision Consultants, Land Acquisition and Resettlement Monitoring Consultant, Independent Third-Party Environmental & Social Monitoring Consultant throughout the project. Conditions for disbursement: No conditions

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	USD24.6 million (8.19%)

President	Jin Liqun
Vice President	Urjit Patel, Infrastructure Investment Department, Region 1
Director General	Rajat Misra, Infrastructure Investment Department, Region 1
Team Leader	Farhad Ahmed, Sr. Investment Operation Specialist – Transport
Team Members	Siva Rama Krishna Sastry Jyosyula, Senior Social Development Specialist Gerardo Pio Parco, Senior Environment Specialist Abhijit Sen Gupta, Senior Economist Yogesh Malla, Financial Management Specialist Liu Yang, Counsel Chitambala John Sikazwe, Senior Procurement Specialist Giacomo Ottolini, Procurement Consultant Venkatesan Sundaresan, Technical Consultant Barsha Dharel, Gender, and Social Inclusion Consultant

## 2. PROJECT DESCRIPTION

### A. Project Overview

1. **Project Objective.** The objective of the proposed project is to improve connectivity and road safety in the Chennai Metropolitan Area.

2. **Project Description.** The project is a part of the broader Chennai Peripheral Ring Road (CPRR). The CPRR is conceptualized to provide better connectivity in Chennai catering to the growing traffic requirements. The project will also provide connectivity to industrial areas and will enhance port connectivity for commercial vehicles. The project consists of the construction of a 56.2km six-lane dual carriageway with two-lane service roads on each side, as well as consulting services and capacity development.

3. **Expected Results.** The Results Monitoring Framework is included in Annex 1. Project Development Objective Indicators are:

- a. *Travel time.* A reduction of approximately half (52 percent) of the travel time between National Highway (NH)-16 and NH-48; and
- b. *Traffic accidents.* Vehicular accident number is half of the accident number on comparable roads in the vicinity of CPRR.

The proposed project's Intermediate Results Indicators are:

- (i) *Road construction progress.* Full construction completion of Sections II and III in the 4<sup>th</sup> year of implementation;
- (ii) *Employment of local laborers.* Proportion of local laborers working on different contract packages reached 20 percent by the third year of implementation;
- (iii) *Skill training for women.* 20 women receiving skill training on different construction-related skills (e.g., engineering surveys, construction supervision, heavy construction equipment operation);
- (iv) *Introduction of workers' Code of Conduct.* All contract packages introduce a Code of conduct by the third year of implementation; and
- (v) *Gender safety and equitable access.* Conducting audits and the incorporation of audit recommendation(s) to ensure that project-constructed infrastructure is gender-sensitive, with equitable, safe, and accessible features.

4. **Expected Beneficiaries.** The primary beneficiaries of the project will be the general population using private and public vehicles, as well as businesses and commercial cargo traffic. The benefits will arise from a safer, more efficient, and reliable road network. Indirect benefits will include improved access to economic, social, and life-enriching facilities and services. Furthermore, the communities along the corridor are expected to benefit from access to jobs created during the construction and operation phases of the road. It is expected that the project will promote industrial and economic growth along the road corridor.

5. **Co-financing.** The project will be jointly co-financed by the Asian Infrastructure Investment Bank (AIIB) and the OPEC Fund, with the AIIB being the lead partner. AIIB's environmental and social, and procurement policies will be applicable to the project.

There exists a formal framework agreement between the AIIB and the OPEC Fund. A draft project-specific co-financing agreement has also been prepared and finalized.

## **B. Rationale**

6. **Strategic fit for AIIB.** The proposed project aligns with the Bank's corporate, transport, and sustainable cities strategies. The project, as part of the overall CPRR road system, will: (i) enhance the city and regional integration; (ii) facilitate more efficient domestic and cross-border connectivity through Ennore/Kattupalli ports; and (iii) facilitate national goods movement through Chennai Port by providing a modern road network for passenger and goods movements. The project will enhance urban mobility by reducing congestion, hence reducing Greenhouse Gas (GHG) emissions (Annex 3 provides details). The CPRR project will improve road transport conditions in Chennai that have been inadequate from traffic demand and road safety perspectives. Apart from constructing an access-controlled six-lane road, the road sections will contain two separate service lanes on each side, as well as safe pedestrian and bus infrastructure.

7. **Value addition by AIIB.** Beyond providing financing, AIIB's participation has and will continue to improve project preparation and implementation by (i) leveraging the project team's experience in roads and highways design, procurement, and implementation; and (ii) strengthening the implementing entity's technical due diligence, procurement document quality, Environmental and Social (E&S) performance. The AIIB has been instrumental in mobilizing OPEC Fund's investment in the project. AIIB's financing includes targeted activities for incorporating road safety into the design with further capacity building through training. The AIIB has made substantive contributions to the Engineering-Procurement-Construction (EPC) procurement documentation, E&S practices, and requirements, and facilitated the implementation of further public consultation and the Grievance Redress Mechanism (GRM) processes.

8. **Value addition to AIIB.** AIIB's participation in the project will (i) enhance its experience in financing complex urban road projects; (ii) support future opportunities to finance high-demand urban, phased, highway projects in India and the region; (iii) promote working with OPEC Fund to facilitate future co-financing opportunities; and (iv) enhance AIIB's experience as the lead financier. Also, the project plans to pilot the use of a combination of traditional and non-traditional ICT-based approaches in project monitoring (see 2 (E), Monitoring and Evaluation section for details), which is expected to shape future monitoring approaches to AIIB projects.

9. **Lessons learnt.** In the course of the project design, the Bank team has identified several lessons from on-going transport sector projects in India and South Asia, as well as some relevant lessons from projects supported by other financiers (mainly the World Bank). They were taken into consideration while designing the project. The lessons include:

- a. *Optimal design and construction risk sharing with contractors.* The public sector faces design and construction risks in infrastructure projects, in general. To mitigate against them, the best strategy is the optimal sharing of these risks with the contractors/developers. The project effected this strategy by the use of EPC contracting approach, which shifts that design and construction risks to the contractors;



- b. *Investment Sustainability.* The physical and financial sustainability is the key for deriving maximum investment benefits. Again, the use of EPC contract approach with 7-year post-construction maintenance period, funded by the Government of Tamil Nadu (GoTN), in the proposed project, will enhance the investment sustainability;
- c. *Optimum loan approval timing.* Several AIIB projects in the region have been suffering due to the premature loan approval, especially due to the non-availability of adequate land so that the contractors can be mobilized. Also, often the procurement related preparedness is sub-optimal. These have also been major factors for slow loan disbursements. In the proposed project, it has been agreed with the Government of India (GoI) that the negotiations can only take place after the acquisition of a half of the required land area and the procurement of three-tenths of the number of contracts. The project negotiations were postponed until these conditions are met;
- d. *E&S risk mitigation.* Experience from the ongoing Chennai Metro Rail Phase 2 - Corridor 4 (L03101A) shows that the Engagement of an independent third-party E&S monitoring consultants is helpful in mitigating E&S (especially land acquisition and resettlement related risks). The proposed project is a high risk one. Therefore, a provision has been made to engage such consultants during the full implementation period. The GoTN will finance such consultants. The consultants will assist PMU/PIU in the implementation of E&S management plans. Risks will be further mitigated with the engagement of a gender equality and social inclusion (GESI) specialist by the AIIB, as part of its implementation support; and
- e. *SEA related risk mitigation and Gender.* Road projects are characteristically risky from sexual exploitation and abuse (SEA) perspective. This is due to the presence of huge number of migrant laborers at construction sites. This has been observed in projects all over the world implemented by different financiers. The proposed project has assessed these risks and mitigation measures are incorporated in the project design. Also, measures are included in the project design to have a positive impact on advancing gender equality and empowerment of women.

### C. Components

10. **Scope.** The AIIB and the OPEC Fund will fund Section II (26.1km) and Section III (30.1km) of the CPRR among five sections (total length - approximately 133km) of the CPRR. Each section is planned as a six-lane, access-controlled dual carriageway with two-lane service roads on each side of the main carriageway. The carriageway design allows for the future addition of another lane in each direction in the median. Section III connects to the already operating Section IV (23.8km). Among the remainder sections, while Section I (25.4km) is being financed by JICA, it is understood that the GoTN has also secured JICA funding for Section V (approximately 27.5km). Going forward, the GoTN plans to improve the whole length of the CPRR to a standard of the proposed project. Although Section IV is already in operating condition, it will require some upgrading to bring it to the full CPRR standards. The GoTN plans to toll the entire CPRR corridor (Sections I to V). Therefore, the proposed project includes the construction of toll plazas: the AIIB will finance one toll plaza in each section (Sections II and III). However, the tolling systems and operations will be designed and implemented separately. Therefore, they are not a part of this project financing. The

tolling will be undertaken and managed by the Highways and Minor Ports Department (HMPD). While Table 1 provides CPRR project intervention details, Annex 2 provides detailed project descriptions.

**Table 1: Project Physical Characteristics and Intervention Details**

<b>Alignment Characteristics</b>	<b>Section II</b>	<b>Section III</b>	<b>Total</b>
Land Acquisition (hectare) (private/ government)	186 (158/28)	234 (156/78)	420 (314/106)
Length (km)	26.1	30.1	56.2
Right of way width (m)	60		
Main Carriageway Lanes	3 x 3.5m lanes in each direction + paved shoulder		
Central Median (m)	8.5m (allows for future widening)		
Service Road	2 x 3.5m lanes on each side and bi-directional		
Pedestrian Pathway / Utility Corridor	One each side, 3m wide each		
Width of the carriageway at structures	14m in each direction		
Interchange (at NH-4 and NH-205)	0	2	2
Vehicular Underpass (VUP)	4	6	10
Light Vehicular Underpass (LVUP)	8	5	13
Railway Overpass Bridge	0	1	1
Major Bridge	2	2	4
Minor Bridge	7	7	14
Culverts	105	109	214
Combined Exit/ Entry Ramps	4	3	7
Bus Bays/ Shelters (service roads)	24	19	43
Toll Plaza	1	1	2
Rest Areas	1	1	2
Pavement Type	Asphalt Concrete		

11. **Components financed by AIIB and OPEC Fund.** The following provides the details of the components. It is to be noted that the OPEC Fund will only co-finance Component A.

- a. Component A – Civil Works Construction: (AIIB and OPEC Fund co-financing)
  - a. Section II (26.1km) – Connects to Section I (JICA-funded; civil works ongoing) at Thatchur on National Highway 16 (old NH-5), and Section III at the start of Thiruvallur Bypass. The entire Section II is on a new greenfield alignment. Section II comprises two tender packages: EPC-01 (13.3km) and EPC-02 (12.8km). EPC-01 and 02 have already been awarded and implementation commenced. Both packages have a seven-year post-construction maintenance period.
  - b. Section III (30.1km) – Connects to Section II at Thiruvallur Bypass and to Section IV (Section IV is already operational) at Sriperumbudur on National Highway 48

(Old NH-4). Approximately 9.6km of Section III consists of improving the existing State Highway 57 (SH-57) to six lanes, with the balance of Section III on a greenfield alignment. Section III is divided into three EPC packages: EPC-03 (10.4km), EPC-04 (10.0km), and EPC-05 (9.7km). EPC-03, -04 and -05 are being procured. Each contract includes a seven-year post-construction maintenance period.

- b. Component B – Consulting Services and Capacity Development: (AIIB financing)
- a. Project Management Consultant (PMC) – This consultancy comprises tasks linked to overall project management, technical overview, and overall monitoring (technical, progress, and financial), tracking, and reporting. It will also report on overall project expenditures, including various consultancies. The PMC will also have roles in training and capacity building, especially in areas of project management, highway engineering, highway operations and maintenance, environmental and social monitoring, and road safety areas. Additionally, the consultant will have expertise in road safety and training to support the Tamil Nadu Highways Department (TNHD). The PMC already commenced.
- b. Construction Supervision Consultants (CSCs) – Each section (sections II and III) will have a separate CSC. The CSC’s role will be to review contractor’s submissions (as the project is using an EPC procurement method that requires contractors to provide the designs), monitor construction progress, quality assurance, and review progress reports during implementation and a one-year post-construction period. Each CSC will have a road safety specialist to ensure that the EPC designs submitted include road safety measures that adequately mitigate road safety risks. The scope of work for this role includes E&S expertise. While the CSC for Section II is already on-board, the CSC for Section III is being procured. The AIIB has already reviewed the request for proposal (RfP) and provided clearance to a consultant shortlist.
- c. Land Acquisition, Rehabilitation & Resettlement Action Plan Monitoring Consultant (LARRMC) – This consultancy has already been procured, which will support the Project Management Unit (PMU) and the Project Implementation Unit (PIU) in monitoring and evaluation of all stages of land acquisition, rehabilitation & resettlement action plan Implementation process.

#### D. Cost and Financing Plan

12. The indicative project cost and financing plan are presented below (Table 2). It is to be noted that, AIIB and OPEC Financing figures are exclusive of taxes, which will be borne by the GoTN.

**Table 2: Indicative Project Cost and Financing Plan**  
(Numbers and percentages are rounded to the extent possible)

Item	Project Cost (USD million)	Financing (USD million )		
		AIIB	OPEC Fund	GoTN
<b>Component A:</b> Civil Works	572.4	372.075 (65%)	100 (17.5%)	100.34 (17.5%)
<b>Component B:</b> Consulting Services and Capacity Development	5.0	5.0 (100%)	0 (0%)	0 (0%)
<b>Sub-Total</b>	<b>577.4</b>	377.055 (64.7%)	100.0 (17.1%)	105.945 (18.2%)

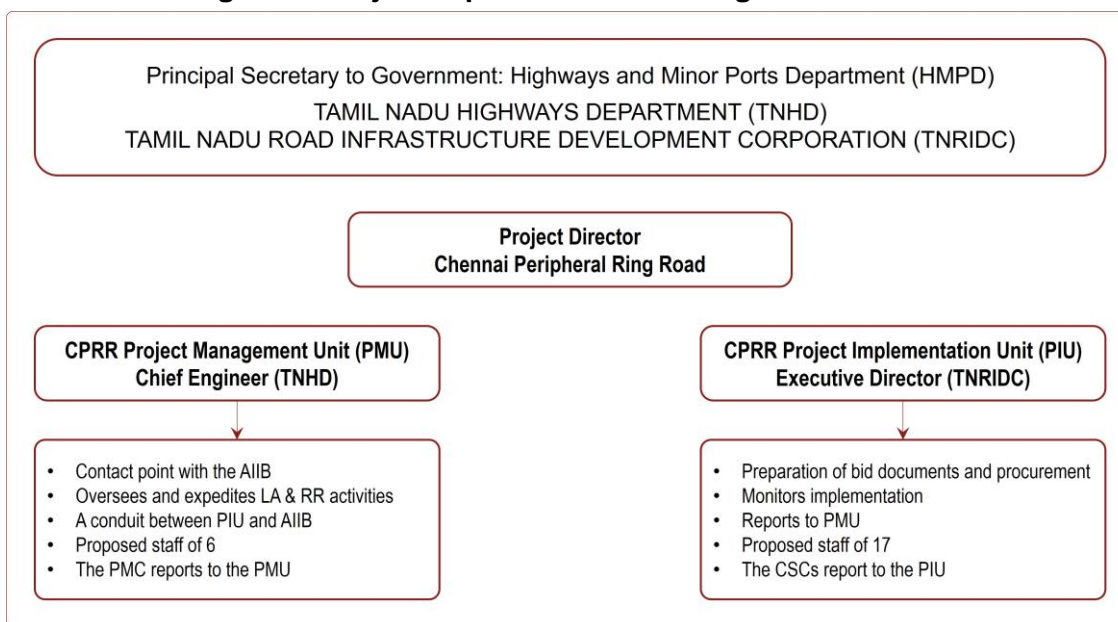
Item	Project Cost (USD million)	Financing (USD million)		
		AIIB	OPEC Fund	GoTN
Land Acquisition and Resettlement	270.0	0 (0%)	0 (0%)	270.0 (100%)
Other Expenses (e.g. Taxes, Charges, etc.)	155.0	0 (0%)	0 (0%)	155.0 (100%)
Front-end Fee	0.945	0.945	0	0
<b>Total</b>	1,003.3	378 (38%)	100 (10%)	525.3 (52%)

**E. Implementation Arrangements**

13. **Implementation period.** The land acquisition process is well underway. Almost three-fourths (72 percent) of the land are already available. The land required for EPC-01 is now fully available. The proportion of the land acquired to land required figures for EPC-02 is roughly 81 percent. The land acquisition for EPC-01 and -02 is expected to be fully completed by end-December 2022. The land acquisition progress for the remaining contract packages, as of end-November, 2022, are: EPC-03 (72 percent), EPC-04 (34 percent), and EPC-05 (60 percent). Construction is expected to take roughly three years and the contract implementation period will be between early-2023 to end-2025.

14. **Implementation Management.** The TNHD and the implementing agency are experienced in CPRR implementation given that they have already undertaken and completed CPRR Section IV and are presently implementing Section I with support from JICA. Figure 1 provides the proposed project management and implementation arrangement and roles.

**Figure 1: Project Implementation Arrangement**



15. In addition to the consultancies financed by the AIIB under Component B, the following consultancies are to be financed by the TNRIDC.

- a. Land Acquisition Implementation Consultants – A consultancy has been hired and is working on the implementation of the acquisition process;

- b. Independent Third-Party Environmental and Social Monitoring Consultants –The Bank requires that the client retains and finances suitably qualified and experienced third-party consultants, funded by the client, for the implementation period. This requirement is for projects with high E&S risks and impacts. The consultancy will assist PMU/PIU in the implementation and monitoring of environmental and social management plans, at all implementation stages.

16. **Procurement.** Procurement has commenced in accordance with Bank's Procurement Policy (January 2016), and Section II of Interim Operational Directives: Procurement Instructions for Recipients (PIR), June 2016. The procurement of works and services is following International Open Competitive Tender (IOCT) and National Competitive Tender (NCT) as set out in paragraphs 10.1 and 10.4 of AIIB's PIR, using the Government of Tamil Nadu's e-tendering platform ([www.tntenders.gov.in/nicgep/app](http://www.tntenders.gov.in/nicgep/app)).

17. **Financial Management.** The TNHD will be responsible for the overall project financial management. A PMU has been established at the TNHD with adequate staff for overall project coordination, monitoring, and reporting. The unit will be assisted by the PMC. The project will be implemented by the TNRIDC (PIU) and staffed with adequate technical, administrative, and finance/accounting staff. In the annual GoTN budget, a separate budget head will be provided for this project. To the extent possible, the project will align its planning, budgeting, accounting, funds flow, and audit arrangements with the GoTN's system. A Financial Management Manual has been developed by the TNHD and reviewed by the AIIB. The manual outlines project's financial management arrangements including the roles and responsibilities of the PMU and the PIU. The AIIB has assessed the financial management capacity of the THND and the TNRIDC. The assessment has concluded that FM capacity of these two entities is adequate and the related risks are manageable (see Section 3(C) - Fiduciary and Governance).

18. The PMU will consolidate and submit Interim Unaudited Financial Reports (IUFRs) within 45 days from the end of each fiscal quarter. The external audit report for each year of project implementation will be submitted within nine months from the fiscal year-end. The project financial statements will be audited by an independent auditor based on terms of reference acceptable to the AIIB.

19. All payments related to the project are to be pre-financed by the GoTN. The TNHD will release periodic funds based on the budget allocation to a specific bank account of the PIU (TNRIDC) for government counterpart and co-financing portions. The PMU will prepare a consolidated statement of expenditures (SOE) based on actual eligible expenditures paid. The PMU will submit withdrawal claims through the Controller of Aid Accounts and Audit (CAAA) to the AIIB. The AIIB and the OPEC Fund will review and disburse respectively as reimbursements to the government treasury (Government of India - GoI) for eligible expenditures under their co-financing arrangements. The Disbursement and Financial Information Letter (DFIL) details the authorized signatories, processes of submitting claims, and other terms and conditions of disbursements related to the project.

20. **Monitoring and Evaluation.** The PMU and PIU are in place for project implementation and monitoring. Furthermore, they will be assisted by the PMC and

CSCs. The PMC's and CSC's Terms of Reference (ToR) collectively include, amongst others: setting up a project and quality management system; reviewing and updating the Resettlement Plans (RPs); conducting project social audits and assisting the TNRIDC to implement the Gender Action Plan (GAP); monitoring the implementation of the Environmental Management Plan (EMP); monitoring and reporting on the project Results Monitoring Framework; conducting road safety audits; providing on-the-job and subject-specific (such as road safety audits) training to TNHD staff; monitoring the maintenance period for one year after completion of construction (subsequent monitoring will be performed by TNHD staff), and providing monthly all-encompassing project reports to the AIIB (and the OPEC Fund).

21. The project will also pilot a monitoring system that will use a combination of traditional and non-traditional ICT monitoring tools. The CSCs are expected to assist the project in this endeavor. Currently projects progress monitoring typically involves site visits by project personnel and regular reporting on the progress from project implementation entity (ies). This project monitoring approach faces several challenges including its limitations in an unprecedented situation (e.g., COVID-19), which limits the physical visits by supervision consultants or borrower's personnel. Furthermore, such an approach is unsuitable for obtaining real-time information and comprehensive analysis required for progress and disbursement forecasting. The non-traditional approach, which aims at technology disruption, uses an entirely new way of getting things done. The non-traditional methods include the use of geo-enabling construction site monitoring systems using smartphones or tablets, remote monitoring approaches (e.g., satellite imagery, drones), and CCTV cameras for real-time monitoring. Such a non-traditional approach will help address challenges faced by the traditional approach including facilitating project monitoring when faced with the unprecedented situation that restricts physical presence at the construction activity sites.

22. The EPC contracts also include requirements regarding project monitoring and reporting, including developing a quality assurance plan for CSC's review; EPC designs (to be vetted by the CSCs); AIIB reserves the right to review and audit the project progress, procurement, and accounts; monthly and quarterly progress reports (to be reviewed by CSCs and the PMC); and an environmental management system (also to be reviewed by the CSCs, and the PMC).

23. **AIIB's Implementation Support.** Under normal circumstances, the AIIB is expected to conduct at least two site visits per year to monitor project progress. The AIIB has retained a local consultant based in Chennai with extensive highway engineering and construction experience – including working for other Multilateral Development Banks (MDBs). This consultant has been working on the project since Spring 2020 and is intimately familiar with the proposed and other highway projects in Tamil Nadu. The consultant will continue his services during the implementation period. AIIB's implementation support will also include the services of a local environmental and social specialist and a gender equality and social inclusion (GESI) specialist. These specialists will help the client in the mitigation of E&S, and gender and sexual exploitation, and abuse-related risks. The team members are also expected to visit project sites once the COVID-19 related travel restrictions are eased. The AIIB also plans to help the TNHD/TNRIDC in piloting a monitoring approach that will combine traditional monitoring and non-traditional ICT-based tools. Lessons learned from the

pilot exercise will help fine-tune future monitoring approaches, especially under circumstances that restrict field travel and on how to make optimum use of the ICT.

### 3. PROJECT ASSESSMENT

#### A. Technical

24. **Strategic Alignment.** The proposed project aligns with the Comprehensive Mobility Plan (CMP)<sup>1</sup> strategies and plans (Annex 4 provides details). The CPRR is one of the eight CMP identified freight corridors. Furthermore, AIIB is currently supporting or plans to support another three projects, which are also a part of the CMP proposals.

25. **Traffic demand projections.** Site-specific traffic surveys were conducted throughout the corridor based on location, type of traffic, peak hour, average daily traffic, and then calibrated for annual average daily traffic (AADT). Growth patterns were projected based on the above along with the application of other data and economic parameters, which were updated in 2020. Annex 2 includes the traffic data. Traffic projections indicate that Section II main carriageway could reach capacity with the three lanes in each direction configuration in about 2041 if measured by a high benchmark service level (“B”), and similarly Section III could reach capacity in 2029 or 2035 – again depending on the road service level. The carriageway design allows for the addition of one lane in each direction. This design feature will help mitigate these future congestion risks. Other road improvements that are expected in the area, per the five-year plan, will also help address the additional traffic volumes in the corridor.

26. **Project Design.** Project alignment is based on a larger study for the overall CPRR (Sections I to V). The design is based on the Indian Road Congress (IRC) “Manual of Specification and Standards for Six Laning of Highways Through Public Private Partnership”, and other applicable specifications of the IRC and Gol’s Ministry of Road Transport and Highways (MoRT&H). The design, such as for pavement and laning arrangement, was further developed based on the forecasted type and volume of traffic. Site geotechnical features are not complicated and do not require unusual preparation. Except for approximately 9.6km in Section III, which is on an existing road alignment, the remaining road sections are on a new (greenfield) alignment. The design accommodates existing utility relocations, non-vehicular traffic, a utility corridor, illumination, highway safety measures, bus and truck laybys, toll plazas, and landscaping.

27. As indicated before, the project comprises five (5) EPC contracts (two for Section II and three for Section III), each with seven-year post-construction maintenance period. The EPC contract mechanism provides the contractor the opportunity to implement its own designs, based on the parameters set by the TNHD. The designs are reviewed and vetted by the TNRIDC and its consultants. This will provide scope for creativity in design by the contractor. Other methods of procurement have been explored by TNHD’s general consultants. However, EPC method was deemed to be the most appropriate in cost and delivery schedule efficiency. This method, also, shifts the design and construction risks to the contractors.

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<sup>1</sup> [www.cmdachennai.gov.in/pdfs/ComprehensiveMobilityPlan-CMA.pdf](http://www.cmdachennai.gov.in/pdfs/ComprehensiveMobilityPlan-CMA.pdf)

28. **Construction.** Construction for this project is not complicated and much of the alignment (except for 9.6km in Section III) is greenfield alignment. Construction for Sections II and III can progress in a phased manner as land becomes available and resettlement takes place. TNRIDC has already procured Section II EPCs (EPC-01 and -02). The EPC-03, -04, and -05 contract packages are being procured. They are expected to be procured by early-2023. The Bank has already reviewed and concurred on all three relevant tender documents. The projected three-year construction period is feasible (including a six-month design period), which generally progresses concurrently with mobilization and site preparation. The EPC contractors will furnish their own design and stage the construction accordingly, with reviews by the TNRIDC using consultants.

29. **Maintenance Period and Operations.** Tamil Nadu state is experienced in EPC contracts with a seven-year post-construction operation and maintenance period. The AIIB financing is for the construction phase only. However, the Bank's review of the tender documents did consider the adequacy of the maintenance period requirements. The TNHD is planning to implement tolling at some point of time in the future. This operation will be separate from the EPC contracts.

30. **Operational sustainability.** The project will be built to modern highway standards with adequate maintenance program for the first seven years. The project team has discussed with the TNHD, the availability of an adequate budget for the maintenance period and has been assured that it will be accommodated in its annual budgets. Furthermore, the project is expected to collect tolls in the future, which would help support the maintenance operations.

## B. Economic and Financial Analysis

31. **Economic Analysis.** The economic viability of the full CPRR corridor (Section I to V) has been evaluated and the corridor was deemed economically viable with the Economic Internal Rate of Return (EIRR) and Net Present Value (NPV) are estimated at 15.65 percent and INR28,695 million (roughly USD380 million), respectively.<sup>2</sup> The economic analysis covers a period of 20 years of operation and compares 'Without Project' and 'With Project' scenarios. The economic analysis considered Section II, and Section III separately, and then Sections II and III combined. The economic cost includes construction cost, provisional sums, market value of land, resettlement and rehabilitation (R&R) and utility shifting, and excludes taxes. A salvage value of 20 percent has been estimated at the end of the benefit period and includes residual values for earthworks, culverts, bridges, etc. which will have a longer life than the project. The quantifiable benefits of the project will mainly accrue from vehicle operating cost (VOC) and value of travel time (VOT) savings, reduction in GHG emissions and road accidents, and savings in maintenance costs.

32. The EIRR for Section II and Section III are calculated at 19.27 percent and 18.79 percent, respectively. The corresponding NPV values are INR10,389 million (USD139 million) and INR16,215 million (USD216 million). Combining Sections II and III will result in an EIRR of 18.96 percent and NPV of INR26,603 million (USD355 million). Sensitivity analyses comprising following scenarios were conducted: (i) cost increase of 15 percent;

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<sup>2</sup> The EIRR values for different sections of CPRR are: 10.41 percent for Section I, 19.27 percent for Section II, 18.79 percent for Section III, 32.40 percent for Section 4, and 10.01 percent for Section 5.



(ii) reduction in benefits by 15 percent; and (iii) project delayed by a year. The analysis results indicate that the project is economically robust. This means that the project yields positive NPVs under the aforementioned scenarios, with a 12 percent discount rate.

33. **Financial Analysis.** A financial analysis notes that the project on its own would not be financially viable. It is to be noted that the proposed project is a sovereign-backed financed project.

### C. Fiduciary and Governance

34. **Procurement.** The Bank has conducted a capacity assessment of the project implementing agency and assessed that the TNRIDC is experienced in implementing EPC contracts. Furthermore, the TNRIDC is implementing a project financed by the Asian Development Bank (ADB)<sup>3</sup> utilizing the same procurement and contracting strategy, as well as Section I of CPRR currently under implementation with funding from JICA. The TNHD and the TNRIDC are designated as the PMU and PIU, respectively.

35. The AIIB has reviewed the draft Project Delivery Strategy (PDS), which outlines the procurement arrangements covering tendering and contracting strategies, procurement plan, capacity assessment, market conditions, potential procurement risks, and proposed mitigation measures. The Bank has agreed to the draft PDS and has concurred with its approach, in principle.

36. The project comprises five EPC contracts (two EPCs for Section II, and three EPCs for Section III) each with a seven-year post-construction maintenance period included under the contract. The AIIB and OPEC funds will not cover maintenance costs. The EPC contracts are using a single-stage, two-envelope package using the e-tender portal: [www.tntenders.gov.in/nicgep/app](http://www.tntenders.gov.in/nicgep/app). This e-tender portal is being used for MDB-financed projects. The use of this portal is expected to enhance procurement efficiency, economy, and transparency. Out of five EPC contract packages, the TNRIDC has already procured two packages (EPC-01 and -02) and the remaining three are being procured. All EPC packages have been, or are being procured following the International Open Competitive Tender (IOCT) method and all are subject to Bank's prior reviews.

37. The proposed project will finance three consultancy services. All consulting services packages have used or have been using Bank's Standard Request for Proposal (SRFP) consultants' selection. While items (a) and (b) below have followed an International Open Competitive Selection Method, item (c) has followed Local Competitive Selection. All of them were subjected to Bank's prior reviews. The consulting services procurement status is as follows:

- a. Project Management Consultant (PMC) – The TNRIDC already hired the PMC.
- b. Construction Supervision Consultants (CSC) – The Section II CSC (CSC 1) has been hired and the hiring process for Section III (CSC 2) has already started. The Bank has reviewed the Request for Proposal (RFP) and provided clearance to a list of shortlisted consultants. It will approximately take two more months to complete the procurement process.
- c. Land Acquisition and Resettlement Monitoring Consultant – The TNRIDC has

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<sup>3</sup> Tamil Nadu Industrial Corridor Project

already procured the consultants.

38. The Bank has carried out a capacity assessment through several discussions with the PIU, and local inputs, as well as reviewing and commenting on the TNRIDC submitted PDS. The project procurement risk is assessed as 'Moderate' by the TNRIDC considering its experience in implementing highway projects using EPC contracts, current market conditions in Tamil Nadu, and the stable political climate in the state. The Bank staff has reviewed and concurred with the assessment.

39. **Financial Management.** The financial management capacity of the TNHD (PMU) and the TNRIDC (PIU) was assessed focusing on institutional capacity, staffing, planning/budgeting, funds flow, accounting, internal controls/audit, reporting, and external oversight. Both organizations have prior experience implementing projects funded by MDBs and are familiar with MDB financial management requirements. Based on the financial management assessment, the capacity is considered adequate and the financial management risk is 'medium', with some proposed mitigation measures,

40. The TNHD and the TNRIDC have adequate and experienced finance/accounts staff. The project will follow GoTN's planning and budgeting procedures. Based on the expected project needs and procurement plan, the PIU will provide estimated budgetary requirements on an annual basis to the PMU for review and consolidation. The approved project budget will be included in the annual GoTN budget as a separate budget line item. Once the budget is approved, funds will be released periodically to a separate bank account of the PIU through the appropriate head of account. The PIU will be mainly responsible for implementing the project and managing project-related payments. On a periodic basis, the PIU will report to the PMU on funds utilization. All project payments are to be pre-financed from GoTN's sources. Once payments are made against eligible expenditures, the PMU will prepare a consolidated statement of expenditures (SOEs) based on co-financing arrangements. The PMU will submit through the CAAA withdrawal claims along with SOEs to the AIIB. The AIIB and OPEC Fund will review and reimburse the GoI treasury for eligible expenditures under the co-financing arrangements.

41. The PMU and PIU will follow their respective applicable basis of accounting. They will maintain a separate project account and have custody of the supporting documents. The PIU will prepare a periodic financial report and submit to the PMU on a timely basis. The PMU will consolidate and submit Interim Unaudited Financial Reports (IUFs) quarterly to the AIIB within 45 days from the end of each fiscal quarter. The format and reporting content of IUFs will be as agreed with the AIIB.

42. The existing internal control process and procedures of the TNHD (PMU) and the TNRIDC (PIU) will be applicable to the project. The internal audit for the project will be carried out following existing internal audit arrangements of the TNHD and the report will be shared with the AIIB. The PIU internal audit will be conducted quarterly by a chartered accountant firm hired by the PIU and the report will be shared with the AIIB through the PMU.

43. The project financial statements including the SOE will be audited by an independent auditor based on qualifications and terms of reference, acceptable to the AIIB. The external audit report for each year of project implementation that includes an audit opinion and management letter will be submitted to the AIIB within nine months

from the end of each fiscal year.

44. **Disbursements.** The loan will adopt reimbursement method of disbursement. GoTN will provide an adequate budget for its own counterpart and co-financiers share as per the financing agreements. The GoTN will pre-finance payments of eligible expenditures and then the PMU will prepare SOEs for co-financiers' part of eligible expenditures and submit withdrawal application(s) through the CAAA. Upon receipt of the withdrawal claim, the AIIB will review and make disbursement to the Gol's appropriate account for AIIB's share of eligible expenditure. Based on the AIIB's review of withdrawal claims, the AIIB will advise OPEC Fund to make disbursement for its share to the Gol's appropriate account. DFIL details the authorized signatories, process for submitting claims, and other terms and conditions of disbursements.

45. **Governance and Anti-corruption.** The AIIB is committed to preventing fraud and corruption in the projects it finances and will ensure compliance with AIIB's Policy on Prohibited Practices (2016). Implementation will be monitored regularly by the AIIB staff. The AIIB reserves the right to investigate, directly or indirectly through its agents, any alleged corrupt, fraudulent, collusive, coercive, or obstructive practices, misuse of resources, and theft or coercive practices relating to the project and to take necessary measures to prevent and redress any issues in a timely manner. Detailed requirements will be specified in the Loan Agreement and the project tender documents. The AIIB has and will continue monitoring the work related to tender document preparation and tender/proposal evaluation under the AIIB financing.

46. **Institutional Capacity.** The TNHD has experience in implementing donor-funded programs (including the World Bank, the ADB, and JICA). The TNHD has in place a PMU, and the PIU has been operational at the TNRIDC. Along with the institutional structure in place, assistance will also come from specialist consultants as noted earlier. The scope and terms of reference for the consultants have been reviewed by the AIIB. A PDS has been developed by the TNRIDC with AIIB staff input.

#### **D. Environmental and Social**

47. **Environmental and Social Policy (including Standards) and Categorization.** AIIB's Environmental and Social Policy (ESP), including the Environment and Social Standards (ESSs) and the Environmental and Social Exclusion List, will apply to this project. ESS 1 (Environmental and Social Assessment and Management) and ESS 2 (Involuntary Resettlement) are applicable to the project. ESS 3 (Indigenous Peoples) is not applicable. The OPEC Fund will follow AIIB's ESP. The project has been screened and reviewed in accordance with the ESP and ESSs and is assigned Category "A".

48. **Instruments.** The Environmental Impact Assessment (EIA) accompanied by an Environmental Management Plan (EMP) has been prepared to address project-related environmental issues. The Social Impact Assessment/Resettlement Plan (SIA/RP) has been prepared for Section II. A Resettlement Planning Framework (RPF) has been prepared for all AIIB-financed components to address issues of compensation for any physical and economic displacement. An Environmental and Social Due Diligence accompanied by an Environmental and Social Corrective Action Plan has been prepared to improve the environmental and social performance of the associated facilities, i.e.,

Sections I, IV, and V.

49. **Environmental Aspects.** The project is expected to generate overall socio-economic benefits in terms of serving the growing transportation demand and reducing congestion. The anticipated environmental impacts include the removal of trees, disturbance from construction-related noise, and pollution. Most impacts are expected to be short-term and limited to the construction phase. Construction-related environmental impacts can be largely mitigated through appropriate construction practices accompanied by site-specific mitigation measures. It is estimated that nearly 2,351 trees will be felled and 414 trees will be transplanted. As noted in the EMP, compensatory forestation will be undertaken at the ratio of 10:1 (ten new trees for every one felled) – the exact number will be confirmed and recorded during the site clearance stage. Other adverse impacts of the project will be temporary and reversible during the construction phase. Such temporary impacts pertain to air pollution, noise, and disposal of construction wastes, which have been addressed in the EIA. Apart from the environmental mitigation measures, the EMP includes institutional arrangements and budget for project implementation and monitoring.

50. **Climate Change Risks and Opportunities.** The project will take into consideration the climate change effects of an anticipated continuous increase in ambient temperature, the intensity of cyclones, storm surges, heavy precipitation events, and sea-level rise. Adaption measures incorporated in the design include: (i) adoption of suitable material in construction for temperature increase; (ii) upstream river training to stabilize channels; (iii) drainage box culverts at required locations; (iv) bridge and culvert design for peak flows; (v) drainage system strengthening on both sides of the road; (vi) granular sub-base drainage layer for the full width of the right of way for effective sub-surface drainage; (vii) bottom of subgrade designed to be 1m above the existing ground level for greenfield alignment to avoid pavement failure by capillary action; and (viii) construction of retaining walls on both sides of the road to retain the embankment. Climate mitigation designs will be built into the technical design with particular reference to solar lamps and rainwater harvesting along the road.

51. **Social Aspects.** The proposed project is expected to generate largely positive social benefits for the local population, including improved travel conditions and road safety. Additionally, the project will lead to the improvement in road connectivity, e.g., to ports and the industries in the vicinity of the project. The improved connectivity between the industries in the region and ports will facilitate more efficient movement of goods. Furthermore, it will decongest the city due to traffic diversion and reduced travel time. Improved connectivity to the ports and national highways will stimulate industrial growth resulting in employment generation.

52. A Resettlement Planning Framework (RPF) consistent with the AIIB ESS 2 (Land Acquisition and Involuntary Resettlement) has been prepared, and disclosed. The RPF has been approved<sup>4</sup> by Government of Tamil Nadu. The RPF requires that the land to be acquired<sup>5</sup> by adopting the procedures laid down in the Tamil Nadu Highways Act (TNHA), 2001 and determination of compensation and provision of rehabilitation and

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<sup>4</sup> RPF and Entitlement Matrix approved vide G.O Ms. No.78 dated 19.05.2022

<sup>5</sup> The amendment to RFCTLARR Act, by introducing Sec 105A through the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (Tamil Nadu Amendment) Act, 2014, ratified the use of procedure laid down in TNHA for land acquisition

resettlement will be in accordance with the provisions of the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (RFCTLARR) and ESS 2 of the AIIB Environmental and Social Framework (ESF), approved in February 2016 (Amended February 2019 and May 2021). Roughly 420 hectares (ha) - private land 314 ha and government land 106 ha - is required for the entire project. As of December 2022, all Government land and roughly 279 ha (66 percent) of private land have been acquired, following the approved RPF provisions. The land acquisition is expected to be completed by March 2023. The project involves impact to - 963 titleholder affected families, 268 non-titleholder affected families, 1,838 landowners losing their agricultural land, 37 tenants and 570 employees. A total of 576 structures will be affected, out of which 393 are residential and 84 are commercial structures and the remaining 99 structures are a mixture of residential and commercial use. Besides structures, 74 common property resources (CPRs) will be impacted by the land acquisition. In addition to the PMC, a Land Acquisition, Resettlement and Rehabilitation (LARR) implementation consultant is assisting the implementation of resettlement plans (RP). Furthermore, a LARR monitoring consultant (LARRMC) is conducting concurrent monitoring and supervision. The analysis carried out and reported through a monitoring report by monitoring consultant have indicated that the process in compliance with RPF and RPs. Bank social specialist will closely review the progress and monitoring outcomes and strengthen the process as needed.

53. **Gender, Social Inclusion, and Gender-Based Violence.** The aim of the Chennai Metropolitan Area Comprehensive Mobility plan (CMP), 2019 is to attain people-centric transport system that provides integrated, safe and convenient mobility to all transport users, especially women, children, and other vulnerable groups. Tamil Nadu's draft New Policy for Women 2021 targets improving access of women to employment, reducing discrimination, and eliminating violence against women<sup>6</sup>. The policy further reiterates its commitment to making all forms of city transport systems gender and disabled-friendly. Conducting regular third-party gender safety audits is one of the policy commitments. The Prevention of Sexual Harassment of Women at Workplace Act 2013 requires setting up of an Internal Complaints Committee at workplaces to hear and redress sexual harassment related complaints. The Greater Chennai Corporation has set up a gender and policy lab, under the Chennai City Partnership project, jointly financed by the World Bank and the AIIB. The objective of the lab is to make Chennai safer and bring gender inclusivity to projects. One of the core priorities of the gender lab is to conduct safety audits, which is expected to help in addressing gender, as well as social inclusion, issues under the proposed project.

54. In line with the government priorities, the proposed project aims to promote gender-friendly infrastructure, promote women's empowerment and enhance accessibility to all transport service users, particularly the vulnerable groups. Gender-based Violence (GBV)/Sexual Exploitation and Abuse (SEA) related risks have been assessed to be significant in this project, especially for construction site workers. Furthermore, there are GBV risks linked to infrastructure (being planned to be built under the project) users. Thus, Gender Equality and Social Inclusion (GESI) dimensions have been mainstreamed through the design, implementation, and monitoring of the project

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<sup>6</sup> [https://cms.tn.gov.in/sites/default/files/documents/TN\\_Policy\\_Women\\_2021\\_draft.pdf](https://cms.tn.gov.in/sites/default/files/documents/TN_Policy_Women_2021_draft.pdf)

interventions (see Annex 6 for details). The project will focus on: a) *creating gender-friendly, safe, equitable, and accessible infrastructure*; b) *expanding women's access to employment*, and c) *actively mitigating GBV/SEA risks*. The project will take active steps to ensure that project constructed infrastructure is inclusive and accessible to vulnerable groups, including women, children, elderly, and persons with disabilities. Likewise, women's access to employment will be expanded through skills development training in construction, operations, and maintenance work, as applicable. To address GBV/SEA risks, the project will set up an internal complaints committee as required by the law to ensure that sexual harassment-related grievances are handled timely and effectively. Further, the project will introduce and operationalize the construction workers' Code of Conduct (CoC).

55. The Gender Action Plan (GAP) is being finalized in consultation with the government. Identified GAP actions will be implemented with help from main stakeholders, including the TNHD, the TNRIDC, gender lab, contractors, and others. The GAP will contain timebound actions, along with the entities responsible for these actions and budget requirements. It will also contain a monitoring plan for monitoring planned activities.

56. **Occupational Health and Safety, Labor and Employment Conditions.** The TNRIDC will ensure adequate health and safety measures for their workers, and the bidding documents include clauses on how contractors shall address health and safety requirements. The TNRIDC will also ensure that civil works contractors comply with applicable labor laws and regulations and adopt and enforce workers' Codes of Conduct to mitigate sexual exploitation and abuse (SEA) related risks that may arise, mainly from the influx of migrant workers and worksite-induced SEA. The contractors will be required to prepare a COVID-19 Response and Management Plan in line with the World Health Organization and Gol guidelines, ensuring appropriate health care for affected workers, should the pandemic risks continue during construction.

57. **Stakeholder Engagement, Consultation, and Information Disclosure.** Extensive consultations have been conducted during ongoing field surveys. The consultations will continue on an ongoing basis during the project implementation. The English versions of EIA and SIA/RP, and Tamil versions of the executive summaries of the EIA and SIA/RP have been disclosed on TNHD's<sup>7</sup> and AIIB's<sup>8</sup> websites, and hard copies will be made available at accessible locations in the project area.

58. **Project Grievance Redress Mechanism.** A two-tier project Grievance Redress Mechanism (GRM) has been established, per AIIB's ESP requirements. Communities and individuals who believe that they are adversely affected by the project will be able to submit complaints to the project-level GRM for resolution. In addition to the above,

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<sup>7</sup>[https://www.ckicp.tn.gov.in/Reports/Environment\\_Impact\\_Assessment\\_\(EIA\)\\_Chennai\\_Peripheral\\_Ring\\_Road\\_Project\\_section\\_2and3.pdf](https://www.ckicp.tn.gov.in/Reports/Environment_Impact_Assessment_(EIA)_Chennai_Peripheral_Ring_Road_Project_section_2and3.pdf)  
<https://www.ckicp.tn.gov.in/Reports/EIA%20Report%20in%20Tamil.pdf>  
<https://ckicp.tn.gov.in/Reports/Resettlement%20Planning%20Framework%20Report.pdf>  
<https://ckicp.tn.gov.in/Reports/Excecutive%20Summary%20of%20Resettlemet%20Planning%20Framewo rk%20Report%20-%20Tamil.pdf>  
<https://ckicp.tn.gov.in/Reports/Resettlement%20Plan%20Report%20for%20CPRR%20Section-2.pdf>  
<https://ckicp.tn.gov.in/Reports/Resettlement%20Planning%20Framework%20Report.pdf>

<sup>8</sup> <https://www.aiib.org/en/projects/details/2020/proposed/India-Chennai-Peripheral-Ring-Road.html>

GRM for addressing complaints from the local community will be made available at the contractor level for workers' grievances.

59. **Project-Affected People's Mechanism.** 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 GRM or the processes of AIIB's Management. Information on AIIB's PPM is available at: <https://www.aiib.org/en/about-aiib/who-we-are/project-affected-peoples-mechanism/how-we-assist-you/index.html>

60. **Monitoring and Supervision Arrangements.** The TNRIDC will be responsible for overall coordination, supervision, and monitoring of the project's E&S aspects, which has established an E&S team to manage E&S aspects associated with the design, implementation, and monitoring of the project. The TNRIDC will engage an independent third-party monitoring agency to verify project environmental and social compliance and report every six months. The monitoring reports will be based on field reviews and internal E&S monitoring reports prepared by the TNRIDC with assistance from the PMC. The AIIB plans to conduct the supervision mission twice a year. Depending on the COVID-19 pandemic related travel restrictions, the AIIB team may conduct virtual supervision missions in place of field visits. In such a case, local technical and E&S consultants will be mobilized to monitor project implementation progress. The Bank also plans to use non-traditional ICT-based tools to test their suitability in project monitoring including progress monitoring of E&S activities.

## E. Risks and Mitigation Measures

61. The Bank team has assessed the overall project risks as "High". The table below provides different risk elements, their risk ratings, and the potential mitigation measures. Conditions for loan effectiveness will include the effectiveness of the OPEC Fund Loan Agreement and execution of the AIIB and OPEC Fund Co-financing Agreement. Loan disbursement conditions will include that the TNHD would have retained the Project Management Consultant, Construction Supervision Consultants, Land Acquisition and Resettlement Monitoring Consultant, and Independent Third-Party Environmental & Social Monitoring Consultant to assist with project implementation and monitoring.

**Table 3: Summary of Risks and Mitigating Measures**

Risk Description	Assessment (H/M/L)	Mitigation Measures
<b>Technical – Design</b>	Medium	<ul style="list-style-type: none"> <li>▪ The design of road elements is not complicated.</li> <li>▪ A base design has been prepared by the client, and the contractors' EPC designs will be reviewed by TNHD's (TNRIDC's) consultants.</li> <li>▪ Road safety specialists will be incorporated into the contractor's and TNHD's teams.</li> </ul>

Risk Description	Assessment (H/M/L)	Mitigation Measures
<b>Technical – Construction</b>	Medium	<ul style="list-style-type: none"> <li>▪ Construction is considered straightforward.</li> <li>▪ Access, land availability, and staging of construction will be reviewed by consultants.</li> <li>▪ The tender documents have indicated land availability status so that contractors can plan and bid accordingly.</li> <li>▪ EPC-01 and EPC-02 (Section II) have been awarded. Section I (JICA funded) is expected to be completed concurrently with Sections II and III.</li> </ul>
<b>Technical – Highway Capacity</b>	Medium	<ul style="list-style-type: none"> <li>▪ The latest design accommodates future widening in the median (in both directions).</li> </ul>
<b>Implementation Schedule</b>	High	<ul style="list-style-type: none"> <li>▪ Land availability could become an issue if the land is not made available to the contractors on time. However, the land acquisition process progress is satisfactory (roughly 72 percent of required land is already available). The GoTN has been expediting the acquisition of the remaining land so that there is no land issue when the contractors mobilize to the sites.</li> <li>▪ Both TNHD and TNRIDC are experienced in EPC contract implementation and they will engage adequate number of staff for project management.</li> <li>▪ The PMC and CSCs will help the TNRIDC in the project management and implementation respectively. The project preparedness is good and it is expected that the project will be completed as planned.</li> </ul>
<b>Cost</b>	Medium	<ul style="list-style-type: none"> <li>▪ Updated Detailed Project Reports (DPRs) for Sections II and III have been submitted with recent cost data. There is approximately a 15% cost reduction since the previous DPR, as was noted earlier. This is based on estimated current market conditions and a more thorough estimation.</li> <li>▪ It is also noted that generally EPC contracts for well-defined projects, such as this, are less costly than traditional contracts. Early indication supports such a notion. Bid prices of EPC-01 and EPC-02 are well within the estimated prices.</li> </ul>
<b>Maintenance and Operations</b> (seven	Medium	<ul style="list-style-type: none"> <li>▪ Procurement documents specify the qualifications of bidders with respect to</li> </ul>



Risk Description	Assessment (H/M/L)	Mitigation Measures
years by the EPC contractors)		<p>highway maintenance and operation, and the documents include performance-based standards.</p> <ul style="list-style-type: none"> <li>▪ Furthermore, the EPC contract is formulated in such a way that the maintenance period costs are set by the TNHD as a percentage of the bid for construction costs and therefore the TNHD will be aware of the maintenance costs at bid submission. This will help in budgeting such costs accordingly. The AIIB will not finance highway maintenance and operations. Nonetheless, such an approach provides predictability in project budgeting and financial and technical sustainability of the proposed operation.</li> </ul>
<p><b>Environment, Social &amp; Gender</b></p> <p>Land acquisition &amp; resettlement</p> <p>GBV/SEA</p>	High	<ul style="list-style-type: none"> <li>▪ The PMC will have adequate E&amp;S experts to conduct the internal E&amp;S monitoring.</li> <li>▪ Implementation of the RP will be aided by an RP monitoring consultancy, responsible for concurrent monitoring and reporting.</li> <li>▪ Third-party monitoring will be in place to ensure regular feedback on a semi-annual basis on the implementation of EMP and RP.</li> <li>▪ GAP will be implemented. GESI indicators will be regularly monitored and reported.</li> <li>▪ The AIIB will conduct regular supervision of E&amp;S performances.</li> <li>▪ The progress of the LA process is already substantial. Although the inherent E&amp;S risks have been judged as “High”, there is a specific plan to mitigate them and the residual risks will not be substantial.</li> </ul>
<b>Implementation Capacity</b>	Medium	<ul style="list-style-type: none"> <li>▪ The TNHD and the TNRIDC are experienced in project implementation.</li> <li>▪ Furthermore, consultants (PMC, CSCs, and other E&amp;S consultancies) will support the TNHD in project implementation.</li> <li>▪ The Bank has already engaged a Chennai-based technical consultant. Additionally, more consultants will be hired based on the technical, E&amp;S, and other implementation requirements.</li> </ul>
<b>Procurement</b>	Medium	<ul style="list-style-type: none"> <li>▪ Both Section II contracts (EPC-01 and EPC-02) have already been procured. All three EPC contracts of Section III are in the procurement stage and their procurement is expected to be concluded by early-2023.</li> </ul>

Risk Description	Assessment (H/M/L)	Mitigation Measures
		<ul style="list-style-type: none"> <li>▪ All consultancy contracts have already been procured, barring the CSC for Section III, the procurement process of which has already started and is to be completed by Q1 of 2023.</li> <li>▪ The PDS and the Procurement Plan have been updated, reviewed, and cleared by the Bank.</li> </ul>
<p><b>Financial Management</b> Delay or inadequate release of budget funds</p> <p>Delay in submission of financial reports including project audit reports.</p>	Medium	<ul style="list-style-type: none"> <li>▪ The detailed project financial management arrangements including annual plan/budgets, funds flow, roles, and responsibilities of the PMU and the PIU, audit timelines, etc. have been specified in the project financial management manual and reviewed by the Bank team.</li> </ul>
<b>Overall rating</b>	High	<ul style="list-style-type: none"> <li>▪ The inherent rating is judged as “High” considering overall project risks. However, with the mitigation measures in place or planned, many of the risks could be mitigated substantially.</li> </ul>

### Annex 1: Results Monitoring Framework

The following table provides indicative Results Monitoring Framework. The indicators are discussed and agreed upon with the TNHD and the TNRIDC.

Project Objective	To improve connectivity and road safety in the Chennai Metropolitan Area.										
Indicator Name	Unit of Measure	Baseline Year (2022)	Target Values						End Year	Frequency	Responsible Party
			2023	2024	2025	2026	2027	2028			
<b>Project Objective Indicators</b>											
1. Travel time (Sections II and III of CPRR) between NH-16 and NH-48	Minutes	125 [a]	N/A	N/A	N/A	N/A	60	60	2028	Baseline & Project-end surveys	TNHD
2. Vehicular accidents (on CPRR compared with comparable roads in the vicinity of the project)	Number	103 [a]	N/A	N/A	N/A	N/A	52	52	2028	Baseline and project-end surveys	TNHD
<b>Intermediate Results Indicators</b>											
1. Construction physical progress, cumulative (physical progress of Sections II and III)	%	0	5	20	60	100	100	100	2028	Annual	TNHD/ TNRIDC
2. Employment of local laborers cumulative (Sections II and III; as a % of the total laborers employed by the project)	%	N/A	10	15	20	20	20	20	2028	Annual	TNHD/ TNRIDC
3. Skill training for women cumulative (including engineering surveys, quality management, construction supervision, and heavy construction equipment operation)	Number [of women trained]	0	5	10	15	20	25	30	2028	Annual	TNRIDC/ Contractors
4. Workers' Code of Conduct (mandatory introduction of workers' Code of Conduct by contractors)	Proportion [of contracts]	0	50	75	100	100	100	100	2028	Annual	TNRIDC/ Contractors
5. Gender safety and equitable access (conducting audits and the	Proportion	0	25	50	75	100	100	100	2028	Design/ Implementation/	TNHD/

Project Objective	To improve connectivity and road safety in the Chennai Metropolitan Area.										
Indicator Name	Unit of Measure	Baseline Year (2022)	Target Values						End Year	Frequency	Responsible Party
			2023	2024	2025	2026	2027	2028			
incorporation of audit recommendation(s) ensuring that project-constructed infrastructure is gender-sensitive, with equitable, safe, and accessible features)	[of contracts]									Completion	TNRIDC

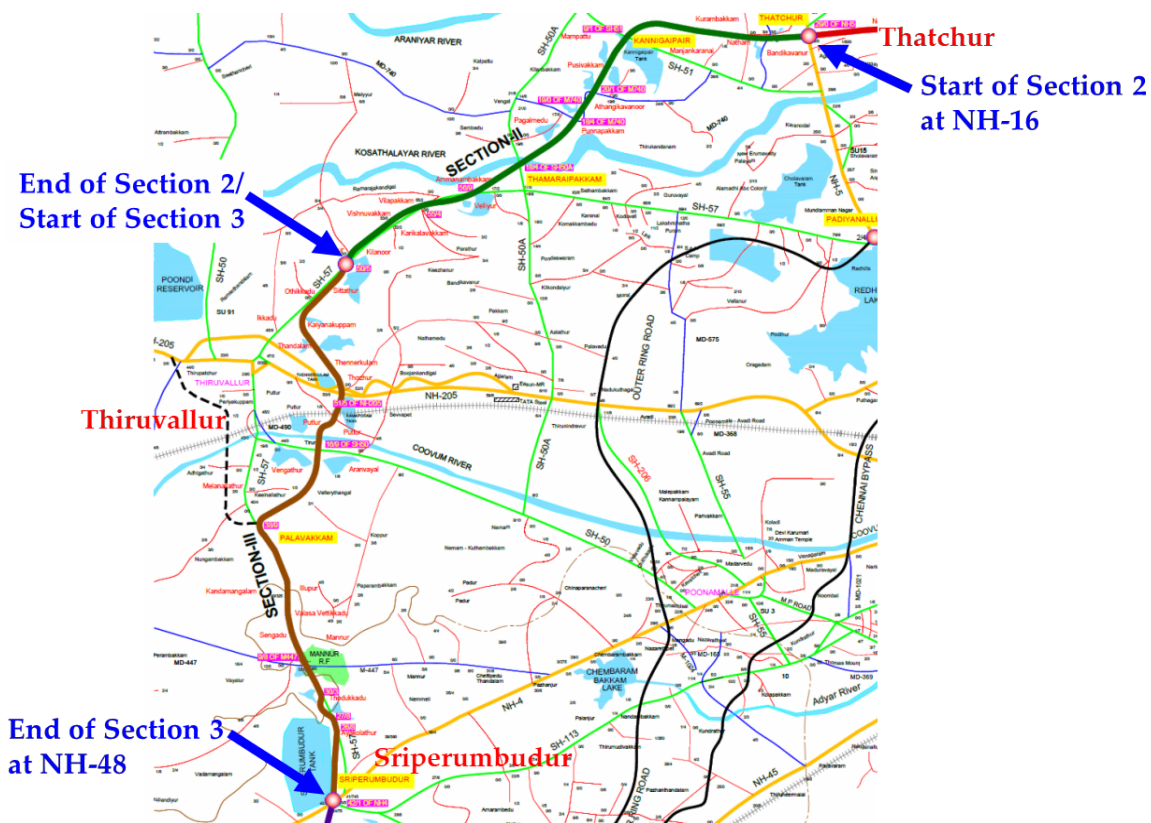
Notes: [a] Baseline figures are based on existing surveys. They will be updated before CPRR opens.

## Annex 2: Detailed Project Description

**A. Project Context.** The Chennai Metropolitan Area (CMA) has an area of 1189km<sup>2</sup> spread over three districts that include the whole of Chennai District (176km<sup>2</sup>), part of Tiruvallur District (637km<sup>2</sup>), and part of Kanchipuram District (376km<sup>2</sup>). Chennai's location on the coast of the Bay of Bengal has resulted generally in radial arterial road patterns in its metropolitan area. The primary radial arterials are National Highway 16 (old NH-5), National Highway 716 (old NH-205), National Highway 48 (old NH-4), and National Highway 32 (old NH-45). Additionally, there are three secondary radial arterial roads: (i) Thiruvotriyur High Road, (ii) Arcot Road between NH-48 and NH-32, and (iii) East Coast Road SH-49. Chennai has three circumferential roads: Inner Ring Road; Chennai Bypass; and Outer Ring Road which connect the radial roads. As Chennai has developed beyond the capacity of the existing road network, a new circumferential road is required. The broader CPRR (Sections I through V) will provide an important transport corridor to improve connectivity around Chennai, connect four National Highways, and connect Ennore and Kattupalli Ports to facilitate the industrial and economic growth of Chennai and Tamil Nadu. The CPRR will reduce travel time/ distance for traffic that does not need to access local roads and hence improve port connectivity and reduce unnecessary congestion on local roads.

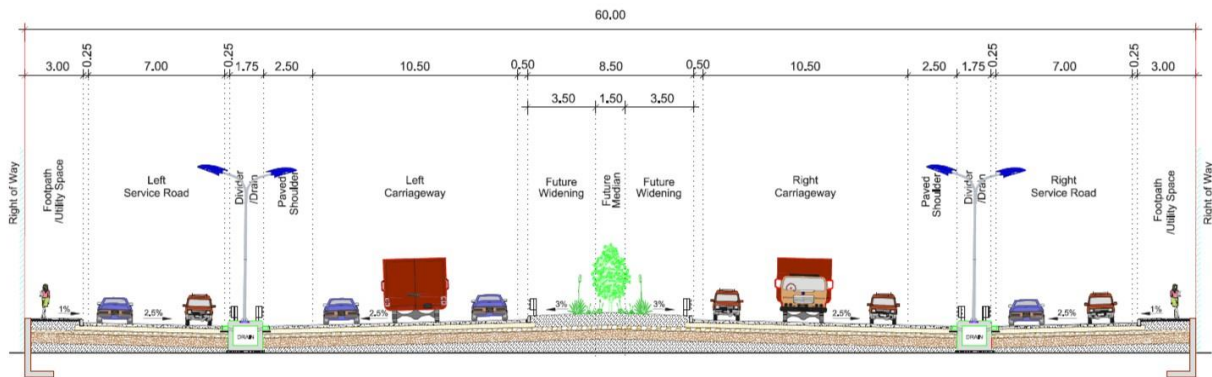
**B. Technical.** The project contracts are being procured using the Engineering-Procurement-Construction (EPC) contract model. The preliminary design developed by TNHD's consultants confirms that the project is technically and economically viable.

### 1. Alignment





2. Roadway Cross Section (Sections II and III)



3. Traffic Projection: in PCU (AADT)<sup>9</sup>

Year	Section II			Section III		
	Main Carriageway	Service Road	Total	Main Carriageway	Service Road	Total
2018	23,984	3,402	27,386	38,666	9,749	48,416
2019	25,216	3,646	28,862	40,695	10,434	51,129
2020	26,512	3,908	30,420	42,832	11,171	54,003
2021	27,875	4,191	32,066	45,082	11,963	57,045
2022	29,308	4,496	33,804	47,451	12,816	60,267
2023	30,816	4,824	35,641	49,947	13,734	63,681
2024	32,402	5,179	37,580	52,575	14,722	67,297
2025	35,761	5,715	41,476	58,024	16,248	74,273
2026	37,602	6,137	43,738	61,080	17,423	78,502
2027	39,538	6,591	46,129	64,297	18,688	82,985
2028	41,575	7,081	48,656	67,687	20,051	87,737
2029	43,504	7,556	51,060	70,901	21,372	92,273
2030	45,522	8,066	53,588	74,269	22,786	97,055
2031	47,636	8,612	56,247	77,799	24,299	102,098
2032	49,848	9,196	59,044	81,499	25,918	107,417
2033	52,163	9,823	61,986	85,377	27,652	113,029
2034	54,345	10,427	64,772	89,036	29,322	118,359
2035	56,619	11,070	67,689	92,854	31,099	123,953
2036	58,989	11,755	70,744	96,838	32,989	129,827
2037	61,458	12,485	73,943	1,00,994	35,000	135,994
2038	64,032	13,261	77,294	1,05,331	37,140	142,472
2039	66,449	14,006	80,455	109,408	39,190	148,598
2040	68,965	14,803	83,768	113,664	41,390	155,054
2041	71,577	15,646	87,224	118,087	43,719	161,806
2042	74,289	16,540	90,829	122,685	46,183	168,868
2043	77,105	17,486	94,591	127,463	48,792	176,255
2044	80,028	18,488	98,516	132,431	51,552	183,983

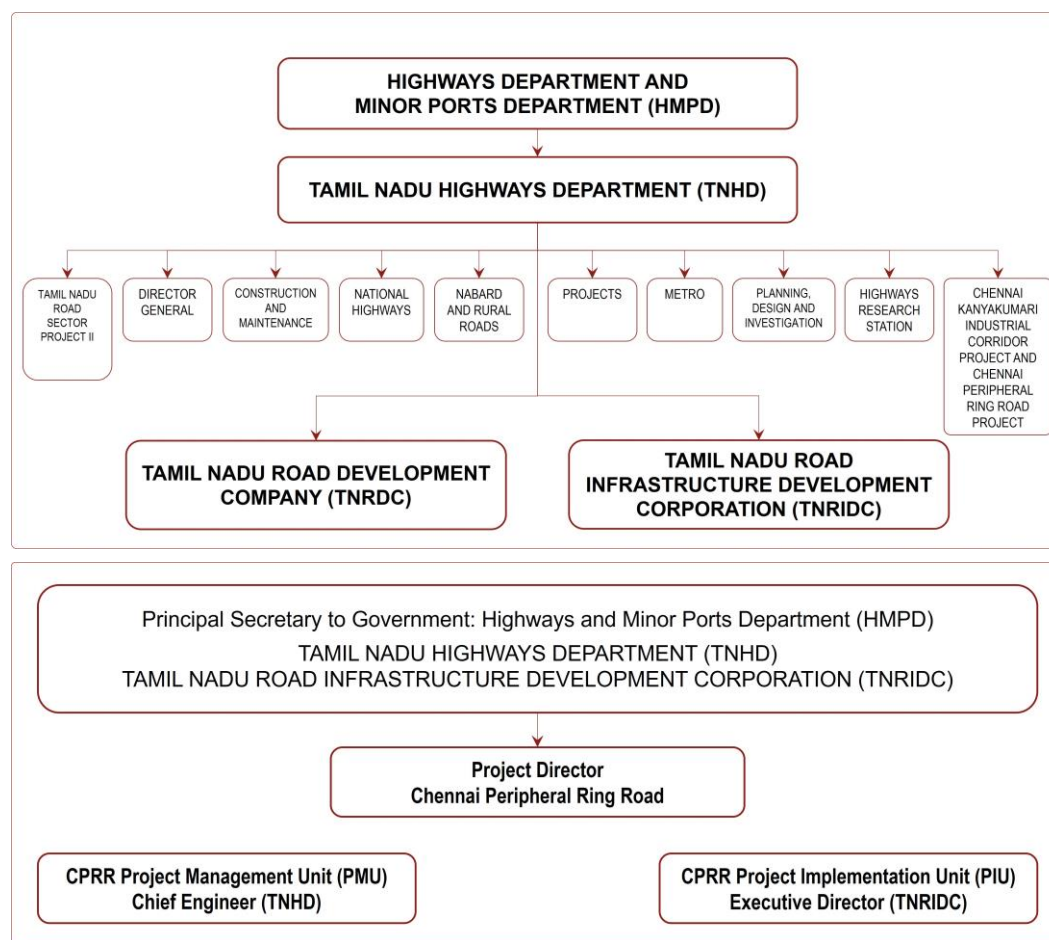
<sup>9</sup> From STUP Consultants DPR for Sections II and III, dated Oct 5, 2020, Table 6.34

### C. Land Acquisition

Section	Stretch	Length (km)			Row (m)	Land Acquisition Area (ha)		
		Existing	New	Total		Private	Govt	Total
II	NH16 to Start of Thiruvallur Bypass	0	26.1	26.10	60	158.04	28.00	186.04
III	NH48 to Start of Thiruvallur Bypass	9.60	20.5	30.10	60	155.89	78.39	234.28
<b>Total</b>		<b>9.60</b>	<b>46.60</b>	<b>56.20</b>		<b>313.93</b>	<b>106.39</b>	<b>420.32</b>

**D. Operations & Maintenance.** Seven-year post-construction operation and maintenance contracts, to be fully financed by the GoTN.

**E. Implementation Arrangement.** Tamil Nadu Department of Highways and Minor Ports (HMPD)<sup>10</sup> includes the Tamil Nadu Highways Department (TNHD), a state departmental agency, which is the overall responsible state entity for the project on behalf of the HMPD. Another agency under HMPD is the Tamil Nadu Road Infrastructure Development Corporation (TNRIDC), an entity wholly owned by the State of Tamil Nadu, which is the implementing agency for the project and will house the Project Implementing Unit (PIU). The TNRIDC is headed by the HMPD Principal Secretary, with the Director General of Highways (TNHD) on its board of directors. The diagram below provides the project implementation and management institutional structure.



<sup>10</sup> <https://www.tn.gov.in/department/13>



## Annex 3: Economic and Financial Analysis

### A. Introduction

**Economic Rationale.** The construction of 133.38 Kms of Chennai Peripheral Ring Road (CPRR) with provision of service roads on both sides focuses on enhancing connectivity around the city, balanced development, efficient freight movement and decongestion within the city, and reducing pollution and travel time. The economic viability of the entire CPRR has been evaluated, considering the quantifiable benefits arising from savings in vehicle operating costs (VOC), savings in travel time costs of passengers and goods (VOT), reduction in greenhouse gas (GHG) emissions, and improved road safety. The corridor was deemed economically viable with the economic internal rate of return (EIRR) and net present value (NPV) estimated at 15.65 percent and INR28,695 million (USD382 million) respectively for the entire CPRR length.<sup>11</sup> Under the present project, a 73 Km stretch of existing roads along Section II and Section III, are being mostly realigned (except 9.6 Km in Section III) with the provision of a six-lane main carriageway and two-lane service road on either side. The realigned length is 56.20 Km.

### B. Approach and Framework of Analysis

**Methodology.** The economic analysis is conducted using a Highway Design and Management (HDM-4) model, which compares the transport cost for road agencies and road users under 'without project' and 'with project' scenarios. The analysis considered 20 years after the implementation period. The EIRR derived from undiscounted net benefit streams has been used to determine the economic viability. Under the 'Without Project' scenario existing road stretch is kept with minimum routine and periodic maintenance while the 'With Project' scenario considers new alignments for six-lane dual carriageway and provides two lane service road on either side with rehabilitation and upgrades to specified standards along with routine and periodic maintenance.<sup>12</sup> The calibration of the model and its sub-models have been done following the local conditions, engineering inputs, and data collected from various concerned departments of the Government of Tamil Nadu as far as feasible.

### C. Demand Analysis

**Base Year AADT.** The traffic assignment on the proposed road sections was carried out based on the traffic volume count survey conducted in 2013 at various locations on and around CPRR alignment along with origin-destination surveys.<sup>13</sup> Based on the analysis with due considerations for future development, the traffic assignment was worked out. It is planned that two-wheelers, auto-rickshaws, and a part of buses (mainly local buses) will move on service roads. The rest of the traffic with long distance regional buses will move along the main carriageway. It is assumed that in the 'With Project' situation, the traffic on the existing road will reduce by 70 percent (only

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<sup>11</sup> The EIRR values for different sections of CPRR are; 10.41 percent for Section I, 19.27 percent for Section II, 18.79 percent for Section III, 32.40 percent for Section 4 and 10.01 percent for Section 5.

<sup>12</sup> Though the alignment for Section III follows the existing road for 9.6km, for simplicity, the full section is considered as new alignment. In the analysis the main carriage way and service road have been considered as new sections, while the existing road will continue to function as link for the local areas.

<sup>13</sup> Survey conducted by STUP Consultants Pvt Ltd for TNRIDC in December 2013 – Refer Table 6.1 of Detailed Project Report-CPRR Section II-Vol 1 and Detailed Project Report-CPRR Section III-Vol 1

30 percent will be moving on the existing road). This 70 percent diverted traffic will move along the proposed main carriageway and service road.<sup>14</sup> In 2020, AADT for Section II is estimated at 10,594 vehicles on the main carriageway and 5,927 vehicles on the service road. For Section III the figures are 19,800 and 15,864 vehicles respectively.<sup>15</sup> The share of goods vehicles comprising multi-axle vehicles (MAVs), 2-axle and 3- axle trucks, and light commercial vehicles (LCVs) is 46 percent and 32 percent in the traffic stream for Section II and Section III, respectively. The presence of two-wheelers in both the sections is quite significant, to the tune of 33 percent and 40 percent respectively (Table A1).

**Table A1: Section-wise Composition of Vehicles**

CPRR Section	Main Carriageway						Service Road			Total
	LCV	2-Axle Truck	3-Axle Truck	MAV	Cars/ Jeep/ Vans	Regional Bus	Local Bus	Two-Wheeler	Passenger Auto Rickshaw	
Section II	8.0	16.7	13.6	8.1	16.0	1.7	2.0	32.6	1.3	100.0
Section III	6.2	12.5	8.5	4.4	21.9	2.0	3.5	40.2	0.8	100.0

**Traffic Forecast.** Traffic growth rates for all categories of vehicles have been estimated based on the past trends of registered motor vehicles and the econometric models as per IRC 108-2015. The econometric models have been developed with respect to relevant economic indicators like Gross State Value Added (GVA), Net State Value Added (NSVA), population of Tamil Nadu, and per capita income (PCI) which influence the growth of the different vehicle categories. The time-series data were collected from RBI<sup>16</sup> and State Government Departments and the elasticity coefficients were derived from empirical models evaluating the relationship between traffic growth and suitable economic indicators.<sup>17</sup> The elasticity values and growth rates calculated have been suitably modified to suit the future traffic scenario for CPRR.

**Traffic Growth Rate.** It is forecasted that GVA, NSVA, and PCI at constant prices will grow at 6.5 percent per annum, 6 percent per annum, and 5 percent per annum respectively on average. Further, the population of Tamil Nadu which is growing at 1.65 percent per annum (2001 and 2011 Census) is likely to grow at 1.5 percent per annum in the future. The growth rate of vehicles is assumed to decline by 10 percent every 5 years after 2028, due to government policies and technological development. For trucks and MAVs the actual growth is less than 3 percent per annum (p.a.) As this is quite low, a value of 5 percent p.a. in the base year is assumed.<sup>18</sup> A generated traffic of 5 percent of each category of vehicles has been assumed from 2024 due to the improvements. The forecast growth rates<sup>19</sup> are shown in Table A2.

**Table A2: Adopted Traffic Growth Rates**

Vehicle Type	2018-2023	2023-2028	2028-2033	2033-2038	2038-onwards	Actual Growth Rate p.a. (2012-2018)
Two-Wheeler	8.51%	8.51%	7.66%	6.89%	6.20%	9.30%
Three Wh./Auto	3.29%	3.29%	2.96%	2.67%	2.40%	3.75%

<sup>14</sup> Based on stakeholder consultations/ expert discussions and IRC 108-2015: Guidelines for Traffic Forecast on Highways

<sup>15</sup> Detailed Project Report-CPRR Section II-Vol 1 and Detailed Project Report-CPRR Section III-Vol 1-Table 6.34

<sup>16</sup> Handbook of Statistics on Indian Economy, RBI-2019-20

<sup>17</sup> State Transport Authority, Govt. of Tamil Nadu

<sup>18</sup> IRC: 37-2012-Tentative Guidelines for the Design of Flexible Pavements

<sup>19</sup> Detailed Project Report-CPRR Section II-Vol 1 – Table 6.33

Vehicle Type	2018-2023	2023-2028	2028-2033	2033-2038	2038-onwards	Actual Growth Rate p.a. (2012-2018)
Car/Jeep	6.44%	6.44%	5.80%	5.22%	4.70%	7.18%
Bus	4.65%	4.65%	4.18%	3.77%	3.39%	4.67%
LCV	5.11%	5.11%	4.60%	4.14%	3.72%	4.90%
2 & 3 Axle Truck	5.00%	5.00%	4.50%	4.05%	3.65%	2.33%
MAV	5.00%	5.00%	4.50%	4.05%	3.65%	2.68%

#### D. Project Cost

**Cost Basis.** For carrying out the economic analysis, the preliminary cost estimate of different sections of the road has been prepared based on cost updating made at 2020-2021 prices by DPR consultants. The financial cost for Section II and Section III has been taken from the Main Reports for those sections.<sup>20 21</sup> The costs for Sections I, IV and V have been estimated by DPR consultants and submitted to the TNRIDC. The construction period for Section II and Section III has been estimated as 3 years starting from 2021. The distribution of cost has been taken as 25 percent in the first year, 45 percent in the second year and 30 percent in the third year.<sup>22</sup> For accurately assessing the value of land acquired for the project, discussions were held with project officials and officials from the GoTN. In Tamil Nadu, land acquisition compensation includes an additional 100 percent solatium on the market rate and cost of rehabilitation. As per estimates given by the TNRIDC, the overall compensation paid is around 250 percent of market value. To capture the opportunity cost, the market value is considered as the land acquisition cost.

**Financial Cost.** The financial cost for Section II and Section III considering the market value of land acquisition and excluding taxes works out to be INR661.609 m/per km (USD8.8m/per km) and INR1,056.545 m/per km (USD14.1 m/per km) respectively. Through discussions and working out broad costing, it has been estimated that the cost of the main carriageway will be 67 percent of the total cost and the rest will be for service road. The total financial cost of the improvement is presented in Table A3.

**Table A3: Financial Cost for CPRR Section II and Section III**

Sl. No.	Description	Cost in Million INR	
		CPRR-Section II	CPRR-Section III
1	Civil Construction Cost	14,240	22,490
2	Goods and Services Tax (12%)	1,710	2,700
3	Lump sum provisions	1,280	2,020
4	Land Acquisition	3,020	15,530
5	Resettlement & Rehabilitation Cost	70	410
6	Utility Shifting	470	670
	<b>Grand Total</b>	<b>20,790</b>	<b>43,820</b>
	<b>Cost for Economic Analysis - considering market value of LA (40% estimated) &amp; excluding taxes</b>	<b>17,268</b>	<b>31,802</b>
	<i>Length-Km</i>	<i>26.10</i>	<i>30.00</i>
	Fin Cost / Km in INR	661.609	1,056.545
	Eco Cost / Km in INR	562.368	898.063

<sup>20</sup> Detailed Project Report-CPRR Section II-Vol 1 – Table 8.1

<sup>21</sup> Detailed Project Report-CPRR Section III-Vol 1 – Table 8.1

<sup>22</sup> Based on discussions with TNHD and TNRSP II officials and information from Design Office

Sl. No.	Description	Cost in Million INR	
		CPRR-Section II	CPRR-Section III
	<b>6 Lane Main Carriageway – 67%</b>		
	Financial Cost in INR	<b>443.278</b>	<b>707.885</b>
	Economic Cost in INR	<b>376.786</b>	<b>601.702</b>
	<b>4 Lane Service Road – 33%</b>		
	Financial Cost in INR	<b>218.331</b>	<b>348.660</b>
	Economic Cost in INR	<b>185.581</b>	<b>296.361</b>

**Conversion Factor.** The economic cost for all the items has been assumed as 85 percent of the financial cost, as advised during the World Bank assisted Tamil Nadu Road Sector Project (TNRSP) in Tamil Nadu.

**Salvage Value.** Salvage value is considered as 20 percent<sup>23</sup> of the economic cost at the end of analysis period. This would include residual values for earthworks, culverts, bridges, etc. which will have a much longer life than the project.

## E. Project Benefits

**Components.** The quantifiable benefits of the project will mainly accrue from vehicle operating cost (VOC) savings, value of travel time (VOT) saving, and saving in maintenance costs. While VOC and VOT have been analyzed through HDM 4, cost reduction due to GHG emissions and accidents have been added externally in the results.

**Average Speed and Roughness.** It is observed that the reduction of travel time for Section II along the main carriageway will be 0.70 hrs. compared with the existing alignment (from 1.06 hrs. to 0.36 hrs.). The average speed on main carriageway will increase from 38.63 kmph in ‘without project’ scenario to 72.94 kmph in ‘with project’ scenario. The reduction of time for Section III worked out as 0.61 hrs. with the increase of speed from 31.39 kmph to 72.81 kmph. The average roughness (IRI) for Section II decreases significantly on main carriageway in ‘with project’ scenario. The average roughness of 4.53 mm/km in ‘without project’ scenario, will reduce to 1.71 mm/km in ‘with project’ scenario. Similar results have been observed for Section III.

**Passenger and Cargo Time Saving Values.** The per capita income of Tamil Nadu is approximately INR218,599, nearly 50 percent higher than the national average.<sup>24</sup> Assuming that 45 percent of the population is engaged in the workforce and they work for 23 days a month, the average wage of a worker is roughly INR220 per hour. However, as a conservative estimate, the analysis assumes an average wage of INR190 per hour with variations for different modes. The working time saving values, per hour per person, assumed were: INR 228 for cars, INR114 for two-wheelers and INR59 for buses/auto-rickshaws. Factors used for deriving these values were: 1.20, 0.60 and 0.31 for cars, two-wheelers and buses/auto-rickshaws respectively of the average wage value. Factors for two-wheelers and buses/auto-rickshaws have been estimated from results of two ADB assisted studies: Jaipur Metro Rail Line 1-Phase B Project and Mumbai Metro

<sup>23</sup> Detailed Project Report (DPR) for various road improvement works under Tamil Nadu Road Sector Project II (PPC-04)- Final Detailed Project Report- 2018-STUP Consultants p Ltd.

<sup>24</sup> Handbook of Statistics on Indian Economy, RBI-2019-20

Rail Systems Project.<sup>25</sup> The figures are geometric average figures from these projects. The Jaipur study quoted figures for two-wheelers and buses/auto-rickshaws were 75 and 35 percent of time saving values of car passengers, respectively. Corresponding figures of the Mumbai study were 45 percent and 27 percent. Non-working time saving values of passengers were valued at 40 percent of the above working time saving values. These financial costs have been converted to economic costs for HDM model inputs. For cargo, the economic time saving values ranged from INR20 per hour for LCVs to INR113 per hour for MAVs. They were estimated from the values used in World Bank's Tamil Nadu Road Sector Projects (TNRSP) studies, using factors to convert them to present levels.

**Avoided cost of Accidents.** Given the lack of accident records on the existing corridor, an effort has been made to estimate the same from average accident rates in Chennai. As per the data from the Ministry of Road Transport and Highways<sup>26</sup> and city authorities, the number of accidents has been estimated at 1.41 per Km per year. The rates for fatality and injury work out to be 0.23 per Km and 1.34 per Km per year, respectively. The number of serious injuries is assumed as 50 percent of the total number of injuries. Moreover, it is further assumed that due to improvements there will be a 50 percent<sup>27</sup> reduction in annual deaths and serious injuries. The value of a fatality and an injury was estimated based on the values indicated in IRC: SP: 30-2009 and factoring it to the year 2020. The estimated economic cost for a fatal accident has been worked out as INR1,642,265 while the same for serious injury as INR744,420. Based on the above facts and other assumptions, the savings in accident cost has been worked out as roughly INR18.0 million and INR14.0 million per year for Section II and Section III, respectively.<sup>28</sup>

**Reduction in Green House Gases.** The project will cause significant reduction in the Green House Gas (GHG) emissions as well as other pollutants, which is largely due to reduced congestion, increased operating speed, and better road conditions in 'With Project' scenario. The reduction for CO2 for Section II is 73.8 percent and for Section III it is 53.1 percent. The costing for CO2 worked out based on World Bank guidelines<sup>29</sup> and the net benefits have been incorporated into the economic analysis.

**Reduction in Maintenance Costs.** The maintenance costs for different sections have been obtained from the HDM analysis. The analysis indicates that the maintenance cost in 'With Project' situation will reduce significantly. The reduction in the economic cost of maintenance is 69.1 percent for Section II and 57.4 percent for Section III.<sup>30</sup>

**Other Unquantifiable Benefits** The improved road transport infrastructure will trigger economic growth in the nearby districts through additional investment, improved access to markets, employment generation, and enhancement of social, health, and educational opportunities. Though quantification of these benefits will be difficult, the economic gain is expected to be

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<sup>25</sup> ADB-Jaipur Metro Rail Line 1-Phase B Project (RRP IND 46417), Oct 2013 and ADB-Mumbai Metro Rail Systems Project (RRP IND 49469), Jan 2019

<sup>26</sup> Road Accidents in India 2018, Ministry of Road Transport and Highways

<sup>27</sup> Case Studies of Implementation: Saving Lives through Safer Roads, IndiaRAP, March 2020

<sup>28</sup> Detailed Project Report-CPRR Section II-Vol 1 and Detailed Project Report-CPRR Section III-Vol 1-Table 9.7

<sup>29</sup> World Bank, 2017, Guidance Note on Shadow Price of Carbon in Economic Analysis

<sup>30</sup> Detailed Project Report-CPRR Section II-Vol 1 and Detailed Project Report-CPRR Section III-Vol 1-Table 9.6

significant.

## F. Economic Analysis

**Undiscounted Cost Stream.** The HDM analysis has been carried out with a discount rate of 12 percent. The undiscounted cost streams for Section II and Section III<sup>31</sup> are shown in Table A4 and Table A5. The negative values in Capex and Opex indicate the salvage value in the former and avoided operation and maintenance costs for the latter in 'With Project' situation (compared to 'Without Project' situation), which adds up as benefits.

**Table A4: Undiscounted Comparison of Cost Streams for Section II**  
*All costs are expressed in INR (million)*

Year	Cost			Benefits					Net Benefits
	Increase in Road Agency Costs			Reduction in Road User Costs					
	Capex	Opex	Total	VOC	VOT	GHG Cost	Accident Cost	Total	
2020	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2021	3,669.44	0.00	3,669.44	0.00	0.00	0.00	0.00	0.00	-3,669.44
2022	6,605.00	0.00	6,605.00	0.00	0.00	0.00	0.00	0.00	-6,605.00
2023	4,403.33	0.00	4,403.33	0.00	0.00	0.00	0.00	0.00	-4,403.33
2024	0.00	0.00	0.00	1,322.66	851.43	22.06	0.00	2,196.15	2,196.15
2025	0.00	0.00	0.00	1,397.51	904.72	25.08	17.97	2,345.28	2,345.28
2026	0.00	0.00	0.00	1,483.78	962.30	28.52	17.97	2,492.57	2,492.57
2027	0.00	0.00	0.00	1,589.11	1,024.24	32.66	17.97	2,663.99	2,663.99
2028	0.00	0.00	0.00	1,723.66	1,090.80	37.14	17.97	2,869.57	2,869.57
2029	0.00	451.95	451.95	1,871.40	1,162.55	42.24	17.97	3,094.16	2,642.21
2030	0.00	0.00	0.00	2,085.22	1,241.31	48.19	17.97	3,392.70	3,392.70
2031	0.00	0.00	0.00	2,294.50	1,331.23	54.94	17.97	3,698.64	3,698.64
2032	0.00	268.63	268.63	2,558.69	1,432.03	63.19	17.97	4,071.88	3,803.25
2033	0.00	0.00	0.00	3,028.82	1,559.31	72.84	17.97	4,678.94	4,678.94
2034	0.00	-1,463.70	-1,463.70	4,836.43	1,909.24	90.60	17.97	6,854.23	8,317.93
2035	0.00	451.95	451.95	2,661.30	1,905.07	91.44	17.97	4,675.78	4,223.83
2036	0.00	0.00	0.00	2,999.95	2,158.47	105.75	17.97	5,282.14	5,282.14
2037	0.00	0.00	0.00	3,399.45	2,470.43	123.14	17.97	6,010.99	6,010.99
2038	0.00	0.00	0.00	3,883.50	2,803.20	144.30	17.97	6,848.98	6,848.98
2039	0.00	0.00	0.00	4,491.89	3,175.98	166.64	17.97	7,852.48	7,852.48
2040	0.00	0.00	0.00	4,934.17	3,348.75	191.31	17.97	8,492.19	8,492.19
2041	0.00	451.95	451.95	5,570.10	3,526.61	216.87	17.97	9,331.55	8,879.60
2042	0.00	-1,195.07	-1,195.07	8,298.38	4,094.50	263.84	17.97	12,674.69	13,869.76
2043	0.00	0.00	0.00	5,446.13	4,307.21	269.84	17.97	10,041.15	10,041.15
2044	-2,935.56	0.00	-2,935.56	6,211.05	4,969.93	313.31	17.97	11,512.26	14,447.82

**Table A5: Undiscounted Comparison of Cost Streams for Section III**  
*All costs are expressed in INR (million)*

Year	Cost			Benefits					Net Benefits
	Increase in Road Agency Costs			Reduction in Road User Costs					
	Capex	Opex	Total	VOC	VOT	GHG Cost	Accident Cost	Total	
2020	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2021	6,757.92	0.00	6,757.92	0.00	0.00	0.00	0.00	0.00	-6,757.92
2022	12,164.26	0.00	12,164.26	0.00	0.00	0.00	0.00	0.00	-12,164.26
2023	8,109.51	0.00	8,109.51	0.00	0.00	0.00	0.00	0.00	-8,109.51
2024	0.00	0.00	0.00	941.18	2,095.01	44.13	0.00	3,080.33	3,080.33
2025	0.00	0.00	0.00	1,174.59	2,430.51	51.89	14.02	3,671.01	3,671.01
2026	0.00	0.00	0.00	1,414.28	2,748.12	60.25	14.02	4,236.66	4,236.66

<sup>31</sup> Detailed Project Report-CPRR Section II & III -Vol 1 – Table 9.9

Year	Cost			Benefits					Net Benefits
	Increase in Road Agency Costs			Reduction in Road User Costs					
	Capex	Opex	Total	VOC	VOT	GHG Cost	Accident Cost	Total	
2027	0.00	0.00	0.00	1,556.96	2,891.98	69.14	14.02	4,532.11	4,532.11
2028	0.00	5.66	5.66	1,726.03	3,037.22	77.83	14.02	4,855.10	4,849.44
2029	0.00	521.21	521.21	2,085.85	3,391.27	89.11	14.02	5,580.25	5,059.03
2030	0.00	0.00	0.00	2,830.63	3,935.40	104.56	14.02	6,884.61	6,884.61
2031	0.00	-1,224.00	-1,224.00	5,242.74	4,952.63	132.87	14.02	10,342.26	11,566.26
2032	0.00	224.64	224.64	3,290.46	5,739.29	142.00	14.02	9,185.76	8,961.12
2033	0.00	0.00	0.00	4,278.89	6,913.94	171.18	14.02	11,378.03	11,378.03
2034	0.00	0.00	0.00	4,500.05	7,236.06	192.88	14.02	11,943.02	11,943.02
2035	0.00	513.94	513.94	4,827.42	7,539.37	211.31	14.02	12,592.12	12,078.19
2036	0.00	0.00	0.00	5,263.03	7,860.67	231.19	14.02	13,368.91	13,368.91
2037	0.00	0.00	0.00	5,382.39	7,863.42	238.52	14.02	13,498.35	13,498.35
2038	0.00	0.00	0.00	5,227.24	7,445.41	230.92	14.02	12,917.59	12,917.59
2039	0.00	-1,224.00	-1,224.00	6,688.69	7,414.23	237.97	14.02	14,354.91	15,578.91
2040	0.00	0.00	0.00	2,105.72	6,557.05	195.16	14.02	8,871.94	8,871.94
2041	0.00	521.21	521.21	1,256.15	6,053.16	180.80	14.02	7,504.12	6,982.91
2042	0.00	217.36	217.36	435.08	5,475.68	164.08	14.02	6,088.86	5,871.49
2043	0.00	0.00	0.00	-253.14	4,833.36	144.72	14.02	4,738.96	4,738.96
2044	-5,406.34	0.00	-5,406.34	-1,084.65	4,071.71	118.88	14.02	3,119.96	8,526.30

**EIRR and NPV.** Considering the costs and the benefits associated with VOC and VOT savings, along with cost savings for GHG emissions and avoided accidents, the EIRR for Section II and Section III work out to be 19.27 percent and 18.79 percent respectively. The corresponding NPV values are INR10,389 million (USD139 million) and INR16,215 million (USD216million). The combined stretch of Section II and Section III gives an EIRR of 18.96 percent with NPV as INR26,603 million (USD355 million). The discount rate in both cases was 12 percent.

**Sensitivity Analysis** Sensitivity analysis is conducted to test the robustness of EIRR to different variations in market and project-specific parameters. The four scenarios are,

- Case – I: Cost increased by 15 percent
- Case – II: Benefit/ traffic decreased by 15 percent
- Case – III: Cost increased by 15% and Benefit decreased by 15 percent
- Case – IV: Project delayed by one year

The sensitivity analysis and switching values are presented in Table A6<sup>32</sup>. It is observed that the EIRR values are more sensitive to reduction of benefits than increase in cost, while project delay by one year does not have any significant impact. Across all the scenarios the project yields a return that is higher than the discount rate and hence can be deemed as economically viable.

**Table A6: Sensitivity Analysis**

<sup>32</sup> Detailed Project Report-CPRR Section II & III -Vol 1 – Table 9.10

	Scenarios	EIRR	NPV	EIRR	NPV	EIRR	NPV
			(INR million)		(INR million)		(INR million)
		Section-2		Section-3		Section-2 & 3	
1	Base case:	19.27%	10,388.68	18.79%	16,214.56	18.96%	26,603.24
2	Construction cost increases by 15%	17.50%	8,672.58	16.98%	13,055.39	17.17%	21,727.97
	<i>Switching Value</i>	90%		77%		81%	
3	Traffic/benefits decrease by 15%	17.22%	7,114.28	16.69%	10,623.21	16.89%	17,737.49
	<i>Switching Value</i>	47%		43%		45%	
4	Both construction costs increase by 15% and benefits decrease by 15%	15.59%	5,398.19	15.00%	7,464.03	15.22%	12,862.22
5	Project delayed by one year	18.99%	8,425.74	18.69%	13,975.75	18.80%	22,401.48



## Annex 4: Member and Sector Context

1. **Country Priority.** India's transport infrastructure has not been able to keep pace with its economic growth and India's urban areas are facing considerable traffic congestion, pollution, and road safety concerns. Continuous improvements to India's transport sector are therefore necessary to facilitate and sustain economic growth and enable urban development. Information about the Republic of India is provided in Annex 5, Sovereign Credit Fact Sheet.
2. **State of Tamil Nadu.**<sup>33</sup> Tamil Nadu is the second largest contributor to India's economy after Maharashtra. It is one of the more developed states in India with a per capita income of INR218,599 (USD2,973) in 2019-20; nearly 50 percent higher than the national average. From 2015-2020, the state's economy grew at an average annual rate of 8.0 percent, which is higher than India's average growth. Manufacturing plays an important role in the state's overall growth, accounting for nearly 20 percent of the output in 2019-2020, slightly lower than the other industrialized states of Gujarat and Maharashtra, but well above the national average of 15.0 percent. Tamil Nadu is the most urbanized state in India with 48.5 percent of the population living in urban areas in 2011 and that is expected to increase to 67 percent by 2030. To meet urban population growth, one of the major projects identified in the Government of Tamil Nadu's VISION 2023 (Tamil Nadu's strategy for infrastructure investment) is the Chennai Peripheral Ring Road (CPRR) to meet projected traffic demand and provide efficient commercial transportation to enhance ports and connectivity.
3. **Chennai Context.** Chennai is the capital of Tamil Nadu and the fourth largest city in India. It is located on the coast of the Bay of Bengal and has grown as a base for the automobile, information technology, hardware manufacturing, and health care industries. Chennai Metropolitan Area (CMA) is 1,189 square kilometers and is part of the golden quadrilateral road network connecting the metropolitan areas of Kolkata, Delhi, and Mumbai. As one of the world's fastest growing cities, Chennai is projected to grow by more than 8 percent annually from 2019 to 2035.
4. Chennai's interlinked transportation system comprises air, sea, road, and rail connections. Its airport has been the fourth busiest in India, after Delhi, Mumbai, and Bangalore. Chennai is also served by two major ports, Chennai and Ennore/Kattupalli. Chennai Port handles the second largest volume of containers in India. Chennai is served by more than five national highway networks. Main road networks within Chennai include the Inner Ring Road, Chennai Bypass Road, and Outer Ring Road (see Figure 1 in the body of this report).
5. **Project's Strategic Fit.** Chennai is forecasted to have a population of over 12.5 million in 2026. With the increasing population, Chennai city is experiencing rapid motorization, leading to increased congestion and pollution. Chennai Comprehensive Mobility Plan (CMP) has identified several mobility and land-use related challenges and suggested eight (8) specific strategies to address them. One of the strategies is the freight management strategy.

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<sup>33</sup> Information provided by AIB's Economics Department

6. The proposed project aligns with the CMP strategies and plans. One of the freight policy principles adopted for Chennai includes restricting heavy vehicles entering the city. The CMP has identified eight freight corridors. The CPRR is one of the CMP freight corridors.

7. Apart from the proposed project, AIB's current and proposed support to Chennai include three other projects: (i) Chennai City Partnership: Sustainable Urban Services Program, PD000477 (under implementation; co-financed with the World Bank); (ii) Chennai Metro Rail Phase 2 Project – Corridor 4, P000301 (under implementation); and (iii) Chennai Metro Rail Phase 2—Balance Corridor 5 - P000368 (under preparation). All these projects are interlinked and they are a part of CMP proposals, barring the Sustainable Urban Services Program, which has cross-cutting transport components.

8. Sustainable Urban Services Program activities will benefit all these ongoing and potential AIB projects. The Program has one distinct transport indicator, which could potentially benefit the proposed project. It is the operationalization of the Chennai Unified Metropolitan Transport Authority (CUMTA)<sup>34</sup> with enhanced capacity and control over sector budget allocation. This indicator will help in overseeing, coordinating, promoting, and monitoring the implementation of various traffic and transportation measures by different agencies in Chennai, including the CPRR.

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<sup>34</sup> CUMTA is established by the State Government in November 2010 (through ACT No. 44 OF 2010) as a coordinating authority in the area of Transport. The overwhelming objective of the creation of the authority is to properly coordinate and streamline activities among different agencies, responsible for the planning, operating and managing transportation system in Chennai Metropolitan Planning Area.

## Annex 5: Sovereign Credit Fact Sheet

### A. Recent Economic Development

1. India is a lower-middle-income country, with a GDP per capita at USD 2277.4 and a population of 1.39 billion in 2021.<sup>1</sup> 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.<sup>23</sup> India's GDP contracted by 6.6 percent in FY2020 (year ending March 2021) on account of stringent lockdown restrictions imposed during the first half of the year. Even though the second wave (April-June 2021) of the pandemic was more severe than the first wave (April-June 2020), the government opted for localized restrictions. With increased mobility and favorable base effect, the Indian economy grew by 8.7 percent in FY2021 even with the Omicron wave happening in January 2021. GDP grew by 13.5 percent in the first quarter of FY2022 on account of pent up demand and a favorable base effect but slowed down to 6.3 percent in the second quarter of FY2022. The economy is expected to slowdown in subsequent quarters due to monetary tightening and weak global demand.

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) reduced key policy rates and introduced measures to reduce the borrowing cost, bolster liquidity, and improve credit flow to the productive sectors. Policy rates remained unchanged with the RBI maintaining an accommodative stance between August 2020 and April 2022. With inflation rising since the last quarter of FY2021, the RBI raised the repo rate by a cumulative 225 basis points since May 2022 which now stands at 6.25 percent. Inflation averaged 7.2 percent in the first half of FY2022 and is likely to gradually ease in the second half. In fact, inflation in November fell below the central bank target of 6 percent, months after it breached the target in January 2022. The currency depreciated by ~8 percent between January and November 2022, primarily due to capital outflows as a response to monetary tightening in advanced economies.

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. Overall deficit moderated to 9.9 percent in FY2021. Revenue collection grew at 32 percent in FY2021, at a pace higher than expected pace due to buoyant tax revenues. This allowed capital expenditure to increase by 39.3 percent in FY2021, well above the initial target of 30 percent. Fiscal deficit during April to October 2022 accounted for 45.6 percent of the annual targeted deficit with both revenue and expenditure being on course to reach targeted levels. High fiscal deficit and a contracting economy resulted in the public debt rising to close to 90 percent of GDP in FY2020. A moderation in the deficit and pickup in economic activity helped public debt to decline to 84.2 percent of GDP in FY2021.

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 transfer, including remittances, remained strong with net inflow of USD 81.2 billion in FY2021. Net FDI inflows remained robust at USD 38.5 billion. During Q1 of FY2022, the current account deficit widened to 2.8 percent of GDP mainly due to the widening of trade deficit. Although

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<sup>1</sup> The income group classification for fiscal year 2020 is based on World Bank criteria.

<sup>2</sup> Data are based on fiscal years. Fiscal year 2021 (FY2021) begins on 1 April 2021 and ends on 31 March 2022.

<sup>3</sup> On Nov. 8, 2016, India's government 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.

remittances and net FDI inflows remained robust, foreign portfolio investment recorded net outflows. External debt stood at USD 617.1 billion in June 2022. India's reserve holdings declined by 17 percent between January and October 2022 as the central bank aimed to reduce currency volatility. Since November 2022, reserves have increased and stands at USD 564.1 billion as of Dec 09, 2022. Reserves remain adequate according to conventional measures.

5. In June 2022, Fitch revised India's outlook to stable in line with Moody's and S&P, 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 while retaining the Baa3 rating. In July 2021, S&P retained India's rating at BBB- with a stable outlook.

## B. Economic Indicators

**Selected Macroeconomic indicators (2019-2022)**

Economic Indicators	FY2019	FY2020	FY2021	FY2022*	FY2023*
Real GDP growth	3.7	-6.6	8.7	6.8	6.1
CPI Inflation (average, % change)	4.8	6.2	5.5	6.9	5.1
Current account balance (% of GDP)	-0.9	0.9	-1.2	-3.5	-2.9
General government overall balance (% of GDP)	-7.5	-12.8	-9.9	-9.8	-9.0
General government gross debt (% of GDP)	75.1	89.2	84.2	83.4	83.8
Public gross financing needs (% of GDP)	11.6	17.2	16.5	15.2	14.4
External debt (% of GDP)	19.5	21.4	21.8	21.7	
Gross international reserves (USD billions) 2/	475.6	579.3	617.6	564.1	
Exchange rate (INR/USD, EOP) 2/	75.4	73.5	75.8	82.6	

Note: FY 2021 ran from April 1, 2021 to March 31, 2022

\* Denotes projected figures

1/Data for 2021-22 are AIIB Staff Projections based on IMF

2/Reserves and exchange rate are sourced from RBI and pertain to early-December 2022.

Source: IMF World Economic Outlook October 2022, Reserve Bank of India, and IMF Country Report 21/230.

## C. Economic Outlook and Risks

6. The economy is expected to grow at 6.8 percent and 6.1 percent in FY2022 and FY2023 respectively, according to IMF. The severity of the COVID-19 pandemic is expected to subside with a pickup in vaccination rate. However, an expected global recession and further monetary tightening as a response to fighting domestic inflation would curb demand. Private consumption will be affected as higher inflation erodes away purchasing power. The government's subsidized food, fertilizer and gas distribution will help offset some of the effects of high inflation. 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 manufacturing sector.

7. Overall inflation is expected to remain elevated at around 6.7 percent in FY2022 before moderating to ~5 percent from FY2023 onwards due to easing of commodity prices. In May 2022, the RBI indicated withdrawal of its accommodative stance in response to sustained inflation. Persistent domestic inflation and the fear of imported inflation through strengthening of the dollar may push the RBI to further raise interest rates.

8. General government fiscal deficit in FY2022 is expected to moderate slightly to 9.8 percent of GDP as tax revenues increase on the back of improved economic activity. Fiscal pressures

could strengthen due to rising subsidy burden and as an hikes in policy rate increase the cost of borrowing.

9. Public debt, is expected to further moderate to 83.4 percent of GDP in FY2022 and is expected to remain stable in the medium term. Despite being high, India's public debt remains sustainable given favorable debt dynamics and the projected economic growth trend in the medium term. Furthermore, with public debt having a long and medium maturity, being denominated in domestic currency, and primarily held by residents, the debt profile is favorable. India's external debt is expected to remain stable.

10. The current account deficit is projected at 3.5 percent of GDP for FY2022 owing to a slower than expected export growth due to the global slowdown and a higher import bill. Remittances may remain strong as a depreciating rupee makes remittances more lucrative.

## Annex 6: Gender, Social Inclusion, Gender-Based Violence

1. In addition to the project's main objective of improving transport connectivity, the proposed project is designed to have a positive impact on advancing gender equality and empowerment of women. The project will contribute to the vision of Comprehensive Mobility plan (CMP), 2019 for Chennai Metropolitan Area to attain people-centric transport system that provides integrated, safe and convenient mobility to all transport users, especially women, children, and other vulnerable groups.
2. The Government of India has launched several initiatives to improve social, political, and economic empowerment of women and girls<sup>38</sup>. However, gender gaps remain. The World Economic Forum has ranked India 140<sup>th</sup> among 156 countries in the 2021 Global Gender Gap Report, plummeting 28 positions from 2020. In South Asia, the country stands in 6<sup>th</sup> position. Likewise, Gender Inequality Index (GII) which measures gender disparity in empowerment and labor market, ranks India 123<sup>rd</sup> among 162 countries. The major attributing factor to the low ranking of the country includes the low labor participation rate of women (20.5%) as compared to men (76.1%).
3. The National Family Health Survey-5 (NFHS) (2019-2021)<sup>39</sup> demonstrates that Tamil Nadu is one of the best performing states on different parameters related to gender equality, including a higher female labor force participation rate (FLFPR).<sup>40</sup> Nonetheless, gaps remain, especially in the effective participation of women in formal employment and the prevalence of gender-based violence.<sup>41</sup> 38.1 percent of ever-married women aged 18-49 experienced gender-based violence (GBV), figure quoted by the NFHS. The figure is higher than the national average of 29.3 percent. In the midst of growing incidents of harassment in public spaces, a reputable Indian daily in March 2022<sup>42</sup> questioned the safety of women in Chennai. The paper reported that an overwhelming proportion of women (over four-fifths) experienced sexual harassment on public transport, per a 2019 survey.
4. In December 2021, the state government of Tamil Nadu presented a new draft policy for women to enhance access of women to all services (e.g., health, education, employment, skills, and training), reduce discrimination, and eliminate violence against women.<sup>43</sup> Core policy objectives comprise increasing women's participation in the workforce leading to a 40% share of Gross State Domestic Product and providing safe and women-friendly public spaces and workspaces. The policy further reiterates its commitment to making all forms of transport systems gender and disabled friendly. One of the activities proposed by the policy is to conduct regular third-party gender safety audit(s) to ensure safe public workspaces for women. Additionally, the state's policy for women has envisioned the creation of 10,000 jobs for women. The Prevention

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<sup>38</sup> [https://cms.tn.gov.in/sites/default/files/documents/TN\\_Policy\\_Women\\_2021\\_draft.pdf](https://cms.tn.gov.in/sites/default/files/documents/TN_Policy_Women_2021_draft.pdf)[https://pib.gov.in/PressReleasePage.aspx?PRID=1707475#:~:text=Beti%20Bachao%20Beti%20Padhao%20\(BBBP,and%20security%20for%20working%20women](https://pib.gov.in/PressReleasePage.aspx?PRID=1707475#:~:text=Beti%20Bachao%20Beti%20Padhao%20(BBBP,and%20security%20for%20working%20women).

<sup>39</sup> [http://rchiips.org/nfhs/NFHS-5\\_FCTS/Tamil\\_Nadu.pdf](http://rchiips.org/nfhs/NFHS-5_FCTS/Tamil_Nadu.pdf)

<sup>40</sup> The rural FLFPR for Tamil Nadu is 35.1%, which is 15.4% higher than the national figure. Urban FLFPR in TN is 23.6%, 7.5% higher than all of India average.

<sup>41</sup> [https://wcd.nic.in/sites/default/files/draft%20national%20policy%20for%20women%202016\\_0.pdf](https://wcd.nic.in/sites/default/files/draft%20national%20policy%20for%20women%202016_0.pdf)

<sup>42</sup> <https://www.newindianexpress.com/cities/chennai/2022/mar/22/is-chennai-really-safe-for-women-question-arises-amid-growing-incidents-of-harassment-at-public-spaces-2432765.html>

<sup>43</sup> [https://cms.tn.gov.in/sites/default/files/documents/TN\\_Policy\\_Women\\_2021\\_draft.pdf](https://cms.tn.gov.in/sites/default/files/documents/TN_Policy_Women_2021_draft.pdf)

of Sexual Harassment of Women at Workplace Act 2013 requires setting up of an Internal Complaints Committee.

5. To complement the policy efforts, the government has also launched programs that target gender equality and women's empowerment. For example, the Greater Chennai Corporation has set up a gender and policy lab, under the Chennai City Partnership project, which is jointly financed by the World Bank and the AIIB. The objective of the lab is to make Chennai safer and bring gender inclusivity to projects. One of the priorities of the gender lab is to conduct safety audits, which will guide the CPRR Gender Action Plan (GAP).

6. Advancing gender equality, promoting women's empowerment, and enhancing access to all transport service users is an important and deliberate objective of the CPRR project; thus, gender equality and inclusion dimensions have been mainstreamed through the design, implementation, and monitoring of the project interventions. In particular, the project will focus on: *a) creating gender-friendly, equitable, and accessible infrastructure; b) expanding women's access to employment, and c) addressing gender-based violence.* The project will take active steps to ensure that project constructed infrastructure is inclusive and accessible to vulnerable groups, including women, children, and persons with disabilities. Likewise, women's access to employment will be expanded through skills development training in construction, operations, and maintenance work, as found feasible. To address GBV, the project will help set up an internal complaints committee as required by the law to ensure that sexual harassment-related grievances are handled timely and effectively. Further, the project will develop and implement Code of Conduct on GBV/sexual exploitation and abuse (SEA) at the construction site for all construction workers to reduce GBV/SEA risks. This measure is intended to address potential GBV/SEA risks due to the presence of migrant workers on large construction sites like the planned construction packages proposed under the project.

7. The following approaches will be used to mainstream the gender equality and inclusion perspective in the project:

- a) Incorporation of gender-specific performance indicators and targets in the project's monitoring framework, operations manual, and implementation plan; and
- b) Development and implementation of the Gender Action Plan (GAP)

8. The following are the proposed indicators for the project:

*Area 1. Gender-friendly and accessible infrastructure*

Gender safety audits<sup>44</sup> and incorporation of audit recommendation(s) to ensure that project constructed infrastructure incorporates gender-sensitive, equitable, safe, and accessible features in the project's design and implementation.

*Area 2. Addressing GBV/SEA risks*

Mandatory introduction of workers' GBV Code of Conduct in project contracts.

*Area 3. Enhancing women's access to employment*

Skill training for women (including engineering surveys, quality management, construction supervision and heavy construction equipment operation).

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<sup>44</sup> With the help of Tamil Nadu Gender Lab and incorporate audit recommendation (s)