



**ASIAN INFRASTRUCTURE  
INVESTMENT BANK**

P000440-IND  
June 13, 2022

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**Sovereign-Backed Financing**

**Project Document**

**P000440 India: Assam Secondary Road Network Improvement Project**

## **Currency Equivalents**

(As at Sep. 22, 2021)

Currency Unit – Indian Rupee (INR)

INR1.00 = USD0.014

USD1.00 = INR73.69

## **Borrower's Fiscal year**

April 1-March 31

## **Abbreviations**

ADB	Asian Development Bank
AIIB	Asian Infrastructure Investment Bank
ASRB	Assam State Road Board
ASRP	Assam Secondary Road Project
CCTV	closed-circuit television
COVID-19	coronavirus disease
EIA	environmental impact assessment
E&S	environmental and social
EPC	engineering, procurement and construction
ESMP	environmental and social management plan
ESMPF	environmental and social management plan framework
ESP	Environmental and Social Policy
ESS	Environmental and Social Standard
FY	fiscal year
GAP	gender action plan
GDP	gross domestic product
HDM-4	Highway Development and Management Model-4
IPP	indigenous peoples plan
IPPF	indigenous peoples planning framework
IT	information technology
MDB	multilateral development bank
MDR	major district road
NER	North-East Region
PMU	project management unit
PWRD	Public Works Roads Department
RAMS	road asset management system
RP	resettlement plan
SWRF	shadow wage rate factor
SIA	social impact assessment
VOC	vehicle operating costs

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## 1. Summary Sheet

Project No.	000440-IND
Project Name	Assam Secondary Road Network Improvement Project
AIIB Member	Republic of India
Borrower	Republic of India
Project Implementing Entity	Government of Assam
Sector	Transport
Subsector	Roads
Project Objective	To improve the connectivity, safety and climate resilience of the secondary road network in project districts of Assam and enhance the institutional capacity of the state's Public Works Roads Department (PWRD).
Project Description	<p>The project has three components:</p> <ul style="list-style-type: none"> <li>A. Road Improvement. Two subcomponents are included in this component: (1) upgrading about 250 kilometers (km) of state highways and major district roads (MDRs); and (2) retrofitting road safety engineering measures on about 750 km of state highways and MDRs.</li> <li>B. Modernization of PWRD's road asset management system and computerization.</li> <li>C. Project management support and institutional capacity building.</li> </ul>
Implementation Period	<p>Start date: June 30, 2022</p> <p>Indicative end date: December 31, 2027</p>
Expected Loan Closing Date	December 2027
Cost and Financing Plan	<p>Project cost: USD491 million</p> <p>Financing plan</p> <p>AIIB loan: USD320 million</p> <p>Government of Assam: USD171 million</p>
Size and Terms of AIIB Loan	USD320 million with a final maturity of 24 years, including a grace period of six years, at AIIB's standard interest rate for sovereign-backed loans.
Environmental and Social Category	Category A
Risk (Low/Medium/High)	Medium
Key Covenants	<p>(a) On a quarterly basis, the Government of Assam shall release funds based on projections to the designated bank account of the project under the Assam State Road Board.</p> <p>(b) Five-year post-construction road maintenance shall be included in the road-upgrading contracts (about 250 km). However, the road maintenance portion of these contracts shall be solely funded by the Government of Assam.</p>

Conditions for Disbursement	The project operations manual needs to be in place and concurred by AIIB.
Retroactive Financing (Loan % and dates)	All eligible expenditures under the Project, incurred in compliance with AIIB's procurement policies and guidelines and in respect of which payments were made not more than 12 months prior to the date of the loan agreement, up to an amount of USD64 million (20% of the amount of the Loan).
Policy Assurance	The Vice President, Policy and Strategy, confirms an overall assurance that AIIB is in compliance with the policies applicable to the Project.

President	Jin Liqun
Vice President	Urjit Patel
Director General	Rajat Misra
Team Leader	Weimin Zhou, Investment Operations Specialist
Back-Up Team Leader	Pratyush Mishra, Investment Operations Specialist
Team Members	Gerardo Pio Parco, Senior Environmental Specialist Christopher Damandl, Senior Counsel Yangzom, Procurement Specialist Yogesh Malla, Financial Management Specialist Sheikh Naveed Ahmed, Social Development Specialist Ashok Kumar, Consultant Rakhi Basu, Consultant Yan Li, Consultant

## 2. Project Description

### A. Project Overview

1. **Assam, in the North-East Region (NER) of India, faces economic development challenges and opportunities.** As per the 2011 census, Assam's total population was about 31.2 million with 49 percent females. Assam is one of the least-developed states in India. In FY2021, India's per capita GDP was USD 2,281 while Assam's per capita GSDP was USD 1,618 making Assam's per capita income about 30 percent lower than the national average. 32.7 percent of Assam's population are poor (national average is 25 percent)<sup>1</sup>. Its economy is largely agricultural with 70 percent of its employment being derived from this sector. Assam contributes to half the country's total tea production<sup>2</sup>, and about 20 percent of the tea produced in India is exported to other countries. Notwithstanding, Assam also has established industries, relying on its rich natural resources, especially in Dibrugarh and other districts of upper Assam. The region's rich and diverse cultural and tourist attractions provide great opportunities for the development of eco-tourism, which, together with existing economic sectors, presents a solid foundation for greater development potential.

2. **The residents of Assam have been facing issues of connectivity and accessibility, especially to employment centers and essential social services.** Assam being a primarily agricultural economy, most of the population lives at a distance from quality social services, including hospitals and schools. 11 percent of Assam's population are tribal, mostly living in remote locations. Maternal mortality rates in Assam are among the highest in the country, and gender gaps in schooling have widened since 2005<sup>3</sup>. This is especially apparent in the riverine island of Majuli, with a population of about 165,000, which still lacks all-weather road connectivity to other parts of the state. Challenges in connectivity also hinder employment opportunities. The unemployment rate in Assam is around 6.1 percent, compared to the national average of 5.1 percent. Participation of women in the labor force is also low at about 18 percent<sup>4</sup>. Poor road connectivity leads to relatively higher transport costs (about 20-50 percent higher), constrains free movement of the rural workforce<sup>5</sup> and industrial products (such as tea). It also limits accessibility to national and international markets, growth opportunities, and essential social facilities such as hospitals and schools.

3. **Assam's road infrastructure is underdeveloped and also faces climate-related risks.** The road network is responsible for most of the freight traffic (70 percent) and passenger traffic (92 percent) in Assam. However, Assam's roads are poorly maintained and lack safety measures, hampering connectivity. This is especially apparent in the state's secondary road network (state highways and major district roads

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<sup>1</sup> [India National Multidimensional Poverty Index Baseline Report](#), based on the national family health survey-4 (2015-2016), NITI Aayog, 2021.

<sup>2</sup> As of 2019, India was the second largest tea producer in the world with production of 1,339.7 million kilograms. About 20 percent of the tea produced in India is exported to other countries (Indian Tea Association)

<sup>3</sup> World Bank's India States Brief 2018 for Assam.

<sup>4</sup> World Bank's India States Brief 2018 for Assam.

<sup>5</sup> Women, tribals, marginal farmers and unserved population

[MDRs)]<sup>6</sup>. About 60 percent of secondary roads are in poor condition, with damaged pavements, inadequate geometry, low capacity, road safety issues, and inadequate drainage. Under-developed secondary roads also offset the benefits of large investments in rural roads and national highways<sup>7</sup>. Road infrastructure in the state faces environmental and climate-related risks. Most of Assam lies in the Brahmaputra and Barak river basins, making it one of the most flood-prone areas in India. The network is also prone to landslides, temperature increases and earthquakes.<sup>8</sup>

4. **Assam is committed to achieving Sustainable Development Goals (SDGs) through its “Assam Vision 2030”<sup>9</sup>, which identifies expediting road network development as one of the key priorities for economic and social connectivity.** Enhanced road connectivity will not only reduce transport costs, but promote gender empowerment and social and economic integration of the underserved population. The Assam government, to support Assam Vision 2030, has launched a flagship program, Asom Mala<sup>10</sup>, to develop high-quality secondary roads over the next 15 years to boost economic activity and promote inclusive growth. The roads under Asom Mala are selected as important transport links to connect industrial nodes, emerging urbanized areas, social services with underserved populations to maximize the development impacts. The Assam Secondary Road Network Improvement Project supports this agenda not only by intervening in the Assam secondary road network but also by adding value on climate adaptation, road safety, environmental and social (E&S) sustainability, technology-enabled infrastructure and capacity building.

5. **Project Objective.** The objective of the project is to improve the connectivity, safety and climate resilience of the secondary road network in project districts of Assam and to enhance the institutional capacity of the state’s Public Works Roads Department (PWRD).

6. **Project Description.** The project will support the Asom Mala program by developing the secondary road network (including state highways and MDRs) in upper Assam to harness the rich but underdeveloped economic potential of this region and to provide essential connectivity to social services, through the following:

- (a) **Physical investments.** Upgrading about 250 km of secondary roads with enhanced climate adaptation and road safety measures and retrofitting road safety engineering measures in another 750 km of secondary roads.
- (b) **Technology.** Modernization of PWRD’s road asset management system (RAMS), by using cloud-based technology and advanced information technology (IT) infrastructure, to promote modern asset management

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<sup>6</sup> Data from PWRD. Assam has 6,832 km of secondary roads, which is 12% of total road length.

<sup>7</sup> 1,630 km of national highways are sanctioned during the last 5 year in Assam to connect the state with NER and mainland India and internationally with Bangladesh, Bhutan and Myanmar. About 30,000 km rural roads constructed under PMGSY (the national program for rural roads).

<sup>8</sup> Based on the project’s climate and geological risk-screening exercise.

<sup>9</sup> Assam Agenda 2030: transformation and development, is a document outlines strategies and actions for achieving sustainable development goals of Assam.

<sup>10</sup> Asom Mala focuses on improving state highways and MDRs in Assam. The roads to be improved are in the pipeline based on their importance and performance. Asom Mala will receive funding from the Assam government and external resources. The AIIB stand-alone project will support the proposed roads included in Asom Mala.

practices. The RAMS will improve PWRD's efficiency through cloud platform and facilitating remote access.

- (c) **Technical Assistance.** Project management support and institutional capacity building, including consultancies to support project implementation, training and technical assistance.

7. **Expected Results.** The key project results will be monitored through the following result indicators (Annex 1):

- (a) Population benefited from improved, safe and climate-resilient road connectivity (total/females) – gender disaggregated indicator.
- (b) Travel time reduction on project corridors (percentage).
- (c) Secondary roads conforming to prescribed road safety standards of the Indian Roads Congress (km).
- (d) Use of cloud-based technology and automated processes in PWRD's RAMS for department operations (yes or no).
- (e) Secondary roads conforming to climate-resilient and green designs (km).
- (f) 75 percent of women surveyed among communities are satisfied with the improvement of project roads (percentage).
- (g) CO<sub>2</sub> emissions avoided because of fuel savings estimated at about 1.62 million tons over the lifetime of the upgraded corridors (20 years). Because data collection is difficult, however, emissions are not included as a result indicator.

8. **Expected Beneficiaries.** The population within the access coverage of the project roads, who are expected to be the primary road users, will be the main beneficiaries of this project. The estimated main beneficiaries, benefiting from enhanced connectivity and road safety, are about 2.1 million people<sup>11</sup>, 49% of which are female. Considering the fact that the future benefits of the project are multi-fold, other expected beneficiaries are as follows:

*Beneficiaries of economic development*

9. Industries, businesses and tea gardens in the larger project area will benefit from the enhanced connectivity to all-weather and safer roads, resulting in improved market access. The expected reduction in transport costs of about 20 percent and travel time of about 30 percent will enhance their competitiveness and revenues. The project will incentivize small businesses (including tourism), small farmers and other private players to invest in the growth opportunities unlocked through the project corridors.

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<sup>11</sup> Projection Analysis to year 2021 using Census of India 2011



10. With improved roads, tea gardens are expected to be able to access international markets through a multi-modal logistics hub being developed at Jogighopa (for onward transport of tea to international markets using waterways, which are a cheaper mode of transport). Small tea gardens, contributing to almost 50 percent of Assam's tea production, are generally located at a considerable distance from tea processing facilities. Reduced travel time and costs will benefit small growers immensely and help reduce the spoilage of tea leaves and to enhance the tea quality.<sup>12</sup> The 45 tea gardens, 13 industrial parks<sup>13</sup> serviced by the project corridors in upper Assam will especially benefit.

Beneficiaries of social connectivity

11. Evidence from Indian road projects suggests that road improvements lead to significant impacts on poverty reduction and shared prosperity<sup>14</sup>. Benefits include increased household income by way of employment generation, and improved access to markets, health and educational services. The population in the project areas will benefit from faster, safer and climate-resilient access to social facilities. The project roads will link them to 109 educational institutes and 42 health care institutes/hospitals on both sides of the roads. With better integration of rural roads and national roads, beneficiaries are expected to be able to increase access to a better variety and quality of social facilities.

12. Additionally, the project will benefit the local workforce through direct employment. About 15 million-person days of employment are expected to be generated through road construction and maintenance works under the project.<sup>15</sup> The project will also create jobs through better-performing agriculture, industries and tourism resulting from improved transport access and reduced travel costs.

13. Other significant beneficiaries of social connectivity under the project are as follows:

- (1) Inhabitants of Majuli island. Majuli has a population of about 165,000 and is encompassed by the Brahmaputra River and its tributaries. The island currently has no all-weather road connectivity with the rest of Assam and is heavily dependent on ferry services. During project preparation, several public consultations, focusing on the residents of Majuli, were organized. These consultations highlighted the difficulties in connectivity with good health care and education facilities, job opportunities, and markets for sale of products, all of which are located outside the island. The project permanently connects Majuli with the rest of the state and India by building two bridges over the Subansiri and Luit rivers. The bridges will reduce the travel time by road from Majuli to the nearest national highway by three hours, and to the nearest urban center by two hours. The permanent and increased

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<sup>12</sup> *The small tea grower's of Assam: A study of their monopsonistic exploitation and production*. Thesis by Karabi Das, IIT Guwahati, 2019

<sup>13</sup> Data provided by PWRD

<sup>14</sup> Implementation Completion and Results Report of Assam State Road Project, the World Bank, 2020

<sup>15</sup> Estimated by PWRD based on previous road-construction experiences.

accessibility will help the residents of Majuli avail quality social facilities and improve employment opportunities.

- (2) Women and other vulnerable groups. The road design of this project is gender-informed, based on the suggestions and travel patterns of women obtained during gender-focused public consultations. The design was adapted to include better streetlights, pedestrian crossings, sidewalks, and speed calming facilities benefit female road users. Specifically, 102 bus shelters are to be constructed under this project. These shelters shall increase the safety and comfort of bus services, which are the main mode of motorized transport for women in the state. The enhanced bus services will significantly improve the mobility of women in Assam and open up better education and employment opportunities for them. A project-level gender action plan has also been prepared and disclosed, which will mitigate the social risks and ensure that women's voices are heard. (Annex 2.2 summarizes the key approaches of this project for gender mainstreaming)

#### Beneficiaries of capacity building

14. PWRD will benefit from the enhanced RAMS, modernized IT environment, increased capacity in project management, sector planning and sustainable financing. Pilots for road sensors and intelligent transport devices, roadside amenities and road safety equipment will help the institution explore innovative road operation measures. Female PWRD employees' participation in the training programs organized under the project will be specifically tracked and monitored.

## **B. Rationale**

15. **Strategic Fit for AIIB.** The project is well aligned with the thematic priorities of AIIB's corporate strategy, particularly the following:

- (a) **Green infrastructure.** Given that Assam is expected to see increased rainfall and storm surges, climate adaptation measures are incorporated into the designs of the road upgrades, including the road elevation, special pavement and subgrade materials, slope protection and sufficient drainage designs in flood-prone areas.
- (b) **Technology-enabled infrastructure.** The project will pilot road sensors and intelligent transport devices to enhance road safety and asset management. Especially by way of informing transport users of bus arrival and departure times thus, allowing travelers, especially women and girls, to plan their day while assuaging safety concerns. The project will also support the use of digital technologies and IT tools to improve PWRD's RAMS.
- (c) **Connectivity and regional cooperation.** The supported state highways and MDRs will connect tea gardens, industrial centers, urban and tourism

centers with the national highways to spur economic activity. The two project bridges are expected to provide all-weather connectivity to Majuli.

16. The project is aligned with AIIB's Transport Sector Strategy, supporting two of its priorities: trunk linkages and upgrading of existing infrastructure.

17. **Value Addition by AIIB.** AIIB introduces a holistic approach to the project design, adding value by the following: (a) climate-resilient and green solutions incorporated into the road design, (b) mitigating risks on biodiversity, gender and indigenous people, through the E&S analysis and management plans, and gender action plan, (c) innovative procurement methods, including an engineering, procurement and construction (EPC) contract and maintenance works embedded in construction contracts, (d) technology-enabled infrastructure, such as road sensors and intelligent transport devices, to be implemented for the first time in Assam's secondary road network and (e) road asset management operations helping PWRD evolve into a high-performing and outcome-focused organization.

18. **Value Addition to AIIB.** The project will help AIIB develop its expertise in the knowledge of 1) climate adaptation measures for roads, specifically applicable in a climate-sensitive area, and 2) road safety through project preparation and implementation. AIIB will accumulate expertise on more sophisticated contracting methodologies such as EPC and performance-based maintenance contracts.

19. **Lessons Learned.** The project design reflects the lessons drawn from implementing transport projects across India and other countries, specifically multilateral development bank (MDB) engagements in NER:

- (a) High-level government support is essential to ensure interagency coordination, resolve road maintenance issues and ensure availability of counterpart funds. The project will be directly monitored by the Chief Minister's Secretariat. The Assam government is highly committed to providing counterpart funds and to funding post-construction five-year maintenance under civil works contracts.
- (b) Special focus on capacity building is required in low-capacity states. The project supports a comprehensive capacity-building program for PWRD staff, which will bring cutting edge engineering knowledge and sustainable practices to the department. The impact will go beyond project boundaries.
- (c) Construction programs are often delayed and should consider the NER context. The works contracts, therefore, consider the short working season resulting from heavy and frequent rains, the shortage of aggregates and the construction industry's limited capacity.
- (d) Delays in decision-making often affect project implementation. The project operations manual clearly defines the project implementation framework and responsibilities at various levels.

## C. Components

20. **Component A.** Improvement of road connectivity, climate resilience and safety of project corridors (total investment: USD462.1 million; AIIB loan: USD291.1 million). This component will upgrade and improve about 1,000 km of secondary roads in upper Assam under the Asom Mala program:

- (a) **Subcomponent A1.** Upgrade of about 250 km of state highway and MDR sections, including the construction of bridges to connect Majuli with the northern bank of the Brahmaputra River. The road upgrades mainly include road widening, embankment, subgrade, subbase and pavements, along with drainage, slope protection, road marking and signage. The road designs incorporate safety and climate adaptation measures. All the civil works contracts provide for five-year maintenance; for one section, a pilot EPC contract will be implemented.
- (b) **Subcomponent A2.** Road safety improvements, including retrofitting an additional 750 km of state highways and MDRs with road safety engineering measures. The measures, to be identified through a road safety audit, include improved junctions, curves, signage and road marking, crash barriers and traffic-calming measures.

21. **Component B.** Modernization of PWRD's road asset management system and computerization (total investment: USD6.4 million; AIIB loan: USD6.4 million):

- (a) **Subcomponent B1.** Road asset management system enhancement and computerization, including upgrading PWRD's operations e-portal and RAMS and migrating them to a cloud database. The subcomponent includes enhancing information and communication technology infrastructure in PWRD's directorate and division offices, allowing remote access to business operations to improve PWRD's efficiency and resilience, particularly during a pandemic.
- (b) **Subcomponent B2.** Piloting demonstration corridors with digital technology, safety equipment and roadside facilities. Three corridors in subcomponent A1 have been selected as demonstration corridors for piloting digital technology, safety equipment and roadside amenities. The interventions include adaptive traffic signals, speed sensors and speeding guns, automatic traffic counters, closed-circuit television (CCTV), weigh-in-motion sensors, flooding sensors, accident rescue equipment, among others. The pilots of roadside amenities include rest areas, tourist watch-out areas, parking facilities and electric bus stop signs, which will further enhance road network services.
- (c) **Subcomponent B3.** Sustainable asset management, including: (i) updating PWRD's asset management plan based on the recently developed Assam Road Master Plan, (ii) strengthening the replenishment mechanism of the state road maintenance fund, and (iii) preparing a road map for long-term performance-based road maintenance contracting.

22. **Component C.** Project management and institutional capacity building (total investment: USD21.7 million; AIIB loan: USD21.7 million). Support for project implementation, technical assistance and capacity building:

- (a) **Subcomponent C1.** Project management and implementation support, including consultancy services (construction supervision and E&S external monitoring) and incremental operating costs including office equipment and meeting facilities.
- (b) **Subcomponent C2.** Employee capacity- and knowledge-building program, such as training, study tours and workshops for PWRD's technical staff, including women.
- (c) **Subcomponent C3.** Road safety audit and design, including implementing road safety inspections and audits, preparing road safety improvement schemes covered under component A2, and conducting road safety awareness programs for local communities.
- (d) **Subcomponent C4.** Specific road sector plans, including those that complement the Assam Road Master Plan. Potential topics include climate resilience and green strategy, technology-enabled infrastructure and multimodal transport plans.

#### D. Cost and Financing Plan

**Table 1: Project Cost and Financing Plan**

Item	Project Cost (USD million)	Financing (USD million and %)	
		AIIB	Counterpart
Component A			
- Civil works for road upgrade and safety improvements	365.4	291.1 (80%)	74.3 (20%)
- Post-construction five-year road maintenance	12.3	-	12.3 (100%)
- Utility shifting, land acquisition and resettlement	84.4	-	84.4 (100%)
Component B	6.4	6.4 (100%)	-
Component C	21.7	21.7 (100%)	-
Subtotal	490.2	319.2 (65%)	171.0 (35%)
Tax and Contingencies	included in the above	-	-
Front-end fee	0.8	0.8 (100%)	-
<b>Total</b>	<b>491</b>	<b>320 (65%)</b>	<b>171 (35%)</b>

## E. Implementation Arrangements

23. **Implementation Period.** The project is expected to be implemented from June 30, 2022 to December 31, 2027. Because of heavy and frequent rains, the contracts will contain a 30-36-month construction portion and a five-year maintenance portion. The road maintenance portion will be funded solely by the Assam government.

### 24. Implementation Management

25. **Chief Minister's Secretariat.** The project will be directly monitored by the Office of the Chief Minister. The Chief Minister's Secretariat will facilitate coordination with all stakeholder departments and monitor and advise on important project matters.

26. **Project Management Unit.** A project management unit (PMU) has been established in PWRD, headed by the chief engineer for externally aided projects, whose office has been functional since 2008. The PMU will have overall responsibility for project preparation and implementation, such as managing technical designs, E&S safeguards, procurement, financial management and results monitoring. It will facilitate coordination with units of PWRD and other concerned departments of the Assam government. PWRD's field divisions in each district, corresponding to the locations of project roads, will help the PMU implement the project.

27. **Assam State Road Board.** Registered under the Societies Registration Act 1860 and administratively controlled by PWRD, the Assam State Road Board (ASRB) is authorized by the Assam government to be responsible for all project-related payments.

28. **Project Coordination and Management Consultant.** The PMU has engaged a consultant, financed completely by counterpart funds, to provide the PMU with project preparation, implementation and monitoring support. The consultant has been mobilized and is actively supporting the PMU. Construction supervision consultants will be hired to give the PMU contract administration and management support.

29. A project operations manual has been prepared and includes detailed arrangements for tender preparation, invitation, evaluation and award. The manual also defines procedures on financial management, contract management and implementation of E&S management plans.

30. **Procurement.** Project procurement activities will be conducted in accordance with AIIB's Procurement Policy, January 2016, and Section II of Interim Operational Directives: Procurement Instructions for Recipients, June 2016. Procurement of goods and works will be processed through the Assam government's e-procurement system. AIIB's standard procurement documents will be used to procure project goods, works and services. Procurement will be carried out centrally by the PMU, supported by the project coordination and management consultant. The PMU has prepared a project delivery strategy and procurement plan, which includes procurement arrangements such as market approach, method of procurement, contract type and implementation timelines, which AIIB has reviewed and approved.

31. **Environmental and Social.** The PMU will be responsible for managing E&S matters with support from the project coordination and management consultant and PWRD field divisions. Environmental and social management plans (ESMPs) have been developed and are included in the construction contracts. The construction supervision consultants will supervise the contractors' ESMP implementation. The Assam government has established land purchase committees headed by district collectors. The PMU will engage consultants to facilitate the implementation of the resettlement plan.

32. **Financial Management.** The PMU will be responsible for overall project financial management. ASRB will provide project financial management and fiduciary support. ASRB is staffed with qualified finance and accounts staff responsible for acceptable project financial management. In the annual Assam government budget, a separate budget head shall be included in the project, reflecting the government counterpart and AIIB's part as per the financing agreement. ASRB's internal control process and procedures will be applied in the project. The project's internal audit will be carried out biannually by a chartered accountant firm hired by ASRB and the audit report will be shared with AIIB.

33. The Assam government will pre-finance the project expenditures and release periodic funds to ASRB's dedicated project account. Based on the statement of expenditures, AIIB will reimburse the Assam treasury for eligible AIIB-financed expenditures. A disbursement and financial information letter shall detail the authorized signatories, process of submitting claims and other terms and conditions of project-related disbursements.

34. **Monitoring and Evaluation.** The PMU will be responsible for monitoring overall project implementation. The PMU and project coordination and management consultant will prepare quarterly progress reports, including construction progress, procurement status, E&S compliance, financial management status, interim unaudited financial statements, field visit summaries and disbursement forecasts. Since the project E&S classification is category A, the PMU will engage a qualified and experienced third party for E&S monitoring, which will prepare a biannual E&S external monitoring report. The chartered accountant firm will prepare an annual audit report, which will identify implementation issues and performance gaps and suggest improvements. The results framework (Annex 1) will be used to monitor and evaluate the achievement of the project objective and the project outcomes.

35. **AIIB's Implementation Support.** AIIB will monitor project implementation through regular missions, technical visits, and virtual reviews with PWRD. To mitigate the effect of potential longer-term international travel restrictions due to the prevailing SARS-CoV-2 (COVID-19) pandemic, AIIB will explore the possibility of employing remote-sensing tools such as high-resolution satellite imagery and relying on locally based consultants to conduct monitoring and oversight. AIIB will carry out a midterm review between the 30th and 36th month after implementation starts.

36. AIIB's implementation support has been designed to provide knowledge support to PWRD, including the following:

- (a) Review of and support for engineering design, asset management, digital technologies, climate-resilient and green solutions, road safety, E&S safeguard and institutional capacity development.
- (b) Support to procure and implement large civil works contracts and major consultancies, resolve implementation issues and identify and mitigate project risks.
- (c) Support to train PWRD staff and facilitate linkages with international academic institutions and e-learning modules.

### 3. Project Assessment

#### A. Technical

37. **Introduction.** A holistic project design approach has been adopted to help PWRD develop and manage a sustainable secondary road network in Assam. The project corridors to be upgraded (about 250 km) are bottleneck segments of the strategic secondary road network, identified under the Assam government's flagship Asom Mala program and the Assam Road Master Plan. The upgrading aims to develop high-quality road infrastructure by adding climate adaptation and road safety design elements. The project also includes retrofitting an additional 750 km of secondary roads with road safety enhancements. The corridors to be upgraded and retrofitted (about 1,000 km) will provide a complete, connected and safe secondary road network in upper Assam. The corridors serve major agricultural production areas, tea gardens, industries, multimodal hubs, tourist destinations and major townships, and provide connectivity to the wider economy through the national highway network. One of the strategic corridors will connect the river island of Majuli with the north (Lakhimpur district). Table 2 lists the roads proposed for upgrading and their connections to national highways.

**Table 2: Road Segments Proposed for Upgrading**

	Road	Start Location	End Location	Road Length (km)	National Highway Connections
A15	Dhodar Ali	Kamargaon	Kamarbandha	42.1	NH-715 / 37(old), NH-129, NH-15, NH-2, NH-202
A31	Balichapori to Bhogalmara (including 2 RCC bridges over Subansiri and Luit rivers)	Balichapori, Majuli	Bhogalmara	19.5	NH-15, NH-715, NH-13, NH-415
A20	Sibasagar to Sapekhati (Sivasagar to Chumoni; Nakachari to Balighat tiniali)	Sibasagar	Sapekhati	63.4	NH-02, NH-702C, NH-215, NH-715/37



	Road	Start Location	End Location	Road Length (km)	National Highway Connections
A22	Dhakuakhana Butikur Tinali Telijan	Dhakuakhana	Telijan	32.7	NH-15, NH-515, NH-215, NH-415
A30	Moran Naharkatia Duliajan Digboi (through Naharkatia Bypass)	Moran	Kathalguri	70.6	NH-02, NH-715-37, NH-15, NH-215, NH-702, NH-702C, NH-315A
A07	Sarthebari Pathshala Raipur Road	Sarthebari	Raipur	17.7	NH-27 Connection to Indo- ASEAN East West Corridor (15 km away) through State Highway-9
	<b>Total</b>			<b>245.9</b>	

ASEAN = Association of Southeast Asian Nations, km = kilometer, NH = national highway, RCC = Reinforced Concrete Bridge

Source: PWRD

38. **Civil Works and Design Standards.** The project corridors to be upgraded have deteriorated because of inadequate maintenance, excessive use, overloading, inadequate drainage and extreme climatic events such as floods. The network, historically, has been developed piecemeal rather than in a planned, integrated way and has many design and construction deficiencies. The project corridors will be improved and widened to two-lane highways with paved and earth shoulders, mostly along existing alignments. The upgrading measures include improvement of embankments, geometry, drainage, pavement and road safety, and construction of missing bridges and culverts, using the standards of the Indian Roads Congress. Traffic levels are expected to increase significantly after the road upgrades. Some small road sections will be realigned to improve road geometry or bypass congested locations. The project corridors are designed to have a minimum life of 20 years for roads and 100 years for bridges, with asphalt pavements with a drainage layer, granular subbase, bituminous base and wearing course.

39. **Climate-Resilient and Green Solutions.** Assam's road network is highly vulnerable to extreme climatic events caused by heavy rainfall,<sup>16</sup> frequent flooding and landslides. Consequently, a large part of the network has deteriorated prematurely and has a short service life. The project corridors have been designed to withstand extreme climate events to ensure all-weather transport access, including through the following:

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<sup>16</sup> Rainfall will increase by five to 10 percent and the number of extreme wet days by 35 percent as per Assam's Climate Change Action Plan 2050.

- (a) Road embankments will be 60 centimeters higher than the highest flood levels, providing 10 percent more waterway. They will use precast technology, provide more and bigger culverts, use special-grade bitumen that can better withstand heavy rains and use concrete pavements in built-up and poorly drained areas.
- (b) The designs use bioengineering measures for erosion control and bridge approaches, such as reuse of construction waste from dismantled pavements and bridges, avenue plantation along the alignments, promotion of the use of local materials to minimize consumption of scarce hard stone, preservation and reuse of topsoil, use of Geobags for slope protection and rehabilitation of borrow areas.
- (c) The design gives importance to biodiversity resources. The E&S documents have screened impacts on important flora and fauna, identified migration routes and corridors. These biodiversity protection measures, and caution signs are incorporated in road designs in known migration routes.

40. **Road Safety.** The project corridors to be upgraded incorporate road safety engineering measures based on road safety audits carried out during project preparation. Key measures include adequately designed junctions, road geometry, road signs, protection structures, traffic-calming measures, speed restrictions, bus shelters, guard rails and pedestrian crossings in urbanized locations and near schools. The measures were discussed with local communities, including women. More road safety audits will be conducted during implementation together with road safety public-awareness education in local communities.

41. **Innovative Pilots.** The project uses pilots along selected demonstration corridors (A15, A30 and A31) to experiment with innovations, including the following:

- (a) **Digital technology applications.** To further enhance safety management and asset management, road sensors and intelligent transport devices will be piloted, such as adaptive traffic signals, speed sensors and speeding guns, automatic traffic counters, CCTV, weigh-in-motion sensors, flooding sensors, among others.
- (b) **Road safety equipment.** Traffic law enforcement and rescue equipment will be piloted to improve the traffic law enforcement capacity of police.
- (c) **Roadside amenities.** Sales booths, toilets, tourist watch-out areas, electric bus signs providing estimated arrival time, rest areas, among others (Annex 2) will be planned and implemented with the active involvement of tourism and transport departments, local governments and the private sector.<sup>17</sup> The amenities will create much-needed jobs and income opportunities for local communities.

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<sup>17</sup> These interventions could be supported under various development programs of the Assam government and the Government of India.

42. **Asset Management.** The project will help PWRD ensure the road network's sustainability by enhancing the existing RAMS. The project will support the upgrading of PWRD's e-portal and RAMS using cloud-based technologies with additional function modules and help computerize PWRD local offices with the latest IT tools to allow remote access, increasing the efficiency, transparency and use of real-time data for key business processes. The proposed pilots will explore innovations to further enhance asset management of the road network.

43. **Operation and Maintenance Sustainability.** RAMS will support planning, funding and delivering of road maintenance. USD271 million was allotted and spent for road maintenance for fiscal year (FY) 2016, FY2017 and FY2018 in Assam,<sup>18</sup> significantly more than in earlier years. Further measures to enhance road maintenance are adopted in this project, including (a) an EPC contract for the complex road section to allow design optimization, which will reduce future maintenance costs, and (b) construction contracts for road upgrading, including five-year road maintenance after construction to ensure road performance.

44. Other measures for maintenance sustainability will be explored through technical assistance, including (a) long-term performance-based maintenance contracting, which lowers long-term maintenance costs, and (b) the replenishment mechanism of the existing Road Maintenance Fund, to look into nonbudgetary resources to enhance the long-term financing sustainability of the road network.

45. **Institutional Capacity for Project Implementation.** PWRD has been implementing MDB-funded projects for 15 years and gained sufficient implementation experience and familiarity with MDBs' safeguard and fiduciary procedures. However, PWRD is still learning to procure and implement large civil works contracts and use new contracting models. Continued guidance and support from AIIB are essential during project implementation, including E&S management and grievance redress procedures. The project design includes technical assistance to enhance PWRD's implementation capacities, including road safety audit and design, supervision consultants and road sector plans. The project includes training and capacity-building programs for PWRD staff.

## **B. Economic and Financial Analysis**

46. **Economic Analysis.** The economic evaluation of the proposed investments was carried out using Highway Development and Management Model-4 (HDM-4) to assess the project's economic viability, comparing the with- and without-project scenarios. The analysis covers an operating life span of 20 years and a construction period of three years, discounted at an economic opportunity cost of capital of 10.0 percent. All costs and benefits are expressed in domestic currency at constant 2020 prices, net of transfers and financial charges.

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<sup>18</sup> The fiscal year (FY) begins on April 1 and ends on March 31 of the subsequent year. FY2016 refers to the year beginning on April 1, 2016 and ending on March 31, 2017.

47. The economic costs of the project include (a) investment costs of road upgrade (about 250 km) and road safety improvements (about 750 km) and (b) routine and periodic maintenance costs of the project roads.

48. The economic benefits of the project include (a) savings in vehicle operating costs, (b) savings in travel time resulting from increased travel speeds, (c) reduction of injuries and casualties associated with road accidents, because of improvements in road safety, and (d) wider economic effects. The quantitative cost-benefit analysis calculates the benefits of (a), (b) and (c).

49. At a discount rate of 10 percent, the project is estimated to generate an economic net present value of INR16,525 million and yield an economic internal rate of return 17.8 percent, exceeding the discount rate of 10 percent (Table 3). Therefore, the project investment is economically justified. Fuel savings, as part of savings in vehicle operating costs, help avoid an estimated total of 1.62 million tons of CO<sub>2</sub> emissions over the lifetime of the upgraded corridors. The benefits of CO<sub>2</sub> emissions avoidance are not considered in the economic analysis.

**Table 3: Outcomes of the Economic Analysis**

	ENPV @ 10% (INR million)	EIRR (%)
Rehabilitation of state highways and MDRs (250 km)	10,711	15.2
- Dhodar Ali Road	914	12.9
- Dhakuakhana to Telijan Road	736	13.7
- Moran to Disang Kinar Bangali to Kathalguri	4,920	18.3
- Sivasagar to Nakachari	2,975	18.3
- Majuli to Dhunaguri to Bhogalmara	991	12.5
- Sarthebari Rampur Pathsala Road	175	11.0
Implementation of road safety measures (750 km)	5,814	81.2
<b>Total</b>	<b>16,525</b>	<b>17.8</b>

EIRR = economic internal rate of return, ENPV = economic net present value, km = kilometer, MDR = major district road.

Source: AIIB

50. **Financial Analysis.** The state highways and MDRs in Assam, unlike expressways and national highways, are not tolled and so do not have a revenue stream. Therefore, traditional financial evaluation (calculating the financial internal rate of return) was not performed. The availability of counterpart funding from the Assam government and its willingness to commit the funding were assessed as a part of the financial analysis.

51. **Counterpart Funds.** The Assam government has so far allocated about USD93.5 million (INR6.85 billion) in total for FY2018, FY2019 and FY2020 for Asom Mala. Secondary road network development has always been a priority for the Assam government, and the road development budget has seen an annual increase of 20 percent in the last few years. Assam is committed to providing counterpart funds to implement the project (USD171 million), and its expected annual contribution is less than one percent of its annual fiscal revenue during project implementation.

52. Assam is a special-category state. The Government of India will provide loan proceeds to the Assam government through standard arrangements for development

assistance to the states: 90 percent grant and 10 percent loan. Therefore, the debt service obligation for Assam resulting from the project loan will be 10 percent of the total. The project debt obligation, along with project operation and maintenance costs, will be less than one percent of the state's fiscal revenue. Considering that project counterpart funds and financing costs are a small portion of its annual revenue, the state has sufficient capacity to fund project investment and maintenance and fulfill the loan's debt service requirement.

53. **Climate Change Adaptation Finance.** Climate resilience design is incorporated into the road-upgrading subcomponent, qualifying the project for climate adaptation finance. Based on the Joint Methodology for Tracking Climate Change Adaptation Finance, USD104 million will be considered as climate adaptation finance. They consist of incremental costs, mainly for better culverts and bridges, road embankments, drains, pavements and slope stability than under the business-as-usual scenario.

### C. Fiduciary and Governance

54. **Procurement.** Procurement will include works contracts for road improvement, consultancy for supervision of work contracts, consultancy for road safety improvements, consultancy for technical assistance studies and capacity building and procurement of information and communication technology goods. The Assam [e-procurement system](https://assamtenders.gov.in/) (https://assamtenders.gov.in/) to be used for project procurement of goods and works allows international tenders. Other MDBs have assessed and used the platform and found it acceptable.

55. The PMU will be responsible for procurement and contract management. The project team assessed the PMU staffing and their qualifications and experience, concluding that they have adequate capacity and extensive experience in MDB-financed projects and procurement of construction works for roads and bridges and, therefore, are familiar with MDB procurement requirements. The PMU initiated all major civil works and consulting services contracts, and having reviewed these packages, the project team is satisfied with the quality of the procurement documents and the PMU's procurement process. Contract packaging and methods of procurement considered lessons from similar projects implemented by the PMU and from the supply market analysis provided in the project delivery strategy. The detailed procurement arrangement and contracting strategy proposed in the project delivery strategy and procurement plan meet AIIB's procurement principles and standards. All major procurement activities are subject to prior review by AIIB, and the procurement plan will be updated regularly or as needed and submitted to AIIB for approval. However, considering the risk of delays in implementation because of lengthy internal processes and COVID-19 restrictions, the overall project procurement risk is assessed as medium.

56. **Financial Management.** ASRB's financial management capacity was assessed, focusing on institutional capacity, staffing, planning and budgeting, funds flow, accounting, internal controls, reporting and audit arrangements. ASRB has implemented MDB-funded projects and is familiar with MDBs' financial management requirements. Based on the assessment, financial management capacity is considered adequate, and the financial management risk is medium.

- (a) **Staffing.** The State Finance Department will depute one experienced and qualified finance staff, acceptable to AIIB, to ASRB to manage the project account. ASRB will use the services of an external accounting firm for project accounting, reporting and internal oversight, to be hired for the project.
- (b) **Planning and budgeting.** The project will follow the Assam government planning and budgeting procedure. PWRD will prepare an annual budget based on the procurement plan and financing agreement. The annual budget proposed for the project will be shared with AIIB and submitted to the State Finance Department for review and approval. Once it is approved, the project budget will be included in the annual state budget under a separate budget head.
- (c) **Funds flow.** The project will follow the Assam government's treasury system for funds flow to ASRB. The Assam government will release funds to ASRB quarterly, which will be deposited in a separate project dedicated bank account. ASRB will release funds to contractors and vendors after approvals. In case of land acquisition and resettlement, ASRB shall release funds to the district administration offices (DAOs) based on their forecasts, and DAOs shall make payment to eligible beneficiaries and report to ASRB. Any fund balance at the end of the fiscal year shall be refunded by DAOs to ASRB.
- (d) **Disbursement.** The loan will adopt the reimbursement method of disbursement. ASRB will prepare a statement of expenditures for AIIB's part of eligible expenditures (incurred and paid) and submit withdrawal applications through the Controller of Aid, Accounts and Audit to AIIB. Upon receipt of the withdrawal claims every quarter, AIIB will review them and make disbursements to the Assam government's account. For retroactive financing needs, the Assam government and AIIB will agree on the total amount, nature of eligible expenditures and period in the financing agreement.
- (e) **Accounting, financial reporting and internal controls.** The project financial statements will be prepared on a cash basis. ASRB will maintain a separate dedicated project account, including a loan register. ASRB uses the Tally accounting software on a stand-alone basis. ASRB will prepare interim financial reports for submission to AIIB within 45 days from the end of each fiscal quarter. ASRB internal control process and procedures will be applied in the project. Based on agreed terms of reference, ASRB shall use the services of a chartered accountant firm to internally audit project transactions.
- (f) **External audit.** The audit report of the World Bank-funded project for FY2018 highlighted some questionable expenditures, such as absence of utilization certificates, short and non-deducted statutory charges, excess payment to contractors, among others. The PMU informed AIIB that these issues were resolved amicably. The project financial statements shall be

audited by the Controller of Aid, Accounts and Audit based on the terms of reference accepted by AIIB. The project audited financial statement, including a management letter for each year of project implementation, shall be submitted within nine months from the end of the fiscal year.

57. **Governance and Anti-corruption.** AIIB is committed to preventing fraud and corruption in the projects it finances. AIIB places the highest priority on ensuring that the projects that AIIB finances are implemented in compliance with AIIB's Policy on Prohibited Practices (2016). Implementation will be monitored regularly by AIIB staff. AIIB reserves the right to investigate, directly or indirectly through its agents, any alleged corrupt, fraudulent, collusive, coercive, or obstructive practices, and misuse of resources and theft or coercive practices relating to the project will require the borrower to take necessary measures to mitigate the risk of such practices and address any issues in a timely manner, as appropriate. AIIB will monitor the work related to tender document preparation and tender/proposal evaluation under AIIB financing.

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

58. **Environmental and Social Policy (including Standards) and Categorization.** AIIB's Environmental and Social Policy (ESP), including the Environmental and Social Standards (ESSs) and the Environmental and Social Exclusion List, applies to the project. E&S due diligence determined that ESS 1 (E&S assessment and management) applies to the assessment of E&S impacts of project activities. ESS 2 (involuntary resettlement) also applies, as road widening and construction will require temporary and permanent land acquisition. The social impact assessment and resettlement plan (SIA+RP) were carried out as part of E&S due diligence. ESS 3 (Indigenous Peoples) applies as Scheduled Tribes are likely to be impacted by the project. The project has been classified as category A, in accordance with the ESP, because of the social risks and impacts stemming from the displacement of the project-affected people.

59. **Environment.** The project follows a framework approach. An E&S management planning framework (ESMPF) has been prepared for the project and was used to screen and process the road packages. Environmental impact assessment (EIA) reports, including ESMPs for all road upgrading packages were completed and disclosed. The activities under Subcomponent A2 on road safety improvements will be covered by ESMPF. The main project activity is road improvement, and negative environmental impacts are typical of road construction activities and are expected to be temporary and limited, occurring mostly during construction and include: air pollution, noise, soil erosion, tree cutting, water pollution, impacts on borrow areas and disposal of construction waste. Roads and bridges will be built and repaired, and impacts on biodiversity were assessed and measures included in each section's ESMP. The ESMPs include an assessment of raw material sources for road construction, such as sand and gravel. The PMU and AIIB prepared and disclosed on their websites ESMPF and EIA reports in English for the initial road packages and executive summaries in local language of Assamese (<http://asrip.apwd.in:8085/asrip/asrip.html?source=aiib>). The ESMPF covers the safeguard processing of the road packages and road safety activities. The EIAs include ESMPs, which contain measures related to occupational and community health and safety, air and water pollution control, noise control, workers camp and construction site management, traffic and public utility management, biodiversity conservation measures,

among others. The ESMP will be included in the tender documents and made part of the contractual obligations of the civil works contractors, which will be overseen by construction supervising consultants.

60. **Social.** Following the framework approach, a resettlement planning framework (RPF) and an Indigenous Peoples planning framework (IPPF) have been prepared and disclosed. The social impact assessments and resettlement plans (SIA+RPs) for all road upgrading packages have been prepared and disclosed in line with RPF. A total of 271.3 hectares of land will be required to carry out project activities, out of which private and public land account for 167.5 hectares and 103.8 hectares respectively. The potential adverse impacts of land acquisition include loss of land, loss of structures (residential, and commercial) and loss of trees, crops and community and religious properties, which are usually disproportionate on vulnerable groups (Scheduled Tribes, women, the elderly, those below the poverty line) during such projects. The project will impact upon 7236 families out of which 3252 are titleholders and 3984 are non-titleholders. During the project preparation, 98 public consultation events were organized with total 1,268 participants (including 365 female and 912 male participants). To mitigate the potential adverse impacts of land acquisition and resettlement, SIA+RPs of road packages include an Entitlement Matrix that identifies the entitled unit, compensation, and assistance measures. The compensation includes non-titleholders and special treatments to vulnerable groups. Long-term rehabilitation measures in the form of a livelihood restoration strategy are also included. The aim of the compensation, assistance and livelihood restoration measures are to improve or at least restore the livelihoods of all displaced people to pre-displacement levels. The nature of the civil works is anticipated to induce short-term impacts, that are normal during road construction activities, linked to temporary loss of access, labor influx, disruptions to commercial activities and effects on traffic and public utilities. These short-term impacts are to be mitigated through measures in ESMP and codes of conduct from contractors included in civil work contracts.

61. Scheduled Tribes are present in Assam. The SIA+RPs identify Scheduled Tribes for two road upgrading packages, which are applicable to ESS 3 (Indigenous Peoples). The PMU has prepared and disclosed the required Indigenous Peoples plans (IPPs) for these two road packages, following the guidance from IPPF, to mitigate and manage any potential negative impact on the indigenous communities. (<http://asrip.apwd.in:8085/asrip/asrip.html?source=aiib> )

62. **Climate Change.** Assam's road network is highly vulnerable to extreme climatic events. AIIB has conducted a climate and geological risk-screening exercise and incorporated adaptation measures into the designs. (See Technical, Project Assessment.)

63. **Gender Aspects.** The project has carried out culturally appropriate and meaningful consultations with women and vulnerable groups during the preparation of the SIA+RPs. The consultation sessions aimed to capture and reflect the concerns and aspirations of women and vulnerable groups to inform the design of the project. The engineering design of the project is informed by these consultations and incorporates mitigation measures and suggestions from females. The project plans to continuously engage and consult with various categories stakeholders, including women and



vulnerable groups, throughout the project cycle by the implementation of a Stakeholder Engagement Plan outlined in each SIA+RP.

64. The SIAs and RPs include an analysis of potential impacts of the project on women and other vulnerable groups and recommend actions to mitigate impacts related to: 1) loss of livelihoods and income because of loss of agricultural land and businesses. 2) safety and Gender Based Violence (GBV) related concerns. The Entitlement Matrix outlines the entitlements to be received by project affected people, including women and vulnerable groups, irrespective of ownership status. Vulnerable families, including female headed households, will be provided with lump sum assistance and priority in employment opportunities under the project. The affected people, including women, are entitled to participate in the national and Assam livelihood restoration programs.

65. A Gender Action Plan (GAP) has been prepared to promote gender inclusive design and implementation of the project. Along with providing visibility and enhancing accountability for gender mainstreaming, it includes activities, target/quotas, and design features to sustainably enhance the gender dimensions of the project. The GAP covers GBV, Gender inclusion, institutional capacity building and gender sensitive GRM related measures. The project GRM will be gender sensitive and shall include female members in the Grievance Redress Committee and collect gender disaggregated data on complaints received and resolved. E&S and GAP training will be provided to PMU, construction supervision consultants and contractors. Moreover, the PWRD employment capacity-building program is currently being developed and will enable the active participation of women staff in PWRD. Annex 2.2 summarizes the key approaches of this project for gender mainstreaming.

66. **Stakeholder Engagement, Consultation and Information Disclosure.** Public consultations have engaged stakeholders to make sure that project-affected people are aware of the project details and safeguard measures to be implemented. The final technical design incorporates pertinent issues raised by communities, such as measures to address road safety risks. The PMU has prepared a Stakeholder Engagement Plan (included in the SIA+RPs) aiming to systematically carry out consultation and communication throughout the project cycle. The PMU has disclosed SIA+RPs, EIAs, and Indigenous Peoples plans of all the road upgrading packages on the PWRD's website (<http://asrip.apwd.in:8085/asrip/asrip.html?source=aiib>). The executive summaries the documents have been translated in Assamese and disclosed the same. These documents have been disclosed on AIIB's website. Printed documents will be made available in the project area.

67. **Project Grievance Redress Mechanism and the AIIB Project-affected People's Mechanism.** A project-specific and gender sensitive Grievance Redress Mechanism (GRM) will be established to receive, acknowledge, evaluate and facilitate the resolution to the complaints relating to E&S issues with corrective actions proposed. This will be undertaken using understandable and transparent processes that are gender responsive, culturally appropriate and readily accessible to all segments of the affected people. Records of grievances received, corrective actions taken, and their outcomes shall be properly maintained.

68. **Applicable Independent Accountability Mechanism.** 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 its ESP in situations when their concerns cannot be addressed satisfactorily through the Project-level GRM or the processes of AIIB's Management. For information on AIIB's PPM, please visit: <https://www.aiib.org/en/policies-strategies/operational-policies/policy-on-the-project-affected-mechanism.html>.

69. **Monitoring and Supervision Arrangements.** As agreed with the PMU, project E&S matters, including ESMP implementation, will be monitored by a qualified and experienced third party. This third-party will prepare a biannual E&S external monitoring report. AIIB will supervise the project's E&S aspects remotely while travel is restricted because of the pandemic. AIIB will conduct onsite supervision missions once travel restrictions are lifted.

#### E. Risks and Mitigation Measures

70. Based on a preliminary assessment, AIIB rates the overall project risk *medium*. The risks of project implementation delays and safeguard compliance are assessed as *high* (Table 4).

**Table 4: Summary of Risks and Mitigating Measures**

<b>Risk Description</b>	<b>Assessment (H/M/L)</b>	<b>Mitigation Measures</b>
<p><b>Technical</b> Institutional capacity of PWRD in implementing the project, including high-value contracts and new contracting models.</p> <p>Delays in decision-making, interagency coordination issues.</p>	<b>M</b>	<ul style="list-style-type: none"> <li>• PWRD has successfully implemented similar projects, including those financed by MDBs.</li> <li>• Capacity building of PWRD to use new contracting models and contract management.</li> <li>• Project management and supervision consultant support.</li> <li>• Chief Minister's Secretariat to ensure interagency coordination, quick decisions and oversight.</li> <li>• The project operations manual clearly defines the decision-making framework and the responsibilities at various levels.</li> </ul>
<p><b>Technical</b> Implementation delays in civil works caused by a short working season, frequent rains, lack of construction material, delays in land acquisition, utility shifting, status clearances, poor performance of contractors.</p>	<b>H</b>	<ul style="list-style-type: none"> <li>• Design of construction program considering the working season and contractor's capacities.</li> <li>• Phased implementation.</li> <li>• Use of modern project management tools to prepare and monitor contracts work progress.</li> <li>• Oversight by the Chief Minister's Secretariat and mobilization of support for district administration.</li> <li>• Regular progress reports and performance audits to identify</li> </ul>

Risk Description	Assessment (H/M/L)	Mitigation Measures
Implementation delays because of COVID-19.		<p>implementation issues and take corrective actions.</p> <ul style="list-style-type: none"> <li>• The ESMPs include general construction requirements during the pandemic, which will give additional guidance to the awarded contractors.</li> <li>• Regular AIIB implementation support and supervision missions to help detect delays at an early stage and to implement mitigation actions.</li> </ul>
<p><b>Procurement</b> Low competition for civil works; delays caused by lengthy internal processes.</p>	M	<ul style="list-style-type: none"> <li>• Contract packaging based on previous projects and supply market analysis.</li> <li>• Conduct contractors' outreach programs.</li> <li>• Advance contracting of major contract packages.</li> </ul>
<p><b>Procurement</b> Price increase in goods and materials resulting in project cost overruns.</p>	M	<ul style="list-style-type: none"> <li>• Tenders have been received and are in line with the estimated costs.</li> <li>• Sufficient provision for contingencies in the project cost.</li> </ul>
<p><b>Procurement</b> Transparency in the procurement process.</p>	L	<ul style="list-style-type: none"> <li>• All tenders will be submitted through the <a href="https://assamtenders.gov.in">e-procurement platform</a> (<a href="https://assamtenders.gov.in">https://assamtenders.gov.in</a>) using a single-stage two-envelope approach.</li> <li>• Other MDBs have assessed the platform and found it acceptable for MDB-financed projects.</li> </ul>
<p><b>Environmental and social aspects</b> Key potential adverse impacts, such as large-scale land acquisition, biodiversity impacts and impacts on indigenous people.</p>	H	<ul style="list-style-type: none"> <li>• Strict implementation and frequent monitoring of project activities following the required measures in the ESMP, resettlement plan, ESMPF, resettlement planning framework and indigenous peoples planning framework.</li> <li>• Resettlement and rehabilitation consultants to be hired to ensure smooth implementation of land acquisition.</li> <li>• PMU to implement and monitor activities. Additional monitoring support from the project coordination and management consultant and construction supervision consultant.</li> <li>• Submission of semi-annual E&amp;S monitoring reports.</li> </ul>
<p><b>Financial management</b> Availability of counterpart funds and delayed payment to contractors.</p>	M	<ul style="list-style-type: none"> <li>• Inclusion of the project under the Assam government's high-priority program: Asom Mala.</li> <li>• Inclusion of the project budget in the annual state budget under a separate budget head.</li> </ul>

Risk Description	Assessment (H/M/L)	Mitigation Measures
		<ul style="list-style-type: none"><li data-bbox="810 277 1351 407">• The financial management chapter in the project operations manual sets efficient systems and procedures for contractors' payments.</li></ul>

COVID-19 = coronavirus disease, E&S = environmental and social, ESMP = environmental and social management, ESMPF = environmental and social management planning framework, H = high, L = low, M = medium, MDB = multilateral development bank, PMU = project management unite, PWRD = Public Works Roads Department.

## Annex 1: Results Monitoring Framework

Project Objective	To improve the connectivity, safety and climate resilience of the secondary road network in project districts of Assam and enhance the institutional capacity of the PWRD.									
Indicator	Unit of Measure	Baseline Data, 2021	Cumulative Target Values					End Target	Frequency	Responsibility
			2022	2023	2024	2025	2026	2027		
1. Population benefitted from improved, safe and all-weather and climate-resilient transport connectivity (total/female).	Number	0			540,000 /264,208			2,099,387 /1,027,177	Midterm	PMU
2. Travel time reduced on project upgraded corridors.	%	0			5			30	Midterm	PMU
3. Secondary roads conforming to road safety standards prescribed by the Indian Roads Congress or retrofitted with road safety measures.	km	0			135			996	Midterm	PMU
4. PWRD uses a cloud-based e-portal and road asset management system for department operations.	Y/N	No				Yes		Yes	Midterm	PMU
5. Secondary roads are designed and constructed with climate-resilient and green solutions.	km	0			35			246	Midterm	PMU
6. 75% of women surveyed among communities are satisfied with the improvement of project roads.	Percentage	N/A						75%	Post Completion	PMU

Intermediate Indicator Name	Unit of Measure	Baseline Data, 2021	Cumulative Target Values					End Target	Frequency	Responsibility
			2022	2023	2024	2025	2026	2027		
1. Secondary roads upgraded.	km	0	0	0	35	150	230	246	Annual	PMU
2. Secondary roads retrofitted with road safety engineering measures.	km	0	0	0	100	500	750	750	Annual	PMU
3. PWRD offices using upgraded e-portal and enhanced information and communication technology infrastructure.	Number	0	0	0	20	30	30	30	Annual	PMU
4. Affected people given skills or self-employment training (total/female).	Number	0			600 /300			1,500 /750	Midterm	PMU
5. PWRD's staff trained in the Project. (total/female)	Staff week	0	0	0	500/50	1,000 /100	1,500 /150	2,000/200	Annual	PMU
6. Technical studies undertaken and plans prepared.	Number	0	0	0	2	3	3	3	Annual	PMU

## Annex 2: Detailed Project Description

### Country Context

1. **India has shown impressive growth in the last two decades, but it has been uneven across regions and sectors.** India is the seventh-largest country by area, the fifth-largest economy, a low-middle-income country and the second-most populous. Its 1.3 billion people live in 29 states and seven union territories. Notwithstanding the slowdown caused by the pandemic,<sup>1</sup> the economy has seen steady growth of more than seven percent during the last decade. India's vision is to become a USD5 trillion economy by 2025. Key economic drivers are infrastructure investment, exports and manufacturing through programs such as Make in India. However, many regions and sectors are lagging far behind in growth. The Government of India focuses on broad-based growth, especially in the North-East Region (NER), agriculture and manufacturing.<sup>2</sup> Raising infrastructure investments, as a post-pandemic economic recovery measure, will make India's businesses more competitive and boost urbanization and employment in manufacturing. The Government of India emphasizes transforming India's mobility through the Connect Bharat initiative: building safe, adequate and holistic infrastructure to leverage multiple modes of transport.

2. **Assam, the most populated state in NER, is lagging the rest of India despite the state's rich natural resources and strategic location between three major economies (China, East Asia and South Asia).**<sup>3</sup> NER has yet to leverage India's position as a fast-growing emerging economy. The Government of India has set up the NITI Forum to speed up NER's growth. Adequate transport connectivity for NER is a priority to harness its growth potential in high-value agriculture, greatly sought-after high-value tourism (ecotourism), minerals and handicrafts. The Government of India earmarks 10 percent of its planned funds to develop NER. The Government of India's Act East policy emphasizes enhanced trade between NER and Association of Southeast Asian Nations (ASEAN) countries. Multimodal transit trade agreements are being signed between NER and neighboring countries.

3. **Assam is one of the less-developed states.** In FY2021, India's per capita GDP was USD 2281 while Assam's per capita GSDP was USD 1618 making Assam's per capita income about 30% lower than the national average. 32.7 percent of Assam's population are poor (national average is 25.0%)<sup>4</sup>. The state is subjected to frequent floods, heavy rainfall, storms and

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<sup>1</sup> During FY2019, economic growth was moderated to four percent.

<sup>2</sup> Niti Aayog New India Policy: India@75, 2018.

<sup>3</sup> NER shares about 5,437 kilometers (km) of borders with Bangladesh, Bhutan, China, Myanmar and Nepal. NER has rich resources of limestone, uranium, coal (1,957 million tons), 58,971 megawatts of hydropower potential, 2.1 percent of which is utilized, natural gas and crude oil. NER has high rainfall, frequent floods and fragile and complex geology, and is blessed with varied geoclimatic zones, rich biodiversity and rare species, unique waterfalls, uncommon natural scenic beauty and cultural endowments, high-value agriculture and horticulture, producing turmeric, ginger, black pepper, oranges, among others.

<sup>4</sup> [India National Multidimensional Poverty Index Baseline Report](#), based on the national family health survey-4 (2015-2016), NITI Aayog, 2021.

earthquakes.<sup>5</sup> Eighty percent of its population is rural and mainly depends on agriculture, which barely contributes nine percent to the state gross domestic product (GDP). Manufacturing development is only nine percent of GDP compared with India's average of 16 percent. The unemployment rate stood at 6.1 percent against the national figure of five percent.<sup>6</sup>

4. **Assam has large growth potential for further industrialization, high-value agriculture and tourism.** The state accounts for 23 percent of crude-oil production (offshore), 33 percent of natural gas production and a sixth of the world's tea production.<sup>7</sup> Assam possesses 320 million tons of coal reserves. Many major industrial centers are located around Dibrugarh. The river island of Majuli and Lakhimpur district on the north bank of the Brahmaputra River are key tourist and cultural attractions. Assam has the unique advantage of its strategic location: it connects the entire NER with mainland India through the 22 kilometers (km) wide Siliguri corridor and is a connecting node for many international economic corridors, including BBIN,<sup>8</sup> the India-ASEAN East-West Corridor, the North Bangladesh-India Corridor and Stilwell Road, which connects upper Assam with Myanmar and China. The communities and industries along the corridors present significant opportunities for international trade and participation in global value chains.

5. **The Assam government is strongly committed to growth.** Assam Vision 2030 aims for 10 percent economic growth and two percent reduction in unemployment by 2025. Key development priorities are revitalizing agriculture,<sup>9</sup> putting Assam on the international tourism map, establishing 100 industrial parks, revitalizing tea gardens, attracting manufacturing units and private sector investment (including foreign direct investment), promoting handweaving, developing entrepreneurship and enhancing trade with Bangladesh and ASEAN countries. The Assam government has launched 18 flagship development programs (Ashtadash Mukutor Unnoyonee Maala), including infrastructure and social development. One is Asom Mala, which aims to develop a high-quality network of secondary roads—the project's focus.

### **Sectoral and Institutional Context**

6. **Assam's road network is underdeveloped.** Although the national Ministry of Road Transport and Highways has developed 1,630 km of national highways in Assam during the last five years to connect Assam with NER and mainland India and internationally with Bangladesh, Bhutan and Myanmar, the development of lower-level roads is lagging. Excluding the primary network of national highways (3,900 km), Assam's state road network of 53,130 km is classified into secondary roads (state highways, 2,521 km), major district roads (MDRs) (4,311 km), tertiary roads (rural roads, 44,597 km) and urban roads (1,701 km). The secondary and tertiary roads are managed by Assam's Public Works Roads Department (PWRD). About half the network is in poor condition because of inadequate maintenance, excessive use, overloading, inadequate

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<sup>5</sup> About 40 percent of Assam is flood prone because it lies between the Brahmaputra and Barak river basins.

<sup>6</sup> Government of India. 2021. SDG India Index and Dash Board, Niti Aayog.

<sup>7</sup> Assam contributes about 1,300 million kilograms of tea or 50 percent of India's total tea production.

<sup>8</sup> BBIN is a Bangladesh, Bhutan, India (via Meghalaya) and Nepal corridor initiative that aims for seamless transport of people and goods between the four countries and access to sea routes to India, Bhutan and Nepal via Bangladesh.

<sup>9</sup> Rice and potato value chains, organic farming. Majuli is an organic hub for increasing production of milk and fish.



drainage and extreme climatic events such as floods. The network has been developed piecemeal rather than in a planned, integrated way and has many deficiencies, such as inadequate geometry, weak pavement, missing road safety engineering measures, poor drainage provisions and insufficient climate resilience measures.

7. **The road network requires significant improvement in capacity, quality and maintenance.** About 60 percent of the secondary roads are in poor condition (International Roughness Index > eight), only about 18 percent have double lanes and about 70 percent have weak pavements (a remaining service life of two or three years).<sup>10</sup> Most of the secondary roads were initially constructed for a short design life and with thin pavements to extend the coverage of limited funds. A large part of the secondary network requires reconstruction and upgrades as it is beyond repair. Maintenance has not been adequately institutionalized in the PWRD system, which has received inadequate financing and lacks a sustainable maintenance mechanism.

8. **Road safety has been a major concern in Assam as in India.** In 2019 alone, India suffered 151,000 fatalities caused by road accidents. The country loses about three to five percent of its GDP to road accidents. India accounts for six percent of global road accidents despite its global share of vehicles of only one percent. Assam's share of road accidents is higher than the national average. In 2019, about 8.1 persons were killed per 10,000 vehicles in Assam compared with the national average of 5.1.<sup>11</sup> The state's severity index (number of persons killed per 100 accidents) went up from 36.3 in 2005 to 38.4 in 2019, above the national average of 33.7. Road accidents are caused mainly by the lack of adequate road safety engineering measures, aggravated by over-speeding, lack of road safety awareness, poor enforcement, limited institutional capacities and involvement of multiple agencies. A road safety committee set up by the Honorable Supreme Court of India is advising and directing various states to resolve road safety issues.

9. **The Assam government launched its flagship program, Asom Mala, to develop high-quality secondary roads.** During the last two decades, national highways and rural roads<sup>12</sup> have received substantial funding from the Government of India, but sufficient support is still lacking for secondary roads. Asom Mala aims to develop a high-quality secondary road network (state highways and MDRs) over the next 15 years to boost economic growth and bring secondary roads up to Southeast Asian standards. With funding from the Assam government and other sources, Asom Mala will employ best practices, including strategic planning, and high-quality designs emphasizing climate adaptation and green measures and road safety.

10. **PWRD is strongly committed to modernizing its road sector management and addressing key sector issues.** PWRD's original business procedures were primarily designed for small budgets and small works. Assam's rapid development requires PWRD to enhance its capacity to build and manage a much larger inventory of roads. It adopted the Road Sector

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<sup>10</sup> As per the road inventory and condition surveys conducted by PWRD

<sup>11</sup> Government of India, Ministry of Road Transport and Highways. 2020. Road Accident in India -2019.

<sup>12</sup> About 15,000 km of rural roads have been constructed in the last seven years under [Pradhan Mantri Gram Sadak Yojana](#) (PMGSY)

Modernization Plan in 2008 under the World Bank-funded Assam State Roads Project (ASRP) to turn itself into a modern road agency with sound policies, planning and engineering practices, business processes, asset management and institutional structures. These have led to the establishment of the Assam State Road Board and the Road Maintenance Fund, RAMS and the e-procurement system; computerization and standardization of PWRD's business procedures; creation of the Assam Road Research and Training Institute; drawing up of a road safety action plan; introduction of area-based maintenance contracts; and increased funding for maintenance. PWRD now wishes to build on these initiatives and carry them forward under Asom Mala through the proposed project. Some key areas for support are the following:

### **Asset Management**

11. **Road asset preservation is a key priority for the Assam government along with network expansion.** PWRD owns about USD4.2 billion worth of road assets. Their adequate maintenance and rehabilitation are essential to minimize annual losses of about four to five percent and to realize the investments' full development benefits. PWRD has established RAMS with a comprehensive database on a geographic information system (GIS) platform. RAMS has already been used to make investment decisions in Asom Mala. PWRD now plans to integrate road safety and climate resilience in RAMS to further enhance its database and information technology (IT) infrastructure.

12. **Innovative delivery and adequate funding are needed to support maintenance.** The traditional in-house system of executing maintenance works is becoming less efficient, and a suitable alternative is yet to be developed. PWRD has successfully introduced area-based maintenance contracts and decided to build on them through long-term performance-based maintenance contracts. Notwithstanding increased funding for road maintenance, available maintenance funding is still an issue. The Road Maintenance Fund is supported only by government sources. Mobilization of adequate funds, including through non-budgetary sources, is key for sustainability but still needs to be explored.

### **Road Safety Management**

13. **The Assam government is strongly committed to road safety.** It adopted the Assam Road Safety Action Plan in 2010 based on the Safe System Approach.<sup>13</sup> PWRD has set up a road safety cell to implement a road safety audit program through project preparation, including road safety engineering designs, training of PWRD staff in road safety engineering, road safety inspections and audits of existing roads, identification of blackspots and preparation of road safety improvement schemes to retrofit road safety for existing roads. The road safety audit of project corridors has revealed many safety hazards such as untreated junctions, inadequate sight distance and blind curves, missing wayside facilities, lack of pedestrian crossings and footpaths

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<sup>13</sup> Contained in the road safety manual of the Permanent International Association of Road Congresses and used internationally.

in build-up areas, missing road signs and markings and lack of protection structures. Some of these issues can be retrofitted quickly to significantly improve road safety.

### **Climate Resilience**

14. **Assam's road network is highly vulnerable to adverse climate events.** These are triggered by heavy rainfall, frequent floods, landslides and erosion. PWRD plans to adopt a mainstream approach to climate resilience in Asom Mala (Annex 2.1).

### **Project Components**

15. **Overall Project Design.** The project is designed to support Asom Mala through physical investments and technical assistance to build PWRD's capacity to deliver high-quality projects.

16. **Project Objective.** The project aims to improve the connectivity, safety and climate resilience of the secondary road network in the project districts and enhance PWRD's institutional capacity. The project complies with AIIB's latest corporate and transport strategies to enhance the strategic connectivity of Assam and to support economic development.

### **Component A. Improvement of Road Connectivity, Climate Resilience and Safety**

17. The component will support civil works to upgrade and improve a total of 1,000 km of state highways and MDRs in upper Assam in terms of capacity, climate adaptation and road safety through the following:

#### **Subcomponent A1. Upgrade of about 250 Kilometers of State Highways and Major District Roads**

18. **Selection of Project Corridors.** PWRD's Assam Road Master Plan identifies a strategic network of state highways and MDRs that are critical for economic growth and will be developed under Asom Mala.<sup>14</sup> The selected road sections are mostly the missing links or deteriorated priority sections of Asom Mala. No road section passes through designated protected areas, i.e., national parks or wildlife sanctuaries. Most project corridors are single-lane roads with thin bitumen surfacing. They have inadequate geometry, weak pavements, inadequate embankments, no drainage, no road safety engineering measures and no climate adaptation measures. The average International Roughness Index value is more than eight for most corridors. The upgrade works will address these issues and be undertaken along the existing alignments, excluding small sections and bypasses where realignment is essential to meet engineering standards. Traffic levels in the project corridors are low but expected to grow after road improvement by about four to seven percent per annum, as observed for other secondary roads improved under the ASRP.

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<sup>14</sup> The master plan is being developed by building on PWRD's strategic options and road reclassification study to define a coherent secondary road network of state highways and MDRs under the ASRP.

19. **Overall Design Approach and Standards.** PWRD design policy is to upgrade and improve all Asom Mala corridors so they become high-quality, climate-resilient and safe two-lane highways providing a decent level of service. All the corridors follow Indian Roads Congress Standards prescribed for two-lane highways:

- (a) **Overall geometry.** The corridors are mostly on embankments with a total formation width of 12 meters (m), with a 7 m carriageway and paved shoulders of 1.5 m and a 1 m earth shoulder on either side. In build-up areas, raised footpaths have been provided over the 1 m wide drains.
- (b) **Pavements.** They are designed as bitumen roads with provision for a drainage layer, granular subbase, bituminous base and wearing course for a design life of 20 years and 20 million standard axles. In poorly drained build-up village areas, concrete pavements have been used.
- (c) **Bridges and culverts.** All the bridges and culverts have been designed as concrete structures for a 100-year design life. The bridges have two lanes with sidewalks and the culverts are the full width of 12 meters.
- (d) **Design speed.** It is 100 km/hour in most sections, moderated to 80 km/hour for curves and even 40 km/hour in build-up areas to avoid large-scale demolition of property and to ensure road safety. During operation, the speed limit will be lower than the design speed.
- (e) **Road safety.** Speed will be controlled by traffic-calming design features. All the corridors are designed to meet the prescribed road safety engineering measures for two-lane highways based on a road safety audit undertaken during project preparation.
- (f) **Climate resilience and green solutions.** All the roads and bridges are designed to withstand adverse climatic events based on a climate vulnerability assessment during the project preparation (Annex 2.1).

20. **Innovative Contracting.** PWRD will use big or medium-sized value works contracts, from USD30 million to USD120 million, by customizing International Federation of Consulting Engineers (FIDIC) contracts for the local context and by considering experience gained in India in big civil works contracts. An engineering, procurement and construction (EPC) contract is proposed for the largest package. The objective is to harness private sector efficiency, share the risk between the government and the private sector and incentivize contractors to perform and ensure adequate quality of construction and deliver infrastructure efficiently. All the contracts have an inbuilt provision for five-year maintenance.

## **Subcomponent A2: Road Safety Improvements of about 750 Kilometers of Secondary Roads**

21. The subcomponent will demonstrate how road safety engineering measures can be retrofitted for state highways and MDRs. The secondary road sections to be improved were selected based on their strategic importance to upper Assam. The sections are in relatively good condition and do not require major rehabilitation or improvement but lack safety measures. The engineering measures are to be identified and designed based on the road safety audit supported in subcomponent C3. Typical safety improvements include improved junctions, curves, signage and marking, sidewalks, guard rails in build-up village areas, protection structures and traffic-calming measures.

## **Component B: Modernization of the Public Works Roads Department's Asset Management System and Computerization**

### **Subcomponent B1. Asset Management System Enhancement and Computerization**

22. **Public Works Roads Department's e-Portal.** PWRD's [web portal](http://www.apwd.in/) (<http://www.apwd.in/>) has been in use since 2008. It has workflow-based enterprise applications, including online processing of PWRD's business procedures. It is integrated with PWRD's RAMS, which is already in use for data-based planning and investment decision-making for Asom Mala and other programs. About 15,000 PWRD staff use the e-portal.

23. **Modernization of the Public Works Roads Department's Road Asset Management System.** The project will support the technical and functional enhancement of the e-portal and RAMS and the migration to a cloud-based service. The improved portal will significantly enhance PWRD's efficiency, transparency and sector governance and promote the home-based work environment to maintain PWRD's normal functioning during lockdowns. The updated RAMS will help introduce data-based planning and resource allocation for upgrading, rehabilitation and maintenance to minimize life-cycle costs, and prepare long-term improvement and maintenance plans, including associated financing plans. The following will be done:

- (a) Developing a contract management module and a quantity estimation module for RAMS.
- (b) Enhancing the road safety information module to prepare prioritized plans for road safety improvements in Asom Mala corridors. The module will contain a database of vehicle collisions, blackspots, road features and other information related to road safety management.
- (c) Adding a climate resilience module that will contain a database of climate-vulnerable locations in the Asom Mala network such as road sections passing through flood-prone, erodible, submergible and poorly drained areas. The module will prepare a prioritized plan to retrofit adequate climate adaptation elements along the existing network.

24. **Computerization.** The subcomponent will provide new computers, laptops, printers, local area networks and high-speed internet connectivity for PWRD's local offices and staff. The IT infrastructure is more than 10 years old, is obsolete, often breaks down, is slow and cannot cope with current demand. This project will help PWRD to improve its offices' IT environment.

### **Subcomponent B2. Piloting Demonstration Corridors with Digital Technology, Road Safety Equipment and Roadside Amenities**

25. Demonstration corridors have been selected (A15, A30 and A31) from the road corridors to be upgraded (subcomponent A1) to demonstrate the innovations to enhance road asset management and usage.

26. The digital technology devices to be used in the pilot corridors are automatic traffic counters, variable message signs, adaptive signal controllers, CCTV, weigh-in-motion sensors, flooding sensors, electric bus stop signs showing real-time bus arrival, among others. Road safety equipment includes speed-guns, breath analyzers, video cameras, highway patrol vehicles, accident rescue equipment, among others.

27. **Wayside Amenities.** The need is growing to provide wayside amenities such as rest areas, restaurants, toilets, tourist watch-out areas, parking facilities and other services for tourists and road users. The project will pilot the development of the amenities at suitable locations in consultation with the tourist department, district administration and local bodies. The amenities can be operated by residents or private operators, creating jobs.

### **Subcomponent B3. Sustainable Asset Management**

28. The subcomponent will support technical assistance to enhance PWRD's asset management, including the following:

29. **Update of the Asset Management Plan.** PWRD has prepared an asset management plan based on the ASRP's International Infrastructure Asset Management Manual. The plan will be updated to meet the needs of the Assam Road Master Plan.

30. **Financing Plan for Maintenance.** Notwithstanding increased Assam government funding for road maintenance, available maintenance funding is still an issue. PWRD requires about USD70 million annually to maintain its road network but the available funding is only one-fourth of that. While the Assam government has established the Road Maintenance Fund and the Assam State Road Board to manage it, the only source of money for the fund is the Assam government. The project will support a study to find feasible solutions to establish a regular and steady stream of maintenance funding for Asom Mala. The study will examine practices of other states and in other countries to mobilize non-budgetary funds for maintenance.

31. **Innovative Maintenance Contracting.** PWRD has already begun using area-based maintenance under the ASRP. Building on that, the project will support technical assistance to

introduce long-term performance-based maintenance contracts by customizing contract documents and contract preparation guidelines.

## **Component C: Project Management and Institutional Capacity Building**

### **Subcomponent C1. Construction Supervision and Implementation Support**

32. **Construction Supervision Consultants.** They will be engaged to ensure effective delivery of the road and bridge works under civil works contracts according to the prescribed designs and construction specifications, and to provide professional advice to PWRD on managing contractual issues.

33. **Other Services.** These include (a) external E&S monitoring consultants, (b) resettlement and rehabilitation implementation support consultants and (c) other consultants, contract staff and academic institutions to complement PWRD's in-house capacities for project implementation and provide high-level technical expertise and resource persons for training programs.

### **Subcomponent C2. Employment Capacity-Building Program of the Public Works Roads Department**

34. In collaboration with national and international engineering programs, the subcomponent will implement a comprehensive training program for PWRD staff. The program aims to prepare a new generation of civil engineers in PWRD. The program will be equipped with design software and hardware in collaboration with international and national universities. Key training areas will include climate resilience, green and nature-based solutions, road safety, engineering design, quality assurance, contract management, bridge engineering, pavement design, asset management, management of social and environmental issues, soft skills, project management, performance-based maintenance and digital technologies.

35. Courses will be delivered remotely through lectures, seminars and in-person training courses post COVID, in collaboration with national and international institutes. The training can include activities such as workshops, study tours, among others.

### **Subcomponent C3. Road Safety Audit, Design and Awareness Program**

36. The subcomponent will support the following:

- (a) **Road safety audits and inspections and preparation of road safety improvement schemes** for 750 km of secondary roads under subcomponent A2, including detailed engineering designs for road improvement works and preparation of contract documents.
- (b) **A road safety awareness program for the demonstration corridors under subcomponent B2**, covering road users and communities living along the project corridors. Road safety-related training for PWRD staff will be included.

#### **Subcomponent C4. Development of Specific Road Sector Plans**

37. The Assam Road Master Plan sets a clear path for the next 20 years. It has a comprehensive data analysis on infrastructure demand and supply, identifying priorities and critical links. However, the plan is short on specific topics. The subcomponent will support selected technical studies among climate resilience, multimodal transport, digital technologies, construction industry performance, economic efficiency, and others. The studies will be selected by PWRD based on its priorities and needs during project implementation. Some key study areas are the following:

- (a) **A climate-resilient and green growth strategy.** The study will support its implementation by developing design guidelines for climate-resilient, resource-efficient and green roads, and network-level climate vulnerability assessments.
- (b) **Multimodal transport development plan.** Assam has the potential to promote low-carbon transport and reduce transport costs through water, rail and air transport. The plan will promote multimodal transport to reduce transport costs and thereby make Assam's industries and businesses more competitive internally and nationally, move toward a low-carbon future and attract private capital. The plan will study and consider the women's mobility needs.
- (c) **Technology-enabled infrastructure plan.** It will include ways to promote digital technologies in the road sector for better value for money, quality, productivity, efficiency, resilience, sustainability, transparency, beneficiary involvement and better governance along the full project life cycle. The plan is aligned with the AIIB Corporate Strategy's priority of technology-enabled infrastructure and will be aligned with the existing IT policy of PWRD and the Assam government.

#### **Results Monitoring Framework**

38. The indicators of the project results monitoring framework are summarized in Annex 1. The following are the key ones:

- (a) **Project objective indicator 1: Population benefitted from improved, safe and all-weather and climate-resilient transport connectivity (total/females).** The indicator counts the number of residents living within five km on both sides of the upgraded corridors. The targets are estimated based on 2011 census data.
- (b) **Project objective indicator 2: Travel time reduced on project upgraded corridors (percentage).** The average travel time on each corridor is surveyed using the floating vehicle method during peak hours. The sum of the average travel time of all corridors is compared with the target year and the baseline. The indicator is calculated as



Indicator 2 = [(sum of average travel time of all corridor in base year)-(sum of average travel time of all corridors in future year)]/(sum of average travel time of all corridor in base year)

- (c) **Project objective indicator 4: PWRD uses a cloud-based e-portal and road asset management system for department operations.** Department operations include project monitoring, works measurements and billing, detailed project report submission, and PWRD's clearance.
- (d) **Intermediate indicator 4: Number of affected people given skills or self-employment training (total/female).** The results will be collected from the biannual social external monitoring report.
- (e) **Intermediate indicator 5: PWRD's staff trained in this Project.** One staff-week of training is equivalent to 30 hours of training delivered through physical and e-learning training and workshops and exposure visits.

## Annex 2.1. Climate Resilience and Green Infrastructure

1. **Context.** Assam’s road network is highly vulnerable to extreme climatic events because of heavy and frequent rains and floods. About 40 percent area of the state is flood prone since it is in the river basins of the mighty Brahmaputra and Barak. The number of annual extreme rainfall days is likely to increase by 38 percent by 2050, according to the Assam State Action Plan on Climate (2015-2020). The network is inadequately resilient to withstand extreme events and often suffers premature failures, washouts and overall low service life. Inadequate maintenance and weaknesses in engineering designs and construction quality further aggravate the impact of extreme climatic events. While investments in climate-resilient infrastructure produce about four times more returns,<sup>1</sup> they are not fully realized because of the lack of initial investments required to build resilient infrastructure.

2. **Project Approach.** The project design will include a resilient transport approach. Key elements include the use of innovative, climate-smart and green solutions in project corridors to ensure that they withstand extreme climatic events (Table).

### Climate Adaption and Mitigation Actions Supported by the Project

Component	Climate Adaption and Mitigation Actions
<b>Component A. Improvement of Road Connectivity, Climate Resiliency and Road Safety</b>	
A1. Upgrading of about 250 km of state highway and major district road sections	<p>Climate vulnerability assessments undertaken on all the project corridors to identify vulnerable locations, such as flood-prone, poorly drained, low-lying and erosion-prone locations, including bridges and culverts having excessive scour, changes in watercourses, overtopping, inadequate waterways and erodible banks.</p> <p>Climate-resilient and green solutions adopted based on the above assessment, including the following:</p> <ul style="list-style-type: none"> <li>(a) <b>Drainage.</b> Longitudinal side drains in poorly drained areas.</li> <li>(b) <b>Roads.</b> Embankment height to be 60 centimeters higher than the highest flood levels. Pavement to use special-grade bitumen, drainage layer, improved material specifications and concrete in poorly drained areas.</li> <li>(c) <b>Bridges and culverts.</b> 10 percent more waterways provided than in the normal case, minimum culvert size of 1,000X1,000 millimeters and additional culverts to avoid clogging and ponding and ensure smooth flow of water during rains and floods; high-grade concrete to minimize material consumption and costs; precast technology, integral structures, bearing-</li> </ul>

<sup>1</sup> Global Commission on, 2019. <https://gca.org/about-us/the-global-commission-on-adaptation/>

	<p>free designs and river-training works to improve resilience and performance during floods and earthquakes.</p> <p>(d) Bioengineering measures for erosion control for embankment slopes and bridge approaches, such as Geobags.</p> <p>(e) Earth-retaining walls at bridge approaches and high embankments; reuse of construction waste from dismantled pavements and structures, pavement recycling; use of soil, local materials, waste plastic and industrial byproducts in road construction to conserve scarce natural stones.</p> <p>(f) Roadside and avenue plantation on the land freed because of road realignments and vacant PWRD land, reuse of topsoil; rehabilitation, greening and enhancement of borrow areas, existing ponds and other wayside government land to convert them to productive use as wayside amenities for road users and local communities.</p> <p>(g) Life-cycle cost planning of the project corridors will reduce overall costs and consumption of road building material and result in resource efficiency.</p> <p>(h) The corridors are designed for safe failure, minimum destruction, protection against washouts and early restoration in case of malfunctioning of the drainage system and submergence of roads and bridges during heavy rains and flooding. Bridges will use flood sensors as early warning measures.</p>
<p>A2. Road safety improvements</p>	<p>Road safety engineering measures such as improved geometry, reflective road signs, protection structures, shelters and rest areas will ensure the safety of road users during heavy rains, floods and poor visibility conditions.</p>
<p><b>Component B. Modernization of the Public Works Roads Department’s Asset Management System and Computerization</b></p>	
<p>B1. E-portal and asset management system enhancement and computerization</p>	<p>The road asset management system will help integrate climate resilience into asset management by conducting network-level climate vulnerability assessments, classifying the network according to its climate vulnerability and retrofitting climate resilience in vulnerable locations through rehabilitation and maintenance programs to avoid premature failure of the network.</p>
<p>B2. Piloting of demonstration corridors with digital technology, safety equipment and roadside amenities</p>	<p>The multisector interventions in the pilot demonstration corridors will help smooth traffic management, avoid traffic jams, provide temporary parking and ensure timely post-crash care during extreme climatic conditions. Early warning</p>

	signals for floods will help minimize damage caused by floods and improve disaster management.
B3. Update of sustainable asset management plan	An asset management plan and adequate maintenance will help minimize annual asset losses. Adequate maintenance supported by improved maintenance funding and use of long-term performance-based road maintenance contracts will enhance the resilience of existing roads by retrofitting resilience measures and taking preventive maintenance actions.
<b>Component C. Project Management and Institutional Capacity Enhancement</b>	
C1. Construction supervision and implementation support	Design and supervision consultants will support the preparation and implementation of innovative, climate-informed, nature-based design, construction and maintenance solutions and build PWRD’s capacities to do the same.
C2. Employee capacity-building program of PWRD	The program will build PWRD’s capacity and knowledge base in climate-resilient, green solutions for Asom Mala’s construction and maintenance. PWRD’s human resource professional development strategy has training modules on climate agenda, including awareness raising, to mobilize high-level political and public support for low-carbon and resilient infrastructure.
C4. Development of transport sector subplans	PWRD’s climate resilience and green growth strategy and design guidelines for the project’s climate-resilient and green roads and bridges will set a low-carbon and resilient transport pathway for Asom Mala and Assam’s transport sector, starting with policies, strategic investment planning, infrastructure delivery, asset management, institutions and transport services and operations.

## Annex 2.2. Gender Approaches of the Project

3. **Context.** In India, gender inequality is significant. The World Economic Forum has ranked India 140 (score of 0.625 with parity being 1.0) among 156 countries in the 2021 Global Gender Gap Report. India slipped 28 positions in 2021, compared with 2020 rank of 112 among 153 countries, per the report's previous edition. The country is third-worst performer in South-Asia, ranking below Bangladesh (ranked 65), Nepal (ranked 106) and Bhutan (ranked 130). One of the major factors for India's poor performance is the large gender gap in economic opportunities and participation (score of 0.326). Low level women participation in the labor market (22.3 percent) and wage disparity for similar work are the two major attributes for the large economic opportunity and participation gap.

4. Further literature review and data collection revealed that: Assam, like rest of the country, has low rate of female labor force participation: only 18 percent compared to 22.3 percent in India and 59 percent in East Asia and Pacific region. Meanwhile, the female literacy rate is relatively high (about 71 percent) in Assam, but women find it hard to get formal jobs due to both inadequate transport access and lack of adequate skills required for those jobs. Most of them depend mainly on agriculture, small businesses, casual workers, and informal sector.

5. Consultations with project beneficiaries during the project preparation indicate that gender equity and empowerment remain serious issues in Assam. 98 public consultation events were organized during project preparation with total 1,268 participants (including 365 female and 912 male participants), 13 of which were women-focused consultations. These public consultations found out that: 1) In Assam, most of the women are involved in household and productive roles simultaneously by working in fields as well as taking care and maintenance work of the household, such as cooking, washing, cleaning, nursing, and looking after children. 2) The agriculture or non-agriculture related productive jobs that can generate cash income are therefore preferred to be done at home, or within a short travel from home by the women. 3) the main concerns from them are the loss of assets and the unequal employment wages of construction work. The female participants also expressed the perceived benefits of the project roads, including: 1) improved access to social facilities like health and education; and increased frequency of health workers' visits. 2) increase in income generating activities such as selling of agriculture and handcraft products, and better access to markets. 3) safer roads for walking and crossing. 4) frequent and affordable transport, especially bus service. 5) less flooding of roads.

6. Additional public consultations were held in Majuli island during the visits of the AIIB team in April 2021 and April 2022. The residents and women in Majuli are facing unique challenges due to the inadequate road connectivity with the rest of Assam, including the following cases:

- (i) Most residents in Majuli depend on agriculture, handcrafts, small businesses, and daily-wage jobs. The tribal population and women residing along the project corridors possess unique skills for handcrafts and there is lot of potential for high value agriculture. However due to inadequate transport access, the women weavers of Majuli are forced to sell ethnic attires like Mekhla (traditional dress of Assamese women) to middlemen for an amount ranging from Rs. 1500 to

2500 when the market price of a Mekhla is around Rs.7500 and above. With improved road connectivity, these women can directly sell their products to wholesalers/retailers at a higher price.

- (ii) People from Majuli have to travel to Lakhimpur and further Jorhat to avail quality health facilities. Traveling to these urban centers is very challenging particularly, for expecting mothers and patients with severe health issues. Women members present in the meeting informed that there are several cases when expecting mothers gave birth at the ferry ghat itself. Sometimes, people crossing the river in an emergency might risk their life too, due to the weather condition and the availability of ferry services.
- (iii) At present, the ferry charge is Rs. 50 per passenger and with a two wheeler it is Rs. 100. About 15 to 20 percent of ferry passengers travel with their two wheelers for faster onward and backward journeys. Visiting the nearest town is more or less a whole day affair. The average travel time from Majuli to Jorhat is 12 hours. The expense incurred on travel is high. The cost of bringing goods from Jorhat and other places increases because of poor transport connectivity.
- (iv) Higher (college) education for women in Majuli is constrained by poor access to educational facilities. At present, girl students are required to stay in the city outside of Majuli for which the average monthly expenditure is about Rs. 8000 to 10000. With improved access, it will be possible for many females to commute on a daily basis from Majuli, resulting in a significant cost savings.
- (v) Mobility of women is very constrained in Assam and women are the main users of the poorly developed public transportation system. Lack of safe and reliable public transport has been identified as challenge by tea garden female employees.

7. **Project Approach.** The project design incorporates the comments and findings from women road users. Key interventions are listed below:

- (i) **Gender-informed engineering design.** Roadside facilities are added in the project design to respond to the needs of road users, especially women, including: 1) solar street lightings to be installed close to villages and townships to improve safety. 2) bus shelters to be installed for better bus service. 3) sidewalks on top of covered drains at the sections of villages and townships. 4) pedestrian crossing at needed locations. 5) speed bumps and rumble strips for traffic calming.
- (ii) **Key actions defined in ESMP and RP.** Key actions have been identified in the key E&S documents, including: 1) the Gender based Violence and prevention plan. 2) Create awareness generation campaigns with well-designed IEC (Information, Education and Communication) material for women. 3) Train staff

of the project management unit and other involved stakeholders in gender mainstreaming. 4) Organizing Women consultations. 5) Non-discriminating in wage payment, if employed for construction work. 6) Provisions Gender specific facilities in Labor Camp. 7) The entitlement matrix included in the RP outlines the entitlements to be received by various categories of project affected people including women and vulnerable groups.

- (iii) **Project-level Gender Action Plan.** The project-level gender action plan is developed and disclosed to give a general guidance for the project implementation when dealing with risks regarding gender. The project Gender Action Plan will enable the active participation of women for their opinions in the design and implementation of the project.
  - (iv) **Employment oriented training of women** for the project affected communities and those served by the project corridors including women in tribal areas. The project will also help these women to access the ongoing training opportunities under the “Skill India” and other vocational training programs. The project requires contractors to provide same wage for both women and men workers.
  - (v) **Skill training for the existing PWRD staff and supervisory staff (including women)** with an aim to increase their skill and knowledge base, on the job performance, and earning potential.
  - (vi) **Provision of haats (small local markets)** along the pilot project corridors allowing women, tribals, farmers, and micro-enterprises and micro-enterprises to access markets and business opportunities.
  - (vii) **Pilot project to improve bus service along selected project corridors through ICT intervention**, which will facilitate travel for women and girls to access jobs, markets, health, education, and other social welfare facilities.
  - (viii) **Road safety awareness programs (including girls and women) along project corridors.**
  - (ix) **Including of female members in the Grievance Redress Committee** and collection of gender disaggregated data on complaints received and resolved.
  - (x) **Technical study to understand mobility needs of the women** to access markets, economic opportunities, and basic services in Assam. The study will identify mobility patterns of women, linkages between mobility constraints and employment opportunities and women’s roles in development of the local, evolving sectors (eco-tourism, high-value agriculture) of the economy.
8. **Project Gender Indicators.** Four gender-related and gender-disaggregated indicators are required to be monitored and reported as project indicators, including:

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- (i) 75 percent of women surveyed among communities are satisfied with the improvement of project roads (percentage).
- (ii) Population benefitted from improved, safe and all-weather and climate-resilient transport connectivity (total/female).
- (iii) Affected people given skills or self-employment training (total/female).
- (iv) PWRD's staff trained in the Project. (total/female)



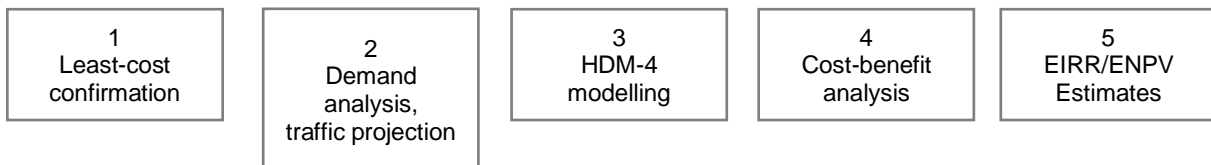
### Annex 3: Economic and Financial Analysis

1. A cost-benefit analysis was carried out to assess the economic viability of the project investment, comparing with- and without-project scenarios over an operating life span of 20 years, with a construction period of three years. All costs are expressed in domestic currency at constant 2020 prices, net of transfers and financial charges. For the economic analysis, a standard conversion factor of 0.90 is applied to investments in goods and a shadow wage rate factor (SWRF) of 1.0 is applied to skilled labor and 0.61 to unskilled labor.<sup>1</sup> International costs are converted to local currency using an exchange rate of INR74.0 to USD1.00.

#### Methodology and Data Source

2. The economic analysis follows an analytical framework shown in Figure A3.1.

**Figure A3.1: Economic Analysis Framework of the Road Rehabilitation Investment**



HDM-4 = Highway Development and Management Model-4, EIRR = economic internal rate of return, ENPV = economic net present value.

3. **Least-Cost Confirmation.** At the feasibility stage, the proposed project design was confirmed as the least-cost among all the design options identified for each of the project road sections, taking into account (a) topographical and weather conditions of the project area, (b) traffic demand and capacity of the current road network, (c) current road conditions, (d) connectivity and linkages of road sections and (f) environmental and social factors.

4. **Base-Year Traffic Demand.** In each of the project road sections, traffic counts have been obtained for one week on all vehicle types, including (a) motorized vehicles, such as two-wheelers, three-wheelers, cars, vans, jeeps, minibuses, standard buses, tempo, light commercial vehicles, two-axle trucks, three-axle trucks, multi-axle trucks, tractors, among others, and (b) nonmotorized vehicles, such as bicycles, rickshaws, animal-drawn carts, among others. Estimated seasonal factors are applied to the surveyed traffic data to calculate annual average daily traffic.

5. **Future-Year Traffic Projection.** The project includes (a) normal traffic with estimated growth rates, (b) diverted traffic to and from competing roads, assumed to be 10 percent of normal traffic and (c) new traffic induced by the project intervention, assumed to be 10 percent of normal traffic.

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<sup>1</sup> A sensitivity analysis is carried out to estimate the EIRR using economic cost without the SWRF conversion

6. **Traffic Growth Rates.** Different growth rates are assumed for motorized and nonmotorized traffic, factoring population growth and socioeconomic development in the project area. Assam, an agricultural state with a population of 31.2 million, has seen rapid economic growth in past decades. Assam's net state domestic product grew at an average annual rate of 7.2 percent in 2011-2020. The average annual growth rate of registered cars in the same period was about 10 percent, outpacing economic growth. Assam Agenda 2030 projects the state's economy to grow at an average annual rate of 5.5-6.25 percent until 2040. Table A3.1 summarizes growth rate estimates for different types of motorized traffic.

**Table A3.1: Growth Rate Estimates—Motorized Traffic (%)**

Vehicle Type	Period 1 (2020-25)	Period 2 (2025-30)	Period 3 (2030-35)	Period 4 (2035-40)	Period 5 (2040-45)
Two Wheelers	7.08	7.25	6.38	5.83	5.55
3 Wheelers	6.96	7.13	6.27	5.72	5.45
Car/ Vans/ Jeeps	6.76	6.91	6.07	5.53	5.26
Mini Buses	5.89	6.01	5.24	4.74	4.47
Standard Buses	5.89	6.01	5.24	4.74	4.47
Tempo	6.70	6.86	6.02	5.48	5.21
LCV's (Goods)	6.70	6.86	6.02	5.48	5.21
2-Axle Trucks	5.50	4.17	2.40	0.92	-0.46
3-Axle Trucks	6.64	6.92	6.08	5.54	5.26
MAV	6.73	6.89	6.05	5.51	5.24
Tractors + Trailer	6.70	6.86	6.02	5.48	5.21
Tractors	6.70	6.86	6.02	5.48	5.21

LVC = light commercial vehicle, MAV = Multi Axle Vehicles.

7. Nonmotorized transport serves local demand and is expected to grow, albeit more slowly than motorized traffic. Growth rate estimates for different types of nonmotorized vehicle traffic are in Table A3.2.

**Table A3.2: Growth Rate Estimates—Nonmotorized Traffic (%)**

Vehicle Type	Period 1 (2020-25)	Period 2 (2025-30)	Period 3 (2030-35)	Period 4 (2035-40)	Period 5 (2040-45)
Bicycle/Cycle	2.16	2.21	1.96	1.94	1.55
Cyc Rickshaw	2.16	2.21	1.96	1.94	1.55
Animal Cart	2.16	2.21	1.96	1.94	1.55
Pedestrian	1.00	1.00	1.00	1.00	1.00

8. **Highway Development and Management Model-4.** Highway Development and Management Model-4 (HDM-4) was used with the default model parameters, with the exception of the road condition parameters, road user effects parameters, value of time parameters and investment costs, which have been calibrated for the project and local conditions. HDM-4 estimates fuel efficiency and consumption and other operation and maintenance costs, based on

which vehicle operating costs (VOC) and travel time can be estimated for each type of motorized vehicle on the project roads under with- or without-project scenarios.

### Cost-Benefit Analysis

9. **Investment costs** include investment in the rehabilitation of 250 kilometers (km) of state highways and major district roads (MDRs) and implementation of safety measures on 750 km of state highways and MDRs (Table A3.3).

**Table A3.3: Investment Costs**

Activity	Investment (USD million)
Land acquisition and preparation	84.4
Rehabilitation of state highways and MDRs (250 km)	350.1
Implementation of road safety measures (750 km)	15.3
Project management and capacity building	21.7
Total	471.4

km = kilometer, MDR = major district road.

10. **Operation and maintenance costs** include (a) routine maintenance of pavement, patrolling, electricity, overhead and insurance and (b) periodic maintenance costs for seal surfacing and track coating every five years (Table A3.4).

**Table 3.4: Annual Routine Maintenance Cost**

Activity	Annual Cost
Routine maintenance for pavement	INR200,000/km
Patrolling and electricity	INR600,000
Other office expense	INR2,400,000
Insurance	0.15% of investment

km = kilometer.

11. **Economic benefits** of the project investment include (a) VOC savings, (b) savings in travel time because of increased average travel speeds, (c) reduced injuries and casualties associated with road accidents because of better road width and geometry, pavement and signage on project roads and (d) wider economic effects. The quantitative cost-benefit analysis calculates and includes only benefits (a), (b) and (c).

- (a) **VOC savings.** By widening and improving the project roads, the investment will reduce congestion, improve vehicle fuel efficiency and reduce vehicle wear and tear. HDM-4 estimates the VOC of for each type of motorized vehicle based on estimates of their speed, travel time and fuel efficiency based on speed and road surface quality. Fuel savings, as part of VOC savings, help avoid an estimated total of 1.62 million tons of CO<sub>2</sub> emissions over the lifetime of the upgraded corridors. The benefits of CO<sub>2</sub> emissions avoidance are not considered in the economic analysis.

For nonmotorized traffic, road conditions can affect the amount of effort and energy required by human- or animal-drawn vehicles. Rougher roads demand greater exertion, time and additional energy intake by vehicle operators. VOC savings are estimated based on market price differentials levied on good and poor roads.

- (b) **Savings in travel time.** Road width and conditions have a major impact on traffic speed. The average speed of motorized traffic on the project roads is about 20-25 km per hour and can double after road improvement, resulting in considerable savings in travel time. For example, bridge connectivity to Majuli Island will reduce travel time from Majuli to Lakhimpur by three to four hours. The model estimates travel time savings for passengers and goods in transit for motorized and nonmotorized vehicles. In road infrastructure projects designed to improve network efficiency, savings in travel time generally account for the biggest portion of the project benefits. About 60 percent of the project's estimated benefits are the result of savings in travel time.

The passenger value of time is estimated based on per capita income of the employed population in the project area. When applicable, an SWRF is applied in valuing the benefit of travel time. The value of cargo delay is valued as the cargo's opportunity cost of capital.

- (c) **Reduced road accidents.** Project safety measures will help prevent road accidents and reduce injuries and casualties on 1,000 km or about 14 percent of the total length of state highways (3,134 km) and MDRs (4,132 km). In 2019, a total of 8,350 road accidents resulted in 6,454 injuries and 3,208 deaths in Assam, about half of which occurred on state highways and MDRs, translating into an estimated 0.58 accident, 0.44 person injured and 0.20 death per kilometer of state highways and MDRs. For the 250 km of project roads to be widened and rehabilitated, HDM-4 has estimated the safety impact for each road section. For the remaining 750 km of project roads on which safety measures will be implemented, the analysis conservatively assumes 10 percent fewer road accidents and associated injuries and deaths. In 2019, a total of 3,299 people were injured and 1,518 died on state highways and MDRs in Assam. Based on conservative estimates, the project-funded safety interventions are expected to help avoid 34.1 injuries and save 15.7 lives annually.

**Table A3.5: Road Accidents and Resulting Injuries and Casualties in Assam, 2018 and 2019**

Type of Road	Accidents				Injured (number)				Casualties (number)			
	2018	%	2019	%	2018	%	2019	%	2018	%	2019	%
NH	3963	48	3988	47.8	2782	46.6	3155	48.9	1541	52	1690	52.7
SH & MDR	4285	52	4362	52.3	3182	53.4	3299	51.1	1425	48	1518	47.3
Total	8248		8350		5964		6454		2966		3208	

MDR = major district road, NH = national highway, SH = state highway.

Source: The State Government of Assam.

- (d) **Monetized benefit of reduced road accidents.** Using the hedonic wage approach, a recent study in India estimated the value of statistical life at INR44.69 million (USD0.60 million) and the value of statistical injury at INR1.67 million (USD0.02 million).<sup>2</sup> Thus, the project-funded safety interventions on 750 km of project roads alone are expected to result in an estimated value of INR700.3 (USD9.46 million) in lives saved and INR56.9 million (USD0.77 million) in injuries avoided at the 2019 base level, conservatively assumed to grow at the rate of population growth.
- (e) **Wider economic effects.** Assam has established industries relying on its rich resources and has great potential to grow if provided with better transport connectivity. (1) Assam contributes half of the country's total tea production (about 1,300 million kilograms), and about 20 percent of the tea produced in India is exported. Upper Assam is blessed with the most tea gardens in Assam, and the project will provide faster connectivity and cheaper logistics to ship tea to Guwahati, the capital of Assam and the regional tea distribution center. (2) Assam is a main center of crude-oil fields (23 percent of India's onshore production) and natural gas (33 percent). Dibrugarh district has many important industrial centers, such as Digboi, Naharkatia, Moran, Duliajan, Margherita, among others. Faster connectivity will lead to cheaper resources and higher profits. (3) Majuli and Lakhimpur district on the north bank of the Brahmaputra River are key tourist and cultural attractions, and the project will enhance access to Majuli.

## Results of the Economic Analysis

12. At a discount rate of 10 percent<sup>3</sup>, the project is estimated to generate an economic net present value of INR16,525 million and yield an economic internal rate of return (EIRR) of 17.8 percent, exceeding the discount rate of 10 percent (Table A3.6). Therefore, the project investment is economically justified. The upgrading of project roads is expected to help avoid an estimated total of 1.62 million tons of CO<sub>2</sub> emissions, because of fuel savings, over the project's lifetime. The benefits of CO<sub>2</sub> emission avoidance are not considered in the economic analysis.

<sup>2</sup> Majumder and Madheswaran. 2019. Value of Statistical Life in India: A Hedonic Wage Approach. Bangalore, The Institute for Social and Economic Change.

<sup>3</sup> The 10% discount rate is selected for the project by referring to the recent economic analyses of World Bank projects and AIIB projects. It is about twice the historical 20-year per capita gross domestic product growth rate in India.

**Table A3.6: Outcomes of the Economic Analysis**

<b>Roads</b>	<b>ENPV @ 10% (INR million)</b>	<b>EIRR (%)</b>
Rehabilitation of state highways and MDRs (250 km)	10,711	15.2
- Dhodar Ali Road	914	12.9
- Dhakuakhana to Telijan Road	736	13.7
- Moran to Disang Kinar Bangali to Kathalguri	4,920	18.3
- Sivasagar to Nakachari	2,975	18.3
- Majuli to Dhunaguri to Bhogalmara	991	12.5
- Sarthebari Rampur Pathsala Road	175	11.0
Implementation of road safety measures (750 km)	5,814	81.2
<b>Total</b>	<b>16,525</b>	<b>17.8</b>

km = kilometer, ENPV = economic net present value, MDR = major district road.

13. Table A3.7 summarizes the economic costs and benefits.

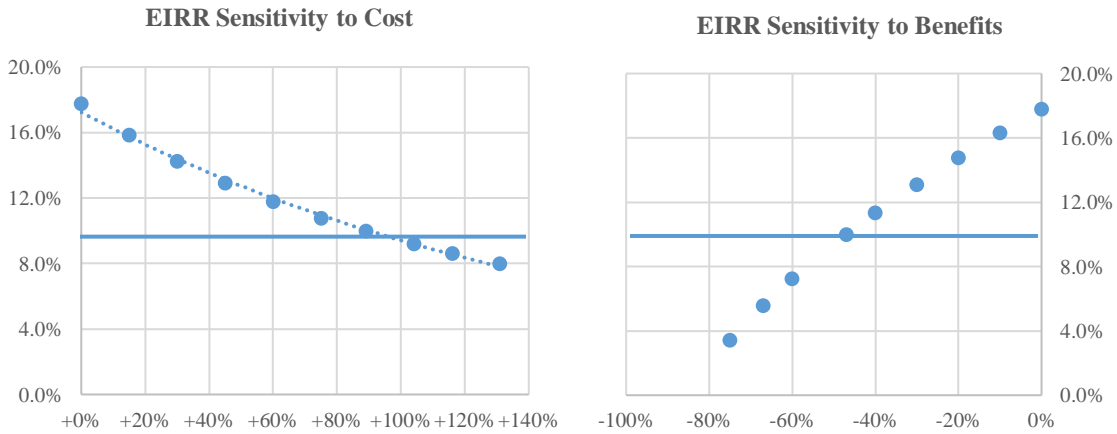
**Table A3.7: Economic costs and benefits**

	<b>Asset related Costs and Savings</b>		<b>Benefits</b>		<b>Net Benefit</b>
	<b>Investment Cost</b>	<b>O&amp;M Cost &amp; Savings</b>	<b>VOC &amp; VOTT</b>	<b>Safety Benefit</b>	
2021	6,140	(507)	-	-	(5,633)
2022	9,403	(73)	(191)	-	(9,521)
2023	7,918	(73)	(167)	822	(7,160)
2024	-	450	2,163	1,214	2,959
2025	-	9	2,477	1,257	3,760
2026	-	(748)	2,673	1,302	4,759
2027	-	(178)	2,853	1,349	4,418
2028	-	957	3,064	1,399	3,548
2029	-	450	3,307	1,449	4,350
2030	-	9	3,572	1,499	5,109
2031	-	(748)	3,831	1,552	6,182
2032	-	(178)	4,062	1,607	5,899
2033	-	1,200	4,333	1,665	4,854
2034	-	450	4,616	1,723	5,950
2035	-	9	4,935	1,783	6,773
2036	-	(748)	5,270	1,845	7,931
2037	-	(178)	5,567	1,909	7,726
2038	-	984	5,908	1,977	6,979
2039	-	450	6,330	2,046	8,008
2040	-	9	6,770	2,117	8,967
2041	-	(748)	7,176	2,191	10,209
2042	-	(491)	7,494	2,269	10,353
2043	-	(4,670)	7,846	2,349	14,971
<b>Total:</b>	<b>23,462</b>	<b>(4,366)</b>	<b>93,890</b>	<b>35,326</b>	<b>14,866</b>
			<b>EIRR</b>	<b>17.8%</b>	
			<b>ENPV</b>	<b>16,525</b>	

EIRR = economic internal rate of return, ENPV = economic net present value, O&M = operation and maintenance, VOC = vehicle operation cost, VOTT = Value of Travel Time.

14. **Sensitivity Analysis.** Results of the sensitivity analysis indicate that the project’s economic viability is robust enough to withstand as much as an 89 percent cost overrun or 47 percent underdelivery of the full intended benefits.

**Figure A3.2: Sensitivity Analysis**



EIRR = economic internal rate of return, ENPV = economic net present value.

15. Table A3.8 summarizes the impact on EIRR and economic net present value from 20 percent cost overrun, 20 percent underdelivery of benefit and a worst-case scenario involving both. Without applying the SWRF to the investment cost, the EIRR is estimated at 15.3 percent. (Table A3.8)

**Table A3.8: Sensitivity Analysis**

	ENPV @ 10% (INR million)	EIRR (%)
[1] Base case	16,525	17.8
[2] Base case without SWRF conversion	12,782	15.3
[3] Base case with 20% cost overrun	12,788	15.3
[4] Base case with 20% benefit reduction	9,483	14.7
[1] + [2] + [3] + [4] Base case without SWRF conversion + 20% cost overrun and 20% benefit reduction	1,245	10.5

EIRR = economic internal rate of return, ENPV = economic net present value, SWRF = shadow wage rate factor.

## Annex 4. Member and Sector Context

### A. Member Context

1. India's economy posted strong growth of 7.7 percent (annual average) from FY2013 to FY2016. The economy started slowing down in FY2017 (6.8 percent) and continued to do so in FY2018 (6.5 percent) and FY2019 (4.0 percent) mainly because of muted domestic consumption growth and investment demand. Domestic economic shocks such as demonetization, failure of a large nonbank financial institution and the teething problems of the rollout of the integrated goods and services tax dragged the growth process.

2. The coronavirus disease (COVID-19) pandemic has resulted in worldwide loss of life and economic disruption. The economic fallout and collapse of global trade was exacerbated by the lockdown and other restrictions on mobility. India's gross domestic product (GDP) contracted by 24.4 percent in the first quarter (Q1) of FY2020 but steadily recovered in subsequent quarters. GDP is estimated to have contracted by 7.3 percent in FY2020.

3. The second wave of the COVID-19 pandemic was much more severe than the first, with daily infections crossing the 400,000 mark in May 2021. To contain the spread of the virus, local restrictions were imposed rather than a nationwide lockdown. GDP grew by 20.1 percent in Q1 FY2021 mainly because of a favorable base effect.

4. The COVID-19-induced restrictions had a severe impact on employment. The unemployment rate shot up to 23.5 percent in April 2020, from a pre-pandemic average of 7 percent (FY2018 and FY2019). As restrictions started being lifted in June 2020, the unemployment rate improved and averaged 7.2 percent from July 2020 to March 2021. Local restrictions pushed the unemployment rate up to 11.9 percent in May 2021. As of July 2021, the unemployment rate had recovered to 7.0 percent, comparable to the pre-pandemic level. Urban regions reported higher unemployment than rural regions. Most job losses were in the informal sectors, where workers had inadequate social protection.

5. The larger impact of COVID-19 restrictions in urban areas had a disproportionately greater impact on the urban poor than on the traditional poor in rural regions. The World Bank estimates that the COVID-19 pandemic increased the overall poverty rate by about 2.5 percentage points in FY2020. The poverty rate is expected to steadily decline to 4.4-6.9 percent by FY2023.

6. India's economy is expected to recover strongly, growing by more than 9.5 percent in FY2021 and 8.5 percent in FY2022.<sup>1</sup> Growth is expected to be assisted by improvement in the business climate as evidenced by India's ranking rising from 142 to 63 in 2015-2020 in World Bank's Ease of Doing Business. Other factors expected to drive growth include rapid urbanization, a unified tax regime and favorable demographics. Achieving a high growth rate will be contingent on addressing key bottlenecks and emerging challenges, including creating jobs by raising competitiveness, resolving infrastructural bottlenecks, bridging the skill deficit, improving institutional capacities and addressing environmental degradation.

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<sup>1</sup> International Monetary Fund. 2021. World Economic Outlook. Washington, DC.



7. Bridging the infrastructure gap is vital to achieve rapid and inclusive growth in a sustainable manner. According to Global Infrastructure Outlook, India needs USD4.5 trillion in infrastructure investments in 2015-2040.<sup>2</sup> As per the National Infrastructure Pipeline (released in December 2019), annual investment of USD301 billion is envisaged, which is roughly seven to eight percent of GDP. The Union Budget 2021-2022 has allocated USD52 billion as capital outlay for various infrastructure projects. These enhanced outlays are expected to generate a multiplier effect that will help revive the economy. Under the National Infrastructure Pipeline, apart from traditional sources such as budgetary and extrabudgetary resources and private investment, alternative initiatives such as asset monetization and funding through a new Development Finance Institution would help raise resources for capital expenditure. The government has unveiled the National Monetization Pipeline to unlock the value of investments in public assets by tapping private capital and efficiencies.

8. Assam is the largest economy in northeast India, ranking 17th in economic activity. From FY2015 to FY2018, Assam grew at an annual average rate of 8.8 percent. Services contribute a major portion to Assam's net state value added (~41 percent), followed by agriculture and mining (~31 percent) and industry (~28 percent). Assam is known for its tea, which contributes more than 50 percent of India's tea production.<sup>3</sup> However, Assam lags most other states in per capita output and ranks 28th.<sup>4</sup>

9. As of FY2018, Assam had spent ~15 percent of gross state domestic product on development expenditure. From FY2015 to FY2018, the government spent ~10 percent of total development expenditure on roads and bridges.

10. As per Centre for Monitoring Indian Economy data, Assam's estimated unemployment rate was 4.7 percent in FY2019, significantly lower than the national average (7.6 percent). The impact of the COVID-19 lockdown restrictions during the first and second waves had less impact on employment in Assam than in the rest of India.

11. Assam's strategic location allows for interstate and transnational connectivity. Assam 2030: Our Dream, Our Commitment envisages a Look East policy to increase economic integration and trade in the region.<sup>5</sup> Assam's location is strategically important, with crucial international road corridors (e.g., Asian Highway, India-Myanmar-Thailand Trilateral Highway, East-West Corridor and the proposed Bangladesh-China-India-Myanmar economic corridor) running through the state.

12. Transport infrastructure and connectivity development could increase Assam's industrial output and link its industries to global value chains. An Asian Development Bank (ADB) study identified Bongaigaon, Amingaon, Guwahati, Nagaon and Silchar as the key economic, manufacturing and border trade centers of Assam. With the Government of India taking the initiative to develop trade infrastructure with neighboring countries, the Assam government has

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<sup>2</sup> Oxford Economics and Global Infrastructure Hub, 2017, Global Infrastructure Outlook

<sup>3</sup> Government of Assam, Industries and Commerce. [About Tea Industries](#).

<sup>4</sup> Assam's population is 31.2 million (as of the 2011 census), constituting roughly 2.58 percent of India's population.

<sup>5</sup> Government of Assam, Transformation and Development. [Assam 2030: Our Dream, Our Commitment](#).

approved setting up five border trade centers—Sutarkandi in Karimganj district, Mankachar and Golokganj in Dhubri district, Darrang in Baksa district and Jagun in Tinsukia district.<sup>6</sup>

13. The ADB study identified electrical equipment and accessories, plastic and plastic products, electronics system design and manufacturing and pharmaceuticals as the key industries where Assam could play a major role in terms of domestic demand and exports. In services, higher education, medical tourism (medical value travel), information technology (IT) and IT-enabled services, aircraft maintenance, repair and overhaul could be key sectors.

14. Assam is prone to flooding. In 2020, it experienced heavy flooding from May to August. As per Assam Disaster Management Authority (ASDMA) reports, June 2020 saw the worst flooding, with 23 districts and about 1.5 million people directly affected. ASDMA reports mention damage to infrastructure such as river embankments, roads and bridges in the flooded districts. Thus, Assam must develop climate-resistant infrastructure.

## **B. Sector Context**

15. Apart from national highway segments managed by the Government of India, Assam's state road network is composed primarily of secondary roads (state highways and major district roads) and tertiary roads (rural roads), which are managed by the state's Public Works Roads Department (PWRD). Road transport accounts for about 70 percent of Assam's freight and 92 percent of passenger traffic, with much of it passing through the secondary road network.<sup>7</sup> Many residents live and work along the secondary roads.

16. Despite the economic importance of Assam's secondary roads, they receive less funding than national highways and rural roads, making them the "neglected middle" in terms of investment and maintenance. As of 2017, only 10 percent of secondary roads in Assam were equipped with drainage facilities, with 13 percent of state highways and 21 percent of major district roads unsurfaced and unsuitable for all-season traffic. Frequent floods have exacerbated the need for all-weather roads. Nearly 80 percent of the state's secondary roads are less than seven meters wide, with thin pavement inadequate for commercial traffic.<sup>8</sup> Only six percent of state highways have double lanes, far short of the 70 percent recommended. Such conditions have led to longer travel time, road safety issues and higher operational costs for Assam's secondary road networks.

17. As in other parts of India, road safety is a serious problem in Assam. In 2014-2019, the number of road accidents in Assam increased by 17 percent and fatalities by 27 percent,<sup>9</sup> compared with 25.2 percent for accidents and 26.8 percent for deaths on state highways nationwide.<sup>10</sup> Speeding causes 64 percent of road fatalities in India, with the most vulnerable road users accounting for 54 percent of those fatalities.<sup>11</sup> Improving road safety thus requires a

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<sup>6</sup> ADB. 2021. Assam as India's Gateway to ASEAN. Manila.

<sup>7</sup> Data provided by PWRD.

<sup>8</sup> Data provided by PWRD.

<sup>9</sup> Data provided by PWRD.

<sup>10</sup> Government of India, Ministry of Road Transport and Highways. 2018. Road Accidents in India.

<sup>11</sup> Government of India, Ministry of Road Transport and Highways. 2018. Road Accidents in India.

comprehensive set of measures, including better road design, traffic and speed management, proper road safety instruments, signage and law enforcement.

18. In 2018, the Assam government initiated Asom Mala to bring secondary road infrastructure on par with Southeast Asian countries and to support the Sustainable Development Goals of Assam Agenda 2030. The Asom Mala program complements [Assam Vision Document 2016-2025](#) priorities on infrastructure development, PWRD's Road Sector Modernization Program and the North Eastern Council Regional Plan (2017-18 to 2019-20)<sup>12</sup>, which focuses on removing infrastructure bottlenecks.

19. In 2012-2019, the World Bank funded the Assam State Roads Project, which aimed to maintain 1,000 kilometers of existing roads and improve PWRD's capacity. Through the project, the World Bank introduced a road asset management system at PWRD, including annual maintenance plans, a publicly available web-based system on road inventory and condition data, computerized workflow for project management and performance-based or other system of maintenance contracting for state roads. The World Bank helped establish the Road Maintenance Fund at the Assam State Road Board (ASRB).

### **C. Institutional Context**

20. The main function of PWRD is to develop and manage the state's road infrastructure for transport and communication. PWRD is responsible for constructing and maintaining the state's secondary road network, which is composed of state highways, major district roads and rural and urban roads. The budget for PWRD increased significantly from 3.8 percent in FY2016 to 8.4 percent in FY2020, signaling that the government prioritizes road development and maintenance.<sup>13</sup>

21. ASRB was established in 2003. Today, it serves as a functionary of PWRD, executing the flagship Pradhan Mantri Gram Sadak Yojana (PMGSY) program for rural road connectivity. ASRB receives and disburses funds for works funded by other departments and agencies and manages the Assam Road Maintenance Fund. The fund is primarily supported by the state budget.

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<sup>12</sup> <http://megplanning.gov.in/circular/NEC%20Regional%20Plan%202017-18%20to%202019-20.pdf>

<sup>13</sup> Data provided by PWRD.

## 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 1927.7 and a population of 1.38 billion in 2020.<sup>1</sup> India's economy grew at an average annual rate of 7.4 percent between FY2014 and FY2018 but has slowed down in recent years following disruptions due to demonetization, rollout of goods and services tax, rural distress and stress in the financial sector.<sup>23</sup> The economy contracted by 6.6 percent in FY2020 as a result of the COVID-19 pandemic and resulting lockdown.<sup>4</sup> It showed signs of revival in the last two quarters of FY2020 as the lockdown measures were gradually eased. Government estimates indicate that the economy grew by 8.7 percent in FY2021, slightly lower than IMF's estimate of 8.9 percent. The economy is expected to grow at 8.2 percent and 6.9 percent in FY2022 and FY2023 respectively.

2. Inflation averaged 6.2 percent in the FY2020, above the target band of 2-6 percent, primarily driven by food inflation due to supply side disruptions. The central bank reduced the repo and reverse repo rates by 115 and 155 basis points to 4.0 and 3.35 percent respectively in May 2020, to stimulate aggregate demand. As a response to the pandemic, RBI also introduced several measures to reduce the borrowing cost, bolster liquidity, and improve credit flow to the productive sectors. Key policy rates were left unchanged with the RBI maintaining an accommodative stance between August 2020 and April 2022. Inflation moderated slightly to average 5.5 percent in FY2021 due to decline in food inflation even as core inflation remained sticky. However, inflation remained above the 6 percent in the last quarter of FY2021. In response to the elevated level of inflation recorded in March 2022, the RBI increased the repo rate by 40 basis points (bps) in May 2022. Signaling policy normalization, the cash reserve ratio (CRR) was also increased by 50 bps. In April 2022, inflation increased to 7.8 percent due to elevated food and fuel prices.

3. General government fiscal deficit is estimated to have risen to 12.8 percent of GDP in FY2020. A downturn in revenue due to economic slowdown and higher spending on the stimulus package resulted in the deficit widening significantly. Central government fiscal deficit declined sharply to 6.7 percent of GDP in FY2021 compared to 9.2 percent in FY2020. 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. High fiscal deficit in FY2020 and FY2021 resulted in the public debt rising to close to 90 percent of GDP but is expected to remain stable in the medium term.

4. The current account posted a surplus in FY2020, for the first time since 2002, due to a greater decline in imports as compared to exports. The current account reverted to a deficit of 1.6 percent of GDP in FY2021 as merchandise imports surged while services exports remained stagnant. Private transfer, which comprises mainly remittances, remained strong with net inflow of USD 59.9 billion during April-December 2021, as economic prospects improved globally. Net

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<sup>1</sup> The income group classification for fiscal year 2019 is based on World Bank criteria.

<sup>2</sup> Data are based on fiscal years. Fiscal year 2020 (FY2020) begins on 1 April 2020 and ends on 31 March 2021.

<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.

<sup>4</sup> On March 24, the government announced a nationwide lockdown till April 14, subsequently extended to May 30. Lockdown was eased beginning June 1.

FDI inflows remained robust at USD 26.5 billion during the same period in FY2021. India's external debt is estimated to be USD 633.5 billion or 21.8 percent of GDP as of March 2022.

5. 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 April 2021, Fitch revised India's outlook to negative while retaining BBB- rating, due to slow reform momentum and challenging economic environment, limited fiscal space and financial sector stress and affirmed this in November 2021. In July 2021, S&P retained India's rating at BBB- with a stable outlook.

## **B. Economic Indicators**

**Selected Macroeconomic indicators (2018-2022)**

Economic Indicators	FY2019	FY2020	FY2021*	FY2022*	FY2023
Real GDP growth	3.7	-6.6	8.9	8.2	6.9
CPI Inflation (average, % change)	4.8	6.2	5.5	6.1	4.8
Current account balance (% of GDP)	-0.9	0.9	-1.6	-2.9	-2.5
General government overall balance (% of GDP)	-7.5	-12.8	-10.4	-9.9	-9.1
General government gross debt (% of GDP)	75.1	90.1	86.8	86.9	86.6
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) 1/	475.6	579.3	617.6	597.7	
Exchange rate (INR/USD, EOP) 1/	75.4	73.5	75.8	76.4	

Note: FY 2020 ran from April 1, 2020 to March 31, 2021

\* denotes projected figures

1/Reserves and exchange rate for FY2022 are sourced from RBI and pertain to end-April 2022.

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

## **C. Economic Outlook and Risks**

6. India is expected to grow at 8.2 percent in FY2022, lower than FY2021 mainly due to unfavorable base effects, weaker domestic demand due to higher fuel prices and lower net exports. High frequency indicators like purchasing managers index, electronic waybills and freight traffic indicate a dissipating impact from the second wave and a return to normal economic activity. Going forward, domestic consumption demand and government expenditure are expected to be the major pillars for recovery. The National Monetization Plan for brownfield assets is expected to free resources worth USD 81 billion over the next three years to finance infrastructure. Private consumption is expected to inch up although it may be constrained by rising household debt levels in the pandemic. Similarly, private investment is expected to pick up amidst improving business sentiment and credit conditions. Exports are likely to bolster growth as global demand picks up.

7. Overall inflation is expected to remain elevated at around 6 percent in FY2022 and moderate to around 5.0 percent from FY2023 onwards. However, an increase in commodity prices could lead to a resurgence of inflationary pressures. In May 2022, the RBI indicated withdrawal of its accommodative stance in response to sustained inflation.

8. General government fiscal deficit in FY2022 is expected to moderate to 9.9 percent of GDP as tax revenues increase on the back of improved economic activity. However, the pace of fiscal consolidation will be slower than originally outlined in the Fiscal Responsibility and Budget Management Review Committee.

9. Public debt, which rose sharply to 90.1 percent of GDP in FY2020, levels last witnessed in early 2000s, is expected moderate to 87 percent of GDP in FY2021 and 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 2.9 percent of GDP for FY2022 as import growth is expected to outpace export growth. Increase in oil prices is expected to exacerbate the trade deficit. Remittances are also expected to pick up as Middle East economies recover and spread of the COVID-19 pandemic in advanced economies is contained.