



**ASIAN INFRASTRUCTURE  
INVESTMENT BANK**

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**PROJECT DOCUMENT  
OF  
THE ASIAN INFRASTRUCTURE INVESTMENT BANK**

**Republic of India  
Madhya Pradesh Rural Connectivity Project**

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## CURRENCY EQUIVALENTS

(Effective as of May 30, 2017)

Currency Unit – Indian rupee (INR)

INR1.00 = USD0.01547

USD1.00 = INR64.64

## FISCAL YEAR

January 1 – December 31

## ABBREVIATIONS

ADB	Asian Development Bank
AE	Assistant Engineer
AIIB (or the Bank)	Asian Infrastructure Investment Bank
BP	Bank Procedures
BT	Bituminous/Bitumen
CAAA	Controller of Aid Accounts and Audit
C&AG	Comptroller and Auditor General
CEO	Chief Executive Officer
CGM	Chief General Manager
CMGSY	Chief Minister's Gram Sadak Yojana
COTS	Commercial Off-The-Shelf
CPRSP	Community Participatory Road Safety Program
DPR	Detailed Project Report
ECoPs	Environmental Codes of Practice
EE	Executive Engineer
EIRR	Economic Internal Rate of Return
EMF	Environmental Management Framework
EMP	Environmental Management Plan
ENPV	Economic Net Present Value
E&S	Environmental and Social
ESP	Environmental and Social Policy
ESSs	Environmental and Social Standards
FPICon	Free, Prior and Informed Consultation
GDP	Gross Domestic Product
GIS	Geographic Information System
GoI	Government of India
GoMP	Government of Madhya Pradesh
GRM	Grievance Redress Mechanism
GST	Goods and Services Tax
IBRD	International Bank for Reconstruction and Development
IDA	International Development Association
IFI	International Finance Institution
IFY	Government of India Fiscal Year
IRC	Indian Roads Congress
IRI	International Roughness Index
IUFR	Interim Unaudited Financial Report
JE	Junior Engineer
MDR	Major District Roads
MIRR	Modified Internal Rate of Return
MoU	Memorandum of Understanding
MP	Madhya Pradesh
MPRRDA	Madhya Pradesh Rural Road Development Authority
NGO	Non – Governmental Organization
NH	National Highway
NIC	National Informatics Centre
NRRDA	National Rural Roads Development Agency
OP	Operational Policy

PAT	Performance Assessment Tool
PCE	Post-Crash Emergency
PCRSP	Pilot Comprehensive Road Safety Program
PMC	Project Management Consultant
PMGSY	Pradhan Mantri Gram Sadak Yojana
PIU	Project Implementation Unit
PM	Particulate Matter
PWD	Public Works Department
RADMS	Road Accident Data Management System
RRAMS	Rural Road Asset Management System
RS	Road Safety
SC	Scheduled Castes
SCF	Standard Conversion Factor
SD	System Defining Consultant
SDR	Social Discount Rate
SH	State Highway
SHG	Self-Help Group
SMF	Social Management Framework
SMP	Social Management Plan
SORT	Systematic Operations Risk-Rating Tool
SP	System Provider
SRLM	State Rural Livelihood Mission
ST	Scheduled Tribes
STEP	Systematic Tracking of Exchanges in Procurement
SV	Switching Value
VG	Viscosity Grade
VF	Vulnerability Framework
VOC	Vehicle Operating Cost
WB	World Bank

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## 1. PROJECT SUMMARY SHEET

### Republic of India Madhya Pradesh Rural Connectivity Project

Project No.	000020
Borrower Implementing Entities	Republic of India Government of Madhya Pradesh (GoMP), Madhya Pradesh Rural Road Development Authority (MPRRDA)
Sector/Subsector	Transport/Road
Project Objectives/Brief Project Description	The objectives of the Project are to improve durability and accessibility, and enhance resilience to climate change of the gravel surfaced rural roads in Madhya Pradesh while building the capacity of the state to manage its rural road network and road safety. The planned activities under the proposed Project are: (i) road upgrading, construction and maintenance, including surface sealing of gravel roads (approx. 10,000 km) and provision of alternate connectivity (approx. 510 km); (ii) institutional development through implementing a rural road asset management system and strengthening design and research and quality assurance capacity of MPRRDA; (iii) road safety management capacity development with road accident data management system and pilot comprehensive road safety program; and (vi) design, implementation and management support.
Project Implementation Period (Start Date and End Date)	May 15, 2018 – December 31, 2022
Expected Loan Closing Date	March 15, 2023
Project Cost and Financing Plan	Project Cost: USD502.00 million Financing: AIB = USD140.00 million (28%) WB (IBRD) = USD210.00 million (42%) GoMP = USD152.00 million (30%)
AIB Loan (Size and Terms)	USD140.00 million with a final maturity of 25 years, including a grace period of 5 years, disbursement-linked level repayments at Bank's standard interest rate for sovereign-backed loans
Co-financing	World Bank: USD210.00 million, an IBRD loan with a final maturity of 25 years, including a grace period of 5 years
Environmental and Social Category	B
Project Risk (Low/Medium/High)	Medium
Conditions for Effectiveness	Cross-Effectiveness of the IBRD's Loan Agreement
Key Covenants	(i) Implementation of the Project in accordance with the safeguard documents (EMF, EMP, SMF and SMP). No activity triggering involuntary resettlement shall be carried out under the Project. (ii) Implementation of the Project in accordance with the World Bank's Anti-Corruption Guidelines, and the Bank's Policy on Prohibited Practices, as relevant (iii) Implementation of the Project in accordance with the agreed Project Operations Manual and Annual Work Plans and Budgets (iv) Establishment of a dedicated financial management unit under MPRRDA Chief General Manager (Finance) within three months after the Effective Date (v) Vacancies of the financial management staff in the Project Implementation Units to be filled with staff within three months after the Effective Date.
Policy Assurance	The Vice President, Policy and Strategy, confirms an overall assurance that the Bank is in compliance with the policies applicable to the Project.

President	Jin Liqun
Vice-President	D.J. Pandian
Director General, Operations	Supee Teravaninthorn
Manager, Operations	Ke Fang
Project Team Leader	Soon-Sik Lee, Senior Investment Operations Specialist
Project Team Members	Alexander I. Ugut, Principal Risk Specialist Baihui Sun, Project Assistant Jang Ping Thia, Senior Economist Jessana A. Yanuario, Finance Officer Kishor Uprety, Senior Counsel Pajnapa Peamsilpakulchorn, Infrastructure Sector Economist Somnath Basu, Senior Social Development Specialist Xiaowei Guo, Senior Procurement Specialist

## 2. STRATEGIC CONTEXT

### A. Country Context

1. India is a fast growing and large developing economy, averaging around 7 percent growth per year in the past few years. In 2016, its Gross Domestic Product (GDP) was USD2.1 trillion, with a per capita GDP of around USD1,614.<sup>1</sup> However, inadequate infrastructure remains a key constraint to economic growth and development.

2. This lack of infrastructure development also means that growth is not well distributed. While some states in India have relatively high reported levels of connectivity, the rural population of ten states – Assam, Bihar, Chhattisgarh, Himachal Pradesh, Jharkhand, Madhya Pradesh, Odisha, Rajasthan, Uttar Pradesh and West Bengal – suffer from poor physical access due to lack of all-weather roads.

3. Madhya Pradesh (MP) is the second largest state in India in terms of area. Its population as of the 2011 Census of India, was 72 million, of which nearly 72.4 percent reside in rural areas with an overall rural accessibility rate of 38 percent.<sup>2</sup> This constrains economic activities in rural areas and prevents the rural population from being fully integrated into the economy and from accessing essential services. Over 36 percent of the rural population live below poverty line, significantly exceeding the urban poverty ratio of 21 percent.<sup>3</sup> A large proportion of the rural population is characterized by marginal and underproductive land holdings, periodic droughts, insecure land tenure and a high dependency on seasonal agricultural labor.

4. MP's human development index score was 0.375 in 2011, well below the national average of 0.55.<sup>4</sup> The fourth National Family Health Survey<sup>5</sup> revealed that the state's nutrition and health indicators are among the lowest in the country. According to the survey, the state's total infant mortality rate per 1,000 live births was 51 (urban 44, rural 54) against a national total of 41 (urban 29, rural 46), women's primary education enrollment ratio was 64 percent (urban 78 percent, rural 58 percent) against a national total of 69 percent (urban 81 percent, rural 63 percent), and women's literacy rate was 59 percent (urban 78 percent, rural 51 percent) against a national total of 68 percent (urban 81 percent, rural 62 percent). Evidence suggests that states such as Goa, Himachal Pradesh, Kerala, Punjab and Tamil Nadu, which have invested heavily in the provision of improved rural connectivity, are better placed in terms of human development, which confirms connectivity as a strong contributor to the human development index.

5. The low level of infrastructure development has hampered the state's ability to accelerate economic growth and to improve livelihoods of its rural population. Poor infrastructure dampens efforts to expand social opportunities as well as avenues for improving incomes through increased productivity. MP lags behind many other states in terms of provision of essential infrastructure, the two critical sectors being roads and power.

### B. Sectoral and Institutional Context

6. **A substantial deficit in transport infrastructure.** In a land-locked state like MP, roads play a critical role in economic growth and development. The state has an abundance of mineral resources and growth potential in agricultural and industrial production, but needs a well-developed road network to benefit from both. The road network growth rate in MP during 2003-08 was 0.11 percent annually, against a national rate of 4.06 percent. The state's road network totals approximately 151,006 km, comprising National Highways (NH) – 5,184 km, State Highways (SH) – 10,934 km, Major District Roads (MDR) – 19,429 km, and rural roads – 115,372 km. Current road density is 22.14 km/100 km<sup>2</sup>, far less than the national average of 37 km/100 km<sup>2</sup>. Only 18 of the 200 highways in India's national highway network (5 percent by length), pass through MP, whereas the state covers 10 percent of India's territory. On the other hand, because of its central location, traffic from all five neighboring states as well as others travels on MP's road network.

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<sup>1</sup> CEIC, A Euromoney Institutional Investor Company

<sup>2</sup> Situation Analysis of Rural Road Maintenance in Madhya Pradesh International Labor Organization

<sup>3</sup> Poverty Assessment of Madhya Pradesh, 2017, WB analysis based on National Sample Survey rounds (NSS) of 2011-12

<sup>4</sup> UNDP [http://www.undp.org/content/india/en/home/operations/about\\_undp/undp-in-mp/](http://www.undp.org/content/india/en/home/operations/about_undp/undp-in-mp/)

<sup>5</sup> National Family Health Survey – 4, 2015-16, International Institute for Population Sciences

7. **Gaps in all-weather rural connectivity.** Rural roads constitute more than two-thirds of the road network in the state. There are 90,000 km of paved rural road network, 68,000 km of which were paved under the Prime Minister's national connectivity program, "Pradhan Mantri Gram Sadak Yojana" (PMGSY),<sup>6</sup> implemented by the MPRRDA. The remaining roads were paved by the Public Works Department (PWD) and other agencies. Although PMGSY connected about 20,000 villages in MP, over 10,000 smaller villages were ineligible for PMGSY and remain isolated, although overall their population is significant. To address this gap, the GoMP further developed about 15,584 km of gravel surfaced roads under the Chief Minister's Gram Sadak Yojana (CMGSY).<sup>7</sup> An estimated 30,000 km of earthen tracks that are not accessible year round are also reported to exist.

8. MP has 52,117 villages, of which 45,481 are either already connected or connectivity works are in progress. MP's connectivity status is summarized in Table 1. Despite the significant improvements made in rural connectivity, further improvement is needed to ensure sustainable access to essential social and economic services to most if not all the rural poor.

**Table 1. MP Connectivity Status**

Connectivity status		Road Length (km)
Villages Connected by Roads	45,481	
➤ PWD - NH/SH/MDR/Rural Road	19,327	61,616
➤ PMGSY – Rural Road (BT)	19,346	73,306
➤ CMGSY – Rural Road (Gravel)	6,808	15,584
➤ Mandi*		500
Unconnected Villages	6,636	-
Total no. villages	<b>52,117</b>	Total network <b>151,006 km</b>

\* Roads constructed by Madhya Pradesh State Agricultural Marketing Board to facilitate transport by farmers of their agriculture products to market center (Mandi).

9. **Issue of sustainable and safe connectivity.** Despite various precautions taken in design of the gravel surfaced roads, roadside residents and road users have witnessed an increased amount of dust pollution as traffic quickly picked up along the gravel surfaced roads, and is becoming a health and traffic safety hazard. The surface quality deteriorated rapidly, with the rise in traffic, causing a decline in user satisfaction and an increase in maintenance frequency and cost. Moreover, gravel surfaced roads are vulnerable to climate change. They are prone to washouts during flood seasons resulting in a disproportionately high cost of rehabilitation to bring them back to service, especially following high flood events. Flooding risk is expected to increase due to climate change.

10. MP does not have a good track record of road maintenance, due to lack of a holistic road management system and a sustainable funding mechanism. In addition, road safety management has not received adequate attention. MP is among the top ten worst performers in road safety in India, with a fatality rate of 12.8 persons per 100,000 population. It adopted a Road Safety Policy in 2015, with the goal of reducing the increasing number of road traffic accidents and fatalities.

11. **Gender and rural connectivity.** MP has one of India's highest levels of gender inequality. Only half of women in rural areas are literate, and the literacy gap between women (51.4 percent) and men (78.5 percent) is large. Only a third of women in rural areas participate in the labor force. In general, rural women and girls suffer the most from inadequate access to jobs, health care and education owing to lack of transport facilities and services. In the Project area, girls' school attendance shows a sharp drop from elementary to middle and high school and women have fewer economic and trading opportunities. In addition, access to health facilities is limited due to inadequate access to transport. Without convenient and safe road access, it will be hard to resolve gender equality issues.

<sup>6</sup> The program was designed to provide a single, all-weather bituminous surfaced road link to villages with population of more than 500 people in normal areas and more than 250 in tribal and desert areas.

<sup>7</sup> The program was designed to connect smaller villages with a population of 150-499 in normal areas, and 100-249 in tribal areas by a single, well-engineered gravel surfaced road link.



### 3. THE PROJECT

#### A. Rationale

12. **Strategic fit.** The Project will provide sustainable and safe last-mile connectivity to small villages and improve mobility of the rural population of MP. The Project will stimulate economic development in the entire state by integrating isolated and poor rural populations with the rest of the state and its markets. Livelihoods of the rural population will be improved by expanding income earning opportunities through better farm-to-market road connections. This aligns with the Bank's priorities of enhancing economic growth and sustainability through infrastructure investment.

13. The gravel surfaced roads constructed under CMGSY have provided minimal improvements to quality and sustainable rural connectivity. However, gravel roads are subject to severe deterioration even with moderate floods. While construction costs are low, maintenance costs are high, especially when taking into consideration reliability and safety conditions. As such, service providers, such as public transportation operators, educational institutions, hospitals, traders, etc. are reluctant to bring essential services to small villages that have no all-weather paved road connection, because it becomes too difficult and costly to provide uninterrupted services. In addition, gravel roads represent a health and traffic safety hazard due to dust pollution. The benefits of sealed roads are the following:

- (i) Improved rural economy by reducing transport costs, minimizing post-harvest losses, and providing more economic opportunities to villagers, especially women;
- (ii) Prompt emergency response in time (ambulance, firefighting, police, etc.) and easier access to the health care system;
- (iii) Lower maintenance and vehicle operating costs;
- (iv) Fewer adverse environmental impacts, and improved health and safety, especially for maternal health; and
- (v) Reduced teacher absenteeism and increased school enrollment and attendance, especially of girls

14. Small villages with potential for growth require additional linkages to economic and market centers. Connectivity between villages is needed to reduce travel time between them and to market centers or schools through direct linkages. The additional linkages under the Project will benefit about 240 villages, thus helping to integrate the rural population, businesses and industries with the national and state economy through better transport connectivity.

15. Rural women and girls may suffer more from inadequate transport facilities and services since poor road access and perceived lack of safety may confine them to work close to home, such as in agricultural employment on their own or nearby farms. The Project is expected to promote economic sustainability through facilitating trade among rural communities by increasing community road access to markets. This will benefit women as well as men. More particularly, the road maintenance pilot under the Project that employs women will contribute to the fight against income inequality and poverty.

16. The Project will contribute to India's vision for development outlined in the country's Twelfth Five Year Plan (2012-2017) by promoting inclusiveness and accelerating agricultural growth by improving last-mile rural connectivity. The broad objectives of the plan include (i) facilitating economic activities of rural population; (ii) improving regional equality across states and within states; (iii) improving living conditions for Scheduled Castes (SC), Scheduled Tribes (ST) and minorities; (iv) generating attractive employment opportunities for Indian youth; and (v) eliminating gender gaps. It is expected that the Project will contribute to meeting various growth indicators of the plan, including reducing poverty, helping to eliminate gender and social gaps in education, and connecting villages with all-weather roads. Moreover, Bank support for the proposed Project is in line with the United Nation's Sustainable Development Goals, specifically Goal 1 on no poverty, Goal 5 on gender equality and Goal 9 on building resilient infrastructure.

17. **Value addition by the Bank.** Promoting sustainable growth in India through investment in rural infrastructure will require substantial financing. It can be achieved faster and more efficiently through collaboration between international financial institutions (IFIs). The Bank's participation in the Project contributes to reducing this financing gap and enhances overall rural development impact by sharing the Bank's knowledge and expertise. In addition, co-financing reduces the administrative burden on the client.

18. Appropriate social measures are critical to the success of rural road projects. In particular, public consultation is a key prerequisite in project design to ensure village support and understand local needs. Such consultations help to minimize grievances during project implementation and operation. The Bank mobilized a social expert during its due diligence to ensure that the public consultations carried out by MPRRDA's consultants were undertaken in accordance with the Bank's requirements. Several issues were identified and recommendations were proposed to MPRRDA based on experience from other rural road projects. In addition, specific public consultation management training was provided to MPRRDA's staff and consultants to ensure these issues are properly addressed during further consultation.

19. Another value addition resulting from the Bank's support in conjunction with the World Bank (WB) resides in the environmental and social standards that will be applied during Project implementation through the application of the Environmental Management Framework (EMF) and Social Management Framework (SMF) and monitoring of Project implementation and any mitigation measures during supervision.

20. **Value addition for the Bank.** In addition to financial viability and resource mobilization improvement, the Project also reinforces the partnership with our co-financing partner. It provides an opportunity for mutual sharing of knowledge and experience between the two banks. It will further strengthen the Bank's capacity to finance broad-base sustainable road infrastructures that are in high demand in other areas of India and in the region.

## B. Project Objectives

21. The objectives of the Project are to improve durability and accessibility, and enhance resilience to climate change of the gravel surfaced rural roads in MP while building the capacity of the state to manage its rural road network and road safety.

22. **Project beneficiaries.** The primary beneficiaries are the estimated 1.5 million rural people inhabiting 5,640 villages,<sup>8</sup> who use the rural roads daily for social and economic activities. These include geographically or culturally isolated communities – such as the SC, ST, people living below the poverty line, youth, and vulnerable sections of society, including women, elderly and people with disabilities – to ensure equity in benefit distribution. More children, especially girls, are expected to enroll in higher education programs and school attendance is expected to improve. Additional off-farm employment opportunities outside the villages may also become available as road access to nearby cities improves. The secondary beneficiaries are police, MPRRDA staff, and service providers such as educational institutions, hospitals, public transport operators, etc. In addition, the Project and future maintenance works will generate further employment and new economic activities for villagers.

23. **Project result indicators.** The Results Framework and Monitoring, presented in Annex 1, will be used to monitor and evaluate the achievement of the proposed key Project indicators. These include:

- (i) Reduction in annual maintenance cost per km;
- (ii) Reduction in roughness index;
- (iii) Rural road asset management system developed and in use; and
- (iv) Share of the state highway network (about 11,000 km SH and 20,000 km MDR) covered under Road Accident Data Management System (RADMS)

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<sup>8</sup> The existing gravel surfaced roads of 5,400 villages out of 6,808 villages with gravel surfaced roads constructed under CMGSY will be upgraded to a sealed surface standard under the Project. Two hundred forty villages will benefit from additional links under the Project. Selection criteria are presented in paragraphs 50-52.

24. The Project intermediate output indicators will be measured periodically during Project implementation to ensure that the Project is progressing in accordance with the implementation plan. Detailed information on the indicators is available in Annex 1.

### **C. Project Description and Components**

25. The Project consists of four components: (i) Road Upgrading, Construction and Maintenance; (ii) Institutional Development; (iii) Road Safety Management Capacity Development; and (iv) Design, Implementation and Management Support.

#### **26. Component A: Road Upgrading, Construction and Maintenance**

**Subcomponent A1: Surface Sealing of Gravel Roads (approx. 10,000 km).** Sealing the surface of eligible existing gravel surfaced roads developed under CMGSY using conventional bitumen (BT) and other alternative options, piloting post-construction maintenance through women's self-help groups (SHG)<sup>9</sup> in selected districts, providing SHGs with road maintenance training and hand tools.

**Subcomponent A2: Provision of Alternate Connectivity (approx. 510 km).** Providing additional links to eligible villages that are already connected by a single road link but critically require additional connectivity to respond to the growing demand to link to more social, economic and administrative centers.

#### **27. Component B: Institutional Development**

**Subcomponent B1: Rural Road Asset Management System.** Defining the system requirements and terms of reference (overall system architecture, data collection and analytical modules) and then procuring a road asset management system or such elements required to upgrade the existing system, as needed to encompass the establishment of a complete inventory of the road network with all its elements, the current condition and performance of the road network, an estimate of the value of the asset, a forecast of future traffic and service demands, an estimate of maintenance needs and cost, a prioritization of quality and performance objectives, funding scenarios for regular and timely maintenance and upgrading of road assets, and the definition of a strategy for rural road maintenance and its implementation.

**Subcomponent B2: Strengthening Design and Research and Quality Assurance Capacity of MPRRDA.** Supporting MPRRDA's capacity by (i) strengthening its design and research unit; (ii) training design staff to enable them to do in-house design to support the field units and review consultants' designs; (iii) reviewing and updating the current rural road design standards and technical specifications; (iv) reinforcing field laboratories in selected districts and training staff on laboratory and field tests; and (v) organizing study tours to share good examples of rural road design and research in India and abroad.

#### **28. Component C: Road Safety Management Capacity Development.**

**Subcomponent C1: Road Accident Data Management System.** Developing a comprehensive and multi-institutional, multi-sectoral road accident data management system, including (i) a GIS-based accident data collection software system for accident recording, storage, analysis and dissemination; (ii) training at headquarter and district levels on database development, management and analysis; and (iii) analyses of crash data.

**Subcomponent C2: Pilot Comprehensive Road Safety Program.** Piloting multi-sectoral road safety initiatives for a high-risk network, including the provision of technical assistance, training and equipment for the design and implementation of road safety engineering interventions further to an audit carried out with the active participation of the local community;

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<sup>9</sup>Women's self-help groups (SHG) are alliances wherein women empower each other through support, education, encouragement and financial assistance to achieve their personal and professional goals for a better future. SHGs are generally comprised of poor village or tribal women who form a financial savings co-op and are often supported by national and international NGOs, local governments and social work initiatives.

road safety enforcement; post-crash emergency management; and road safety education and awareness.

29. **Component D: Design, Implementation and Management Support.** Providing overall support to MPRRDA with respect to project management, construction supervision and quality control and technical and financing audits, including by (i) preparing cost-effective, climate resilient engineering designs and related surveys and investigations; (ii) carrying out construction supervision of civil works and quality control; (iii) implementing independent monitoring of quality of design and works and contract compliance; and (iv) carrying out independent monitoring and assessment of safeguards, user satisfaction survey, compliance and the achievement of the Project outcomes.

#### D. Cost and Financing

30. The Project is estimated to cost USD502 million, and will be jointly co-financed by the Bank and the WB. The financing plan comprises (i) a sovereign-backed loan of USD140 million from the Bank, (ii) a sovereign-backed loan of USD210 million from the WB, and (iii) USD152 million from the GoMP. The cost and financing plan is presented in Table 2.

**Table 2: Cost and Financing (USD million)**

Item	Cost	Financing					
		AIIB		IBRD		GoMP	
		Amount	Share	Amount	Share	Amount	Share
A. Road Upgrading, Construction and Maintenance	<b>485.00</b>	<b>135.00</b>	28%	<b>203.00</b>	42%	<b>147.00</b>	30%
A1. Surface Sealing of Gravel Roads	440.00	123.00	28%	184.00	42%	133.00	30%
A2. Provision of Alternate Connectivity	45.00	12.00	27%	19.00	42%	14.00	31%
B. Institutional Development	<b>3.00</b>	<b>0.90</b>	30%	<b>1.10</b>	37%	<b>1.00</b>	33%
B1. Rural Roads Asset Management System	2.00	0.62	31%	0.71	36%	0.67	33%
B2. Strengthening Design, Research and Quality Assurance Capacity	1.00	0.28	28%	0.39	39%	0.33	33%
C. Road Safety Management Capacity Development	<b>10.00</b>	<b>2.90</b>	29%	<b>4.10</b>	41%	<b>3.00</b>	30%
C1. Development of Road Accident Database Management System	3.00	1.00	33%	1.50	50%	0.50	17%
C2. Pilot Comprehensive Road Safety Program	7.00	1.90	27%	2.60	37%	2.50	36%
D. Design, Implementation and Management Support	<b>3.12</b>	<b>0.85</b>	27%	<b>1.27</b>	41%	<b>1.00</b>	32%
Front End Fees	<b>0.88</b>	<b>0.35</b>	40%	<b>0.53</b>	60%		
<b>Total Costs</b>	<b>502.00</b>	<b>140.00</b>	<b>28%</b>	<b>210.00</b>	<b>42%</b>	<b>152.00</b>	<b>30%</b>

31. While the amounts shown for sub components A1 and A2 in the table above reflect the costs of upgrading/construction, these will be increased by allocations of state budget for the financing of maintenance, which will be determined from time to time according to the Rural Roads Maintenance Policy of the State issued through Order No. 2093 dated February 4, 2015. All roads to be constructed/upgraded under the Project will be contracted as a package of upgrading/construction and post construction five-year maintenance.

32. **Financing terms.** Final maturity of 25 years, including a grace period of 5 years, disbursement-linked level repayments at Bank's standard interest rate for sovereign-backed loans.

33. **Co-financing arrangement.** The Project will be co-financed by the Bank and the WB, providing

an opportunity for mutual sharing of experience between the two banks. The Bank will co-finance about 40 percent of the total loan amount or 28 percent of the total costs of the Project. The WB will provide procurement, safeguards, disbursements, project monitoring and reporting services for the Project on behalf of the Bank. As permitted by the Bank's policies, the WB's policies and procedures on environmental and social issues, procurement, disbursements, financial management, project monitoring, and reporting will be used for the Project (including activities to be financed by the Bank), as they are materially consistent with the Bank's corresponding policies. The Bank will provide adequate support to Project implementation according to a co-financing agreement between the Bank and the WB.

## **E. Implementation Arrangements**

34. **Implementation period.** The Project is expected to be implemented from May 2018 to December 2022.

35. **Project implementation management.** MPRRDA which was created recently for the specific purpose of implementing the PMGSY by the GoMP, will be the agency responsible for implementing the Project. MPRRDA will use its existing structure to the extent possible through support from other GoMP departments, including transport, police, revenue, forest, and district collectors and local offices.

36. The Chief Executive Officer (CEO) of MPRRDA will be in charge of overall Project implementation. The CEO's office will be responsible for implementing the Project under the overall guidance of the Panchayat and Rural Development Department, GoMP. The CEO is supported by experienced personnel at state headquarters. The current structure of the CEO's Office comprises: one engineer-in-chief and ten Chief General Managers (CGM), who hold the rank of Chief Engineer. Of the ten CGM, eight are in the field and two are based in MPRRDA's headquarters. The CGMs are in charge of regional divisions, which comprise 5-7 districts each. Each district has one or more project implementation units (PIUs) headed by a General Manager, who holds the rank of Executive Engineer (EE). At present, there are 81 PIUs under MPRRDA. However, the number can be increased based on the workload and the formation of 105 PIUs in total has been approved. Each PIU is managed by an EE supported by 2-3 Assistant Managers, who hold the rank of Assistant Engineer (AE). There are 4-5 Junior Engineers (JEs) in a PIU. Wherever required, external consultants will be used to assist MPRRDA to prepare engineering designs, supervise the construction, undertake independent audits and implement various institutional development initiatives.

37. **Project Management Consultant (PMC).** A PMC will be mobilized to provide high quality technical, social and environmental advice and implementation support to MPRRDA. The PMC will also undertake half-yearly project performance audits of the overall Project.

38. **Coordination with the WB.** The Bank has reviewed the applicable World Bank Operational Policies (OP)/ Bank Procedures (BP), the WB's Procurement and Consultants Guidelines dated January 2011 (revised July 2014), and the WB's sanctions policies and procedures, as well as its Anti-Corruption Guidelines. The Bank has found them all satisfactory for application to the Project, in accordance with the requirements, respectively, of the: (a) Bank's Environmental and Social Policy (ESP) and Environmental and Social Standards (ESSs) (ESS1 – Environmental and Social Assessment and Management and ESS3 – Indigenous Peoples); (b) the requirements of the Bank's Procurement Policy; and (c) the Bank's Policy on Prohibited Practices. The Bank will rely on the WB's determination of compliance with its policies and procedures applicable to the Project. Project monitoring and reporting, as well as financial management, will also be carried out in accordance with the WB's requirements. This approach ensures that one set of policies will apply to the entire Project. It will also provide a single point of contact for MPRDDA, and therefore facilitate a more efficient and seamless approach to Project implementation.

39. **The Bank's supervision.** The WB plans to visit the Project sites twice a year to monitor progress. The Bank will send its team to join the WB team in these supervision missions. Appropriate resources will be made available to match the frequency of the WB supervision missions. In addition to the semi-yearly supervision missions, the WB and the Bank may engage local consultants to carry out more frequent supervision of the design, construction and environmental and social management activities in the early stages of Project implementation.

40. **E-procurement system.** The MPRRDA will use the National Informatics Centre (NIC) e-procurement system for all procurement under the Project. An assessment of the NIC e-procurement system

has been carried out by the WB and it has been determined to be acceptable for use under WB-funded projects. The impact of using the e-procurement system will be to increase the efficiency and transparency of the procurement process during Project implementation.

41. **Results monitoring and evaluation.** The overall responsibility for monitoring Project results will be with MPRRDA, which will receive regular monthly progress reports from the field and its teams at headquarters. Data on the Project objective indicators will be collected by MPRRDA. Data on the Project intermediate output indicators will generally be obtained from the various project units, including district offices and headquarters and some road crash data from the police department.

42. A quarterly progress report will be prepared regularly by MPRRDA and shared with the Bank and the WB. This report will form one of the main means of monitoring implementation of the proposed Project, and will be prepared in a format agreed with the Bank and the WB. It will highlight status of achieving agreed targets for various monitoring indicators and detail the implementation progress on all aspects of the Project.

43. **Sustainability.** The sustainability of the Project is mainly measured by the endurance of the all-weather paved roads and satisfactory riding quality for the duration of their design lives of ten years. To ensure sustainability of Project investments, benefits and sector improvement, the following key principles have been incorporated into the Project.

- (i) The current practice of performance-based road maintenance approach will be continued;
- (ii) A sound design and construction method will be applied to address the needs of all road users, particularly pedestrians;
- (iii) The existing maintenance management system will be strengthened to manage the rural road network asset more holistically; and
- (iv) Institutional capacity to manage the Project and road assets will be strengthened through the resources provided by the Project.

44. The GoMP has shown a strong commitment for maintenance funding. It consistently allocated the budget required for the first five years' maintenance attached to the construction contracts and subsequent long-term contracts for the part of the network reaching maturity in the PMGSY scheme. A total of 68,000 km of roads constructed under PMGSY are under active maintenance contracts with private contractors. The state budget allocation for maintenance has been increased from about USD47 million in Indian Fiscal Year (IFY) 2011-12<sup>10</sup> to about USD100 million in IFY 2014-15.

45. **Fund flow arrangements.** The Government of India (GoI) will make the proceeds of the loan available to the GoMP in accordance with its standard arrangements for development assistance to the states of India. At the start of the financial year, the GoMP's finance department responsible for budget allocation and fund flows will transfer funds to MPRRDA's bank account through the treasury system. The existing bank authorization system will be used for PIU-level payments. MPRRDA will maintain the financial management system of the Project and will ensure that activities are carried out in accordance with the Project's legal agreements.

46. PIUs serve as branches of MPRRDA in implementing the Project. They are fully accountable and responsible to MPRRDA for fund flows, accounting and financial reporting. Each PIU at district level is headed by a General Manager who is authorized to make payments to the contractors. All the payments are made by e-payment.

47. The field offices will maintain accounting records for completed works and will submit invoices to MPRRDA. Supervision consultants will be engaged as independent engineers to monitor the quality and progress of works and certify the bills for payment. Interim Unaudited Financial Reports (IUFR) will be submitted to the Bank (through the WB) on a quarterly basis, within 45 days from the end of each calendar quarter and will provide detailed financial information on the sources and application of funds

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<sup>10</sup> The Government of India Fiscal Year begins on April 1 and ends on March 31

according to disbursement categories and Project components. The IUFR will disclose receipts and utilization of Project funds and will be reconciled with the Project's accounts prior to submission.

48. **Disbursement arrangements.** The applicable disbursement method will be reimbursement, which will be supported by IUFR. MPRRDA will use its budget allocated funds to finance Project expenditures and submit the IUFR to the Office of Controller of Aid Accounts and Audit (CAAA), GoI, on a quarterly basis. These financial reports will be submitted by the CAAA to the Bank (through the WB) to seek timely reimbursement. The estimated disbursement plan is as shown in Table 3.

**Table 3: Expected Disbursement Plan (USD million)**

Fiscal Year	2018	2019	2020	2021	2022
<b>Annual</b>	33.6	55.0	32.2	16.4	2.8
<b>Cumulative</b>	33.6	88.6	120.8	137.2	140.0

49. **Retroactive financing.** All eligible expenditures under the Project, incurred in compliance with the Bank'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 USD28 million (20 percent of the amount of the Loan), may be financed retroactively. The IUFR will clearly indicate the amount claimed under retroactive financing along with the details of the expenditure incurred. Such IUFRs will be subject to audit during the annual Project audit.

#### 4. PROJECT ASSESSMENT

##### A. Technical

##### 50. Selection criteria of surface sealing of gravel roads (approx. 10,000 km).

- (i) Normal area: only gravel roads constructed under CMGSY shall be eligible. Roads connecting villages with populations of 150–499 will be upgraded in a phased manner, in a descending order based on population.
- (ii) Tribal area: only gravel roads constructed under CMGSY shall be eligible. Roads connecting villages with populations of 100–249 will be upgraded in a phased manner, in a descending order based on population.

51. Together with the village population levels, selection of the existing gravel roads constructed under CMGSY is also based on the extent of maturity of the ongoing 2-year maintenance contracts attached to the original gravel road construction.

52. **Selection criteria for provision of alternative connectivity (510 km).** Selection of the roads is based on economic activity, traffic on the existing links, and population of the villages. Roads carrying more traffic and about 10 km in length, which provide access to three or more villages and benefit at least 5,000 population, are considered.

53. **Road design.** The upgrading of existing gravel surfaced rural roads to a sealed surface standard will improve sustainability of last mile connectivity provided to 5,400 villages. The gravel roads will be upgraded to thin bituminous surfaced standard (20 mm) overlain on a prime coat or tack coat with suitable sub-base course (125/150 mm) and base course (150 mm). Generally, the rural roads will have a single lane carriageway of 3.0 m with a shoulder of 1.0-1.5 m on either side, on a formation of 5.0-6.0 m, depending on the traffic volume. Widening of existing culverts with insufficient capacity in high flood risk areas will be required. Road safety improvements will mainly consist of curve flattening, junction improvements, widening/repair of narrow/weak bridges, physical segregation to the extent possible of vehicle and pedestrian traffic by edge marking, animal under-passes (viaducts), provision of truck laybys and other measures as appropriate. Overall, the design follows the service proven PMGSY design and meets the design life (10 years). Implementation will be in two phases of 5,000 km each, to be completed over a total period of approximately 3 to 4 years. Based on the technical assessment, the Bank team is satisfied that the design is fit for purpose.

54. **Resilience to Climate Change.** MP is a dry state with a mean annual rainfall of 1,160mm. As indicated in the Madhya Pradesh State Action Plan on Climate Change, one of the Project's climate risks is the increase in frequency and intensity of rainfall and changes in spatial and temporal distribution of the monsoon. In the monsoon period, precipitation is expected to increase by 1.25 times in most parts of MP in the next 30-50 years. Gravel surfaced roads are more prone to washouts than paved roads during flood seasons, resulting in a disproportionately high cost of rehabilitation. Surface sealing, embankment pitching, and balancing culverts are a few resilience measures against the risk of damages caused by flood events. Therefore, the Project will enhance resilience to climate changes by sealing gravel surfaced roads.

55. Historically, the likelihood of occurrence of severe floods that damage road infrastructure in the state has been very low and therefore the risks to the investment remain low. In addition, given the relatively shorter design life of the rural roads (10 years), the likelihood of an extreme climate event is low.

56. The mean maximum temperature of MP is 38 degrees Celsius. The average surface daily maximum temperature is expected to rise by 1.8 to 2.0 degrees Celsius in the 2030s and the daily minimum temperature is expected to rise between 2.0 to 2.4 degrees Celsius throughout MP, which is considered significant. With regard to roads, MP has taken early action to mitigate this risk to performance of the asphalt surfacing by adopting the asphalt binder standard VG-30, which withstands ambient temperature up to 48 degrees Celsius, higher than the maximum temperature rise by 2030.

57. **Implementation capacity.** MPRRDA has experience working with multilateral development institutions including the Asian Development Bank (ADB), and a good track record in rural road connectivity. A total of 68,000 km of rural roads are under maintenance, of which 30,000 km have been maintained for more than five years. For the Project, as noted earlier, private consultants will be used as needed in addition to the PMC to undertake various tasks. The Bank team is of the view that MPRRDA, supported by the PMC and these consultants, will have suitable capacity for Project implementation.

58. **Quality and performance monitoring.** MPRRDA has a robust and effective quality and performance monitoring system in place for the Project, adapted from the state quality monitoring system being used successfully in PMGSY. It is to be implemented as follows:

- (i) Quality control of works through the independent construction supervision consultant;
- (ii) PIUs assisted by the standard quality control consultants directly responsible for quality control of the works, materials and workmanship and random tests of the quality of works by the CGMs of MPRRDA; and
- (iii) Independent state quality monitors to undertake quality monitoring and submit their reports, including overall compliance with contract conditions, physical and financial progress, and feedback from consultations with local communities on the quality of the work and any modification required in the engineering design, to MPRRDA.

59. The current construction and asset management systems will be enhanced to support management of contract activities and all workflows associated with construction and to enable management of quality assurance during construction. A Performance Assessment Tool (PAT) for monitoring highway projects by the WB has been recently customized for use on rural roads. The customized PAT will be used for monitoring the performance of civil works in the Project.

60. **Addressing the gender gap.** Apart from benefiting from the roads, women will benefit from the Project through engagement of five women's SHGs in a pilot five-year maintenance activity. This involves routine maintenance of off-carriage way parts of the roads; the main carriageway maintenance will remain the responsibility of the contractor. The SHG members will be provided training and hand tools through the Project, and their work will be directly supervised and the contracts managed by MPRRDA field offices.

61. These groups have already been formed under the MP State Rural Livelihood Mission (SRLM). Priority will be given to SHGs in the poor, marginalized ST and SC villages, in consultation with the



respective local government and community leaders. Each SHG is expected to mobilize about 10 women for the maintenance work, meaning that about 50 women will participate in the pilot; based on successful implementation, the scheme may be rolled out state wide to provide job opportunities for tens of thousands of poor women.

## B. Economic and Financial Analysis

62. **Economic benefits.** Under the proposed Project, the existing gravel roads, which will be improved to paved roads, are already providing connectivity with considerable daily traffic. Hence the consumer surplus approach was found to be appropriate for the economic analysis, among different approaches used for economic analysis of low volume rural roads.<sup>11</sup> Under this approach, only the primary traffic benefits were considered, including (i) savings in vehicle operating cost (VOC); (ii) savings in travel time; and (iii) reduction in carbon savings.

63. **Project cost.** Construction cost for the Project is estimated at USD485 million based on the available finalized Detailed Project Reports (DPRs). Maintenance costs for gravel road (without project scenario) and paved road (with project scenario) were estimated based on National Rural Roads Development Agency (NRRDA) guidelines and discussions with MPRRDA officials. In terms of economic costs, on average 1.28 habitations are linked by a 2.38 km road at a cost of USD0.11 million per road or USD0.046 million per km. Routine maintenance costs have been set at USD1,119 per km per year and periodic maintenance at USD14,925 per km at sixth year. A standard conversion factor (SCF) of 0.85, as followed in other rural roads projects in India, was assumed to convert the financial costs to economic costs.

64. **Traffic analysis and forecast.** A sample basis traffic volume survey was carried out on 63 Project roads spread across MP to assess the existing traffic patterns and the results were used in the analysis. Using representative traffic level, about 284 daily vehicular trips were made on the Project roads,<sup>12</sup> on average. Of the daily trips, 49 percent were passenger motorized vehicles, 19 percent goods motorized vehicles and the balance of 32 percent were slow moving non-motorized vehicles.

65. The traffic was assumed to grow at 5 percent annually, similar to the percentage used in other rural road projects in India. Also, it was assumed that trip generation and vehicle composition pattern would change to match those found in villages already connected by paved roads. Based on these assumptions, traffic forecast was estimated for the analysis.

66. **Economic analysis results.** A cost-benefit analysis of the Project was carried out over a period of 20 years. The economic internal rate of return (EIRR) for the Project under the base case scenario is 21.7 percent. The sensitivity analysis was carried out by varying the economic cost of the Project investment and benefits. Further details of the economic analysis, including the sensitivity analysis, are presented in Annex 3.

67. **Counterpart funds.** Fiscal analysis indicates that counterpart fund requirement (USD147 million) for the Project Component A will be about 1.4 percent of the GoMP's fiscal allocation for the Rural Development Department<sup>13</sup> during Project implementation. To maintain Project sustainability, the Government will need to allocate about INR2,164 million (USD33.5 million) per year for Project operation and maintenance over the period 2024 to 2037, or about 1.9 percent of the GoMP's annual rural development budget. The GoMP has confirmed that such levels of maintenance support would be provided through MPRRDA.

## C. Fiduciary and Governance

68. **Anti-corruption.** The WB Anti-Corruption Guidelines, which are consistent with the Bank's Policy on Prohibited Practices, will apply to this Project.

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<sup>11</sup> Another common approach for rural roads is the "producer surplus" approach, which is used with lower traffic volume and captures other socio-economic benefits, including agricultural productivity increase, employment generation, increased vehicle ownership, improved school attendance, etc.

<sup>12</sup> Based on the traffic survey conducted in March 2015 by RES, GoMP on 63 roads on sample basis

<sup>13</sup> Based on the data from "State Finances, A Study of State Budgets of 2016-17", Reserve Bank of India, May 2017.

69. **Procurement.** Procurement shall be carried out in accordance with the WB's "Guidelines: Procurement of Goods, Works and Non-Consulting Services under IBRD Loans and IDA Credits & Grants by the World Bank Borrower" dated January 2011 and revised July 2014 (Procurement Guidelines); and "Guidelines: Selection and Employment of Consultants under IBRD Loans and IDA Credits & Grants by the World Bank Borrowers" dated January 2011 revised July 2014 (Consultants Guidelines) and the provisions stipulated in the Financing Agreement.

70. MPRRDA's project management unit and the procurement unit have been established with adequate staff to manage day-to-day Project implementation and procurement. A procurement capacity assessment was carried out and risk mitigation measures were proposed. MPRRDA has experience working with multilateral development institutions as it is currently implementing the PMGSY with ADB funding. Given MPRRDA's procurement experience, the fact that the size of the procurement packages under the proposed Project is quite similar to that of the PMGSY, and a similar approach will be followed for the proposed Project, the procurement risk has been rated as "Moderate" by the WB and accepted by the Bank.

71. All procurement activities will be processed through the existing procurement unit in consultation with line departments, using the e-procurement portal [www.mpeproc.gov.in](http://www.mpeproc.gov.in). This e-procurement portal has been assessed and accepted by the WB. The Bank agrees that the e-procurement portal can be used for the Bank funded project. A procurement plan is preparing through the WB's procurement management documentation system called Systematic Tracking of Exchanges in Procurement (STEP) with contract description; cost estimates; procurement methods and implementing timelines. Procurement progress can be timely monitored by the WB's STEP and supervised by the WB team and the Bank team jointly twice a year.

72. **Financial Management.** The CEO of MPRRDA will have overall accountability for maintaining the financial management systems and ensuring that these are operated in accordance with the Project's legal agreements. At MPRRDA headquarters, the CGM (finance) will have overall responsibility for Project financial management arrangements. A separate financial management cell at headquarters will be established under the supervision of CGM (finance) and vacancies of account officers in 8 PIUs are expected to be filled within three months of Project effectiveness. PIUs will be trained by the headquarter finance staff at least once per year as per the Project's operation manual.

73. The internal audit will be carried out by the Institute of Public Auditors of India, which is a government approved organization. In addition to the internal audit, an external audit is to be conducted by independent financial auditors (chartered account firm) empaneled by the Comptroller and Auditor General (C&AG) and the terms of reference for the same will be agreed with the Bank and the WB. The audit report will be submitted within 9 months from the close of each financial year.

74. MPRRDA over the last few years has developed good financial management capacity to implement donor-funded programs, such as PMGSY. The CGM (finance) and support staff are familiar with the WB's financial management. The Bank team's assessment of MPRRDA's financial management policies, procedures and staff indicates that its financial management arrangements are satisfactory to meet the essential fiduciary requirements.

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

75. The Bank has decided to use the WB's Environmental and Social Safeguard Policies (Safeguard Policies) since (i) they are consistent with the Bank's Articles of Agreement and materially consistent with the provisions of the Bank's Environmental and Social Policy and relevant Environmental and Social Standards; and (ii) the monitoring procedures that the WB has in place to ascertain compliance with its Safeguard Policies are appropriate for the Project. Under the WB's Safeguard Policies, the Project has been assigned Category B. Three of the WB's Safeguard Policies have been applied to the Project. They are OP 4.01, Environmental Assessment; OP 4.04, Natural Habitats; and OP 4.10, Indigenous Peoples.

76. Desk based assessments and field visits were conducted to identify potential improvements in existing environmental and social practices for construction of CMGSY roads, and adherence to environmental and social requirements in some of the DPRs already prepared and implemented. The assessment included identification of key environment and social impacts in proposed sub-projects (Project

Components A1 and A2), review of existing implementation capacity, understanding of MPRRDA's implementation practices and other mechanisms to monitor and redress grievances. For this purpose, discussions were held with MPRRDA headquarters, field level PIUs, beneficiary communities and other stakeholders.

77. Most of the civil works comprise sealing of existing gravel roads; there is limited new construction of rural roads, which will avoid environmentally sensitive areas, forests and natural habitats. MPRRDA, in principle, will adopt the norms/guidelines developed for the Gol funded PMGSY, including an EMF and environmental codes of practice (ECoPs), to manage environmental and social issues during the planning, design, pre-construction, construction and operation of the roads. The Project will support capacity building in engineering, and promote cost-effective and environmentally-optimized designs, which is particularly important for low traffic roads given the high costs involved in traditional road design. The upgrading of gravel roads to BT roads and construction of new rural roads will also involve introduction of cost-effective, innovative technologies and alternative material.

78. The Project is likely to have some limited adverse environmental impacts in the local context although the exact nature and magnitude of the impacts will vary in accordance with the location and type of intervention. Deficiencies in planning and design of sub-projects to conserve natural drainage patterns can lead to impairment or worsening of drainage. Potential adverse environmental impacts that require attention and mitigation measures include inappropriate locations and/or inadequate design, excessive earth borrowing, erosion, siltation of water bodies, impaired access to crop fields, damage to irrigation pipe crossings, poor management of construction materials, inadequate debris disposal, and insufficient worksite safety management. Potential adverse impacts on any locally important cultural resources will need to be examined, and appropriate mitigation measures during Project planning and implementation provided in the EMF, including chance find procedures.

79. Based on the assessment, the WB's OP 4.12, Involuntary Resettlement is not applicable as the Project does not anticipate land acquisition and, if any additional land is required, it would be done only through voluntary land donation. Existing CMGSY gravel roads will be upgraded by resurfacing to BT, and the additional connectivity links will be constructed on existing earthen tracks built under other government schemes; land take, if any is required, will thus be minimal. In case there are objections from communities, such roads will either be dropped or taken up later once objections are resolved. Other options to avoid or minimize impacts include: design modifications to reduce width of road, alignment shifts, continuing with same alignment curvature along with appropriate safety signs, modifications in cross-sections to the extent possible keeping in mind safety considerations, etc. The WB's OP 4.10, Indigenous Peoples is applicable as there are twenty-one (21) recognized tribal districts, including 4 notified ST districts and many of the upgraded roads and additional connectivity links are proposed in these areas.

80. To mitigate potential impacts at the pre-construction stage, such as loss of land, community structures, and trees, as well as at the construction stage, such as temporary disturbance, disruption to access, dust emission, etc., the Project has prepared a SMF as well as a Vulnerability Framework (VF). These instruments also will enhance community participation (including SC, ST, and women) at all Project stages. The instruments include: relevant legal and regulatory framework, stakeholders consultation requirements, social screening checklist to identify adverse impacts prior to DPR preparation, documentation of voluntary land donation, provisions to mitigate losses/impacts, framework to enhance community participation and guide Project preparation and implementation in respect of information dissemination and implementation and monitoring arrangements, capacity building program and grievance redress mechanism (GRM). MPRRDA will sign a Memorandum of Understanding (MoU) to document voluntary land donation from anyone affected by the Project who makes such a land donation. The VF provides: (i) for STs, identification by type and number of tribal blocks connected; participation in field visits and use of Free, Prior and Informed Consultation (FPICon) undertaken using socially compatible communication material; and participation in road construction and maintenance works; (ii) for SCs, 10 percent connectivity to such locations where more than 80 percent of the population belongs to SCs; and (iii) for women, recording/enumerating their participation in Project activities, including in road construction and maintenance works.

81. Women, across all age groups, are specifically affected by the lack of rural roads, at the village level, which prevents rural communities from contributing to and benefiting from the national growth process. High maternal mortality rates, for example, have been directly attributed for decades to the

inability of pregnant women to travel easily and safely to medical facilities to obtain adequate pre-natal care or delivery assistance, due to lack of transport connectivity. Connectivity at the village level also has a significant impact on attendance and retention in primary and pre-primary schools, girl children suffering more because they are kept at home out of concerns for their safety. Girl students in rural areas also are impeded from pursuing secondary education for the same reasons. Once such micro-level connectivity is ensured through the proposed Project, women and girls will be able to access infrastructure and services for health, nutrition and education. Further, the many women in rural MP who are engaged in SHGs and other entrepreneurial initiatives promoted by government and nongovernmental organizations (NGOs), will benefit from the proposed Project to advance their activities and support their efforts toward economic self-sufficiency.

82. MPRRDA disclosed the completed SMF and VF and translated versions of the executive summaries of these documents on its website on October 28, 2016 and March 22, 2017 respectively, besides disclosing at district level. These documents as authorized by the Borrower were also disclosed on the WB's website on June 28, 2017. An in-country disclosure workshop with representatives from relevant departments was held on November 9, 2016 in the Project area. The two environment management tools, namely, EMF (Environmental Management Framework) and the ECoPs have also been disclosed on the websites of the WB (June 28, 2017) and MPRRDA (October 28, 2016).<sup>14</sup>

83. A key highlight of the Project has been the modernization of the road designs to ensure improved sustainability and also reduce adverse impacts on the environment, natural habitat, and local/regional drainage systems. The MPRRDA is working with the DPR consultants to build their capacity to respond to the requirements of the SMF and EMF. The public consultation initiatives are also being strengthened, particularly for the tribal areas. MPRRDA is taking firm steps to ensure that the DPR consultants understand how to implement the requirements of EMF and ECoPs appropriately.

84. A GRM has been set up to receive complaints from the local population/beneficiary community. The GRM has been established in line with GoI guidelines for the PMGSY. The communities have been informed about the existence and functions of the GRM.

#### **E. Risks and Mitigation Measures**

85. Based on the Bank's technical and financial assessments, due diligence results and observations during site visits, the Bank assigns a *Medium* overall risk rating to the proposed Project mainly due to a concern about Project sustainability and the size of procurement packages. The WB has undertaken due diligence on the Project and assigned a *Moderate* overall risk rating to the Project based on its Systematic Operations Risk-Rating Tool (SORT). The WB rated institutional and fiduciary risks as moderate because agencies like MPRRDA tend to focus more on civil works and less on institutional development initiatives and MPRRDA did not have prior experience in WB procurement. The institutional risk is mitigated through the close support of the Bank and the WB to link MPRRDA with good practice example peers in India that have implemented such initiatives as those proposed under the Project. The fiduciary risk is mitigated through workshops for potential bidders and revision of tender packages in line with the local markets.

86. The potential risks identified and the mitigation measures proposed by the Bank team are summarized in Table 4. The Bank will monitor the implementation of the mitigation measures during Project implementation through the progress reports from MPRRDA and the joint supervision missions with the WB.

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

Risks	Assessment	Mitigating Measures
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<sup>14</sup> MPRRDA: [http://mprrda.com/Citizen/wb\\_project.htm](http://mprrda.com/Citizen/wb_project.htm);  
World Bank: <http://projects.worldbank.org/P157054?lang=en>

Low quality DPR prepared by consultants lacking sufficient experience may delay the procurement process.	Low	The Bank and the WB will carry out due diligence review to ensure that DPRs contain correct and necessary information for the Project. MPRRDA's quality assurance/quality control process will be also monitored during DPR review/approval stage.
Technical design and implementation capacity	Low	The Project follows a simple design to enhance durability and resilience of the existing gravel surfaced rural roads, and to modernize MPRRDA's project management for efficient service delivery. MPRRDA has the requisite institutional capacity and proven track record of delivering rural road works financed by multilateral agencies and its own resources.
There will be limited environmental and social impacts due to construction of roads.	Low	The EMF, ECoPs and SMF contain mitigation measures, monitoring activities and management practices to address these impacts.
Some contracts had poor bid response	Medium	Some tender packages had to be rebid due to poor bid response and bidders' failure to meet qualification requirements. Workshop with potential bidders and revision of packages in consideration of the local market will mitigate the risk.
MP does not have a good track record of road maintenance due to absence of a holistic road asset management system and sustainable funding mechanism.	Medium	The current asset management system will be upgraded as part of the Project. The upgraded system should be fully utilized for preventive and corrective maintenance. The GoMP has shown a strong commitment for maintenance funding and proposed to include 5-year performance based maintenance requirements in the construction contract. After the 5-year maintenance period, long term maintenance contractors will be appointed.

### Annex 1: Results Framework and Monitoring<sup>1</sup>

<b>Project Objective:</b> The objective of the Project is to improve durability and accessibility, and enhance resilience to climate change of the gravel surfaced rural roads in MP while building the capacity of the state to manage its rural road network and road safety.							
<b>PROJECT DEVELOPMENT OBJECTIVE INDICATORS</b>							
Indicator Name	Core	Unit of Measure	Baseline	End Target	Frequency	Data Source/Methodology	Responsibility for Data Collection
Annual maintenance cost per km		Amount (USD)	1000	750	Annual	The baseline value is derived from the maintenance expenditure of sample gravel road candidates for upgrading under the Project. Actual maintenance expenditure is collected from completed Project road after the first year of maintenance is completed on sample (about 10 percent) Project roads.	MPPRDA and Supervision Consultants
<p>Description: The indicator is used to measure durability of the road surface against traffic loading, by comparing the annual routine maintenance costs of Project roads before and after upgrading. The cost of maintaining asphalt surfaced roads is expected to be less than the same road with gravel surface. The baseline value is derived from maintenance expenditure of sample gravel road candidates for upgrading under the Project. End of Project target value is established from the average maintenance expenditure of sample PMGSY asphalt roads. Actual maintenance expenditure is collected from completed Project roads after the first year of maintenance cycle is completed on sample (about 10 percent) Project roads. These sample roads will represent the 10,000 km roads to be upgraded and 510 km roads to be newly constructed, and included under Components A.1 and A.2. respectively.</p>							
Roughness index (m/Km)		Meter (m)	7	3.5	Annual	The data is collected from sample (about 10 percent) Project roads before and after upgrading using a vehicle mounted roughness measurement device immediately before and after major monsoon season. These sample roads will represent the 10,000 km roads included under Component A.1.	MPPRDA

<sup>1</sup> Source: WB Project Appraisal Document (2017)

Description: Roughness index measures the level of deterioration, hence is an indicator of the resilience of road pavement to climatic factors such as rain, floods, winds and extreme temperature. Asphalt surfaced roads are more resilient to these factors than gravel surfaced roads.

Rural road asset management system developed and in use		Text	No fully GIS based network inventory data, no scientifically based maintenance prioritization, or investment plan.	Prioritized maintenance network investment plan – approved by competent authorities	Annual	The reports from the system definer (SD) and system provider (SP) consultants, and Project's M&E reports. The final key outcome of the system development would be a five-year maintenance investment plan.	MPPRDA
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Description: The current rural road network asset is not fully georeferenced and captured on a GIS platform. The indicator will measure the achievement in modernizing the rural road asset management.

Share of the state highway network (about 11, 000 km SH and 20,000 km MDR) covered under RADMS		Percentage	0	100	Annual	RADMS	Home Department, MPRDA
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Description: The RADMS database enables MP to collect and analyze road accident data scientifically with a contribution of other sector including police, transport, road infrastructure and health, and through citizens' engagement wherever feasible.

**INTERMEDIATE RESULTS INDICATORS**

Indicator Name	Core	Unit of Measure	Baseline	End Target	Frequency	Data Source/Methodology	Responsibility for Data Collection
Roads constructed - rural	✓	Kilometers	0	10510	Quarterly	Progress reports	MPRRDA
• Roads upgraded to bituminous surface		Kilometers	0	10000	Quarterly	Progress report	MPRRDA
• New road construction (multiple connectivity)		Kilometers	0	510	Quarterly	Progress reports	MPRRDA
• Length of roads on which alternative surfacing technology piloted		Kilometers	0	2100	Annual	Progress reports	MPRRDA and supervision consultants
Rural population connected by all-weather paved roads		Number	35,000,000	36,500,000	Annual	MP Department of Planning, Economics and Statistics	MPRRDA
Percentage of high school girls shifting from walking to biking to schools		Percentage	10	80	Annual	Supervision consultant's report	Consulting firms and MPRRDA
Description: This indicator monitors the number of people newly connected to all weather paved roads. It is estimated that about 35 million rural population have access to all-weather roads, and the indicator will monitor the additional estimated population of 1.5 million people to be newly connected by 10,510 km all weather-roads.							
Dust concentration in the ambient air along the Project roads		Microgram/m3	0	0	Once after each of the sample roads are completed	Field measurement of PM10 on sample gravel roads under Component A.1	MPRRDA through a firm



Description: The indicator measures the reduction of dust blown after the Project due to sealing of the gravel roads. This will be done on representative sample roads out of the 10,000 km gravel roads. Note: The baseline and targets will be set before Loan Effectiveness.							
Number of Women's Self-Help Groups (SHGs) engaged in post construction maintenance contracts		Number	0	5	Quarterly	Progress reports	MRRDA
Number of women participating in road maintenance within SHG		Number	0	50	Annual	Progress Reports	MRRDA
Description: This is an initiative to empower women especially where they are most marginalized. The activity includes a pilot operation under Component A.1 for off - carriage way road maintenance through women's SHGs identified from five tribal districts, on five road links.							
Rural roads asset management system developed		Text	No comprehensive network based asset management system	Comprehensive network based asset management system developed	Annual	Consultant's Report, and Progress Report	MRRDA
Description: This indicator monitors outputs to the development and use of RRAMS for the rural roads.							
Design and research unit established in MRRDA		Text	No design and research unit in MRRDA	A functional design and research unit is in place	Annual	Progress Reports	MRRDA
Description: A small design unit will be set up under MRRDA							

Number of Gram Panchayats reporting on road traffic crashes		Number	0	500	Annual	Home department accident database management system	Home Department, Traffic Police Directorate
Description: Traffic police has limited capacity to penetrate in the rural areas to deal with crashes. The Project will engage local residents to report on accidents through a pre-loaded smart phone app. This indicator measures the number of Gram Panchayats trained, provided with smartphone pre-loaded with road accident reporting application.							
Number of crash locations/ blackspots/ junctions/ pedestrian facilities improved		Number	0	50	Annual	Police accident records. MPRRDA will partner with Home Department for exchange of crash data, which will help identify the accident spots and improve them.	MPRRDA, Traffic Police
Description: This indicator measures the numbers of repeated traffic accident locations improved under component C.2.							
Number of MPRRDA's staff trained		Number	0	300	Annual	Progress Reports	MPRRDA
<ul style="list-style-type: none"> <li>• Training on WB procurement policies, contract management and quality assurance</li> </ul>		Number	0	100	Annual	Progress Reports	MPRRDA
<ul style="list-style-type: none"> <li>• Staff trained on environmental and social safeguards</li> </ul>		Number	0	100	Annual	Progress Report	MPRRDA
<ul style="list-style-type: none"> <li>• Staff in the new design unit trained on alternative design and construction technologies</li> </ul>		Number	0	25	Annual	Progress Reports	MPRRDA

• Staff trained on design software		Number	0	25	Annual	Progress reports	MPRRDA
Description: This involves training of staff in different areas to build their capacity in implementing the Project and beyond							
Citizen satisfaction index		Number	0	3.5	At mid-term and end of Project	Satisfaction survey report is the source of data. The surveys will be administered three times during the life of the Project: (i) in year one to establish baseline, (ii) in year 3 to feed in to the Mid Term Review, (iii) last year of the Project to generate end-line, and the results will be captured on scale 1-5, where 1 implies high dissatisfaction and 5 high satisfaction (disaggregated by gender).	MPRRDA through a consultant
• Females satisfaction index		Number	1.5	3.5			
• Males satisfaction index		Number	1.5	3.5			
Description: This indicator measures the level of road users' satisfaction on the provision of infrastructure by the Project. The survey will be done during and after the implementation of the Project. The feedback will inform ongoing implementation and the design of future projects. The satisfaction index is on a scale of 1-5 where 1 implies high dissatisfaction and 5 high satisfaction.							

**TARGET VALUES: PROJECT DEVELOPMENT OBJECTIVE INDICATORS**

Indicator Name	Baseline	YR1	YR2	YR3	YR4	YR5	End Target
Annual maintenance cost per km	1000	0	0	750	750	750	750
Roughness index (m/Km)	7		3.5	3.5	3.5	3.5	3.5
Rural road asset management system developed and in use	No fully GIS based network inventory data, no scientifically based maintenance prioritization, or investment plan.					Prioritized maintenance network investment plan – approved by competent authorities	Prioritized maintenance network investment plan – approved by competent authorities
Share of the state highway network (about 11,000 km SH and 20,000 km MDR) covered under RADMS	0		10	50	80	100	100

**TARGET VALUES: INTERMEDIATE RESULTS INDICATORS**

Indicator Name	Baseline	YR1	YR2	YR3	YR4	YR5	End Target
Roads constructed - rural	0	2000	3500	4150	750	110	10510
• Roads upgraded to bituminous surface	0	2000	3500	4000	500		10000
• New road construction (multiple connectivity)	0			150	250	110	510
• Length of roads on which alternative surfacing technology piloted	0		500	1000	600		2100

Rural population connected by all-weather paved roads	35000000	150000	600000	600000	150000		36500000
Percentage of high school girls shifting from walking to biking to schools	10						80
Dust concentration in the ambient air along the Project roads	0		0	0	0	0	0
Number of Women's SHGs engaged in post construction maintenance contracts	0		2	5	5	5	5
Number of women participating in road maintenance within SHGs	0		20	50	50	50	50
Rural roads asset management system (RRAMS) developed	No comprehensive network based asset management system	Procurement of system definer (SD) consultant for RRAMS advanced	(i) SD consultant in place and defining the RRAMS system requirements; (ii) Procurement of System Provider (SP) consultant is advanced	(i) RRAMS developed and data for 10,000 km of rural roads entered and RRAMS tested; (ii) Procurement of data collection consultant done, and consultant mobilized		GIS based network data and information collected for about 116,000 km rural roads	Comprehensive network based asset management system developed

Design and research unit established in MPRRDA	No design and research unit in MPRRDA		Organizational structure, staffing plan and functional manual prepared	Design unit set up and becomes operational			A functional design and research unit is in place
Number of Gram Panchayats reporting on road traffic crashes	0			100	400		500
Number of crash locations/ black-spots/ junctions/ pedestrian facilities improved	0			25	25		50
Number of MPRRDA's staff trained	0	110	125	40	15	10	300
Training on WB procurement policies, contract management and quality assurance	0	50	25	25			100
Staff trained on environmental and social safeguards	0	50	50				100
Staff in the new design unit trained on alternative design and construction technologies	0	10	15				25
Staff trained on design software	0		25				25
Citizen satisfaction index	0	1.5		3.5		3.5	3.5
Females satisfaction index	1.5						3.5
Males satisfaction index	1.5						3.5

## Annex 2: Detailed Project Description

### A. Madhya Pradesh Road Sector

1. Madhya Pradesh is the second largest state in India in terms of area, and the sixth most populous, with 72.6 million people. Yet MP is less developed on average compared to the rest of India. Over 32 percent of MP's population lives below the poverty line compared to the national average of 21 percent. Within the state, poverty rates in the rural areas are also higher compared to urban areas, across all social groups. While significant progress has been made on the literacy front in the last decade, most social and economic indicators of the state remain poorer than other states.

2. It is evident that the low level of infrastructure development has been hampering the state's ability to accelerate economic growth. Poor infrastructure affects efforts to expand social opportunities as well as avenues for increasing incomes in the productive sector. MP lags behind most other states in terms of provision of essential infrastructure. According to an index ranking, the state's infrastructure is amongst the poorest<sup>1</sup> in the country, well below that of even other less developed major states like Bihar and Odisha and comparable only with the poor north-eastern states. The two critical sectors where the state falls behind are roads and power.

3. In a land locked state like MP, roads play a critical role in economic growth and development. MP, which is abundant in mineral resources and has growth potential in agricultural and industrial production, particularly needs a well-developed road network. The total length of rural roads in the state is 115,372 km, constituting more than one half of the road network in the state. About 90,000 km of the rural road network is already paved, 68,000 km of which was done under the national rural connectivity program, "Pradhan Mantri Gram Sadak Yojana" (PMGSY) by the Madhya Pradesh Rural Road Development Authority (MPRRDA), and the remaining by the Public Works Department and other agencies. MPRRDA has further developed about 15,584 km of gravel surfaced roads under the Chief Minister's Gram Sadak Yojana (CMGSY).

4. The gravel surfaced roads constructed under CMGSY have provided minimal improvements to rural connectivity. Also, those gravel roads are not accessible during rainy seasons, and can experience severe deterioration even under moderate flooding. While construction costs of gravel roads are low, maintenance costs are high, especially when taking into consideration reliability and safety conditions. As such, service providers such as public transportation operators, educational institutions, hospitals, traders, etc. are reluctant to bring essential services to the small villages that have no all-weather road connection, because it becomes difficult and costly to provide uninterrupted follow-up services.

5. Small villages with potential for growth require additional linkages (about 510 km) to economic and market centers in order to do so. Connectivity between villages is needed to reduce travel time between them and to market centers or schools through direct linkages. Each additional linkage will reduce the travel time between villages and market centers and benefit at least 2,000 residents of 240 villages.

### B. Institutional Structure

6. MPRRDA, which was created recently for the specific purpose of implementing the PMGSY by the GoMP, will be the implementing agency for the Project. MPRRDA has experience working with multilateral development institutions including the Asian Development Bank (ADB), and a good track record in implementing a total of 68,000 km of rural roads. MPRRDA will use its existing structure to the extent possible through support from other GoMP departments, including transport, police, revenue, forest, and district collectors and local offices.

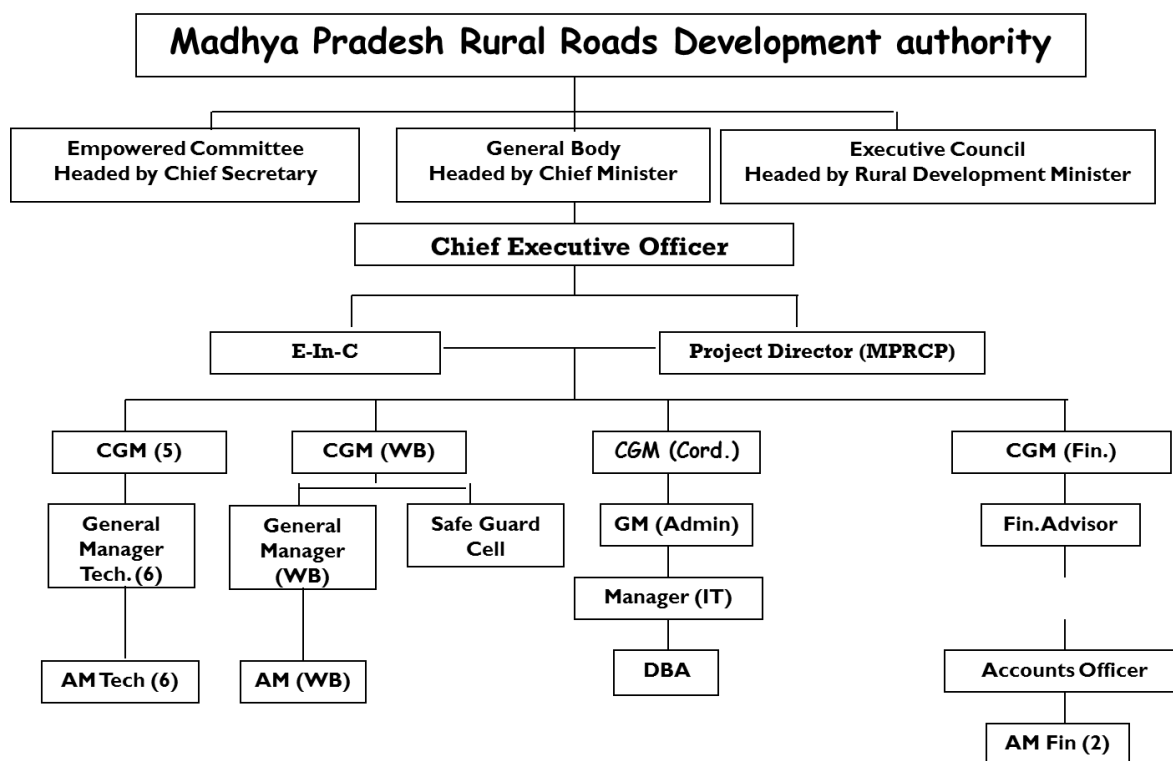
7. The Chief Executive Officer (CEO) of MPRRDA will be in charge of overall Project implementation. The CEO's office will be responsible for implementing the Project under the overall guidance of the Panchayat and Rural Development Department, GoMP. The CEO is supported by experienced personnel at state headquarters. The current structure of the CEO's Office comprises: one engineer-in-chief and ten Chief General Managers (CGM), who hold the rank of Chief Engineer. Of the ten CGM, eight

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<sup>1</sup> Ranked 19<sup>th</sup> out of 28 states in 2010

are in the field and two are based in MPRRDA's headquarters. The state level organization chart of MPRRDA is presented in Figure 1.

**Figure 1: State Level Organization Chart of MPRRDA**



8. The CGMs are in charge of regional divisions, which comprise 5-7 districts each. Each district has one or more PIUs headed by a general manager, who holds the rank of Executive Engineer (EE). At present, there are 81 PIUs under MPRRDA, however, the number can be increased based on the workload. Each PIU is managed by an EE supported by 2-3 assistant managers, who hold the rank of Assistant Engineer (AE). There are 4-5 Junior Engineers (JEs) in a PIU. Wherever required, external consultants will be used to assist MPRRDA to prepare engineering designs, supervise the construction, undertake independent audits and implement various institutional development initiatives.

9. Though MPRRDA has experience working with multilateral development institutions and has adequate capacity to implement the Project, some management systems including road asset management and road safety management capacity need to be developed or further improved to implement the Project efficiently and construct an integrated mechanism for safe operation and economical and responsive maintenance.

### **C. Project Components and Description<sup>2</sup>**

#### **Component A: Road Upgrading/Construction and Maintenance (Total USD485.00 million, IBRD USD203.00 million; AIIB USD135.00 million; GoMP USD147.00 million)**

10. The component has two sub components: (a) Surface Sealing of Gravel Roads: improvement of existing gravel roads developed under the CMGSY program connecting villages with a population less than 500 in general areas and 250 in tribal areas; and (b) Provision of Alternate Connectivity: provision of alternate connectivity to villages that have higher potential to grow faster, given additional linkages to more economic and market centers. The upgrading and new link works will be entirely contracted to local contractors with attached routine maintenance contracts spanning over five years.

<sup>2</sup> Source: WB Project Appraisal Document (2017)



11. **Gender equality.** With a view to promoting support for women in the job market in rural infrastructure development, women's self-help groups (SHG) will be engaged in the post- construction five-year maintenance activity. This activity involves routine maintenance of off- carriage way parts of the road, while the main carriageway maintenance will remain the responsibility of the contractor. The SHG members will be provided training and hand tools through the Project, and their work will be directly supervised and the contracts managed by MPRRDA field offices.

## 12. **Selection criteria of roads**

### **A1 Roads - sealing the existing gravel surface (10,000 km)**

- Normal area: only gravel roads constructed under CMGSY shall be eligible. Roads connecting villages of population 150 - 499 will be upgraded in a phased manner, in a descending order based on population;
- Tribal area: Only roads constructed under CMGSY shall be eligible. In tribal areas, only roads connecting villages of population 100 – 249 population will be upgraded in a phased manner, in a descending order based on population;

### **A2 Roads - additional links (510 km)**

- Roads carrying more traffic and about 10 km long which provide access to three or more villages are considered if the population benefitted by the link is about 5,000 or more and has the minimum traffic to justify the additional link.

**A1: Surface Sealing of Gravel Roads, approx. 10,000 km, (Total USD440.00 million: IBRD financing USD184.00 million; AIB financing USD123.00 million; GoMP USD133.00 million)**

13. This sub component supports the upgrading of 10,000 km of existing gravel surfaced rural roads developed under CMGSY, to a sealed surface standard and long-term maintenance, to improve sustainability of last-mile connectivity provided to 5,400 villages in the state. Implementation will be in two phases of 5,000 km each to be completed over a total period of approximately 3-4 years. In addition to the conventional BT surfacing standard in use for rural roads in India, alternative sealing options like polymer modified asphalt, asphalt blended with plastic waste, and multiple surface treatment will be piloted on approximately 20 percent of the length covered under the Project. The alternative surfacing options barring their respective limitations, enhance cost effectiveness and surfacing quality, reduce carbon footprint and increase job opportunities

14. The component also includes a pilot operation of off carriage way road maintenance through SHG identified from five tribal districts. A direct maintenance contract will be executed between the group and MPRRDA on a pre-defined maintenance schedule of rates, for a period of 3-5 years.

**A2: Provision of Alternative Connectivity - approx. 510 km, (Total USD45.00 million: IBRD financing USD19.00 million; AIB financing 12.00 million; GoMP USD14.00 million)**

15. This sub component supports the provision and long-term maintenance of additional links to about 240 villages that are already connected by a single road link but critically require additional connectivity to respond to the growing demand to link to more social, economic and administrative centers. A total of 510 km of such links will be constructed. The proposed alternative surfacing options will also be applied in this sub component as appropriate.

16. The proposed innovations in the BT surface operations will be applied to both these sub components as appropriate. Project roads will be designed based on the traffic density to all-weather standards prescribed by the Indian Roads Congress (IRC) by providing adequate geometry, pavement, drainage, cross-drainage, and road safety measures, including special treatment in the built-up areas. Road Width (Formation Width) and carriageway width shall be decided based on traffic density as prescribed by IRC, and dictated by the local situation such as availability of land. Given the small size of individual roads, it is expected that the civil works will be packaged and procured under national competitive bidding procedures; generally comprising packages of INR10-50 million (approx. USD150,000-750,000), in line with existing PMGSY practice.

**Component B: Institutional Development (Total USD3.00 million: IBRD Financing USD1.10 million, AIIB USD0.90 million; GoMP USD1.00 million)**

17. The Component will strengthen MPRRDA's institutional capacity to implement the proposed Project as well as manage the state's rural road network by adopting a modern asset management approach while building its knowledge base in line with the latest developments and innovations in the rural roads sub sector. The Component will provide support in the following key areas: (a) improving asset management capacity; and (b) strengthening design research and quality assurance of civil and maintenance works.

***B1: Rural Roads Asset Management System (RRAMS) (Total USD2.00 million: IBRD Financing USD0.71 million, AIIB USD0.62 million; GoMP USD0.67 million)***

18. MPRRDA manages over 90,000 km of rural road assets. The current asset management system is scheme based and supply driven. The PMGSY scheme provides funding to the state for developing rural roads to connect villages with more than 500 people on condition that the state allocates budget and implements 5-year rolling maintenance. The CMGSY on the other hand is a state-funded scheme focusing on smaller villages that are not covered under PMGSY or any other scheme, where the construction is attached with 3-year maintenance contracts for gravel roads and now 5-year maintenance for paved roads under the Project. There are also other schemes involving in rural roads, resulting in fragmented network management with no integrated information on asset registry, condition, or value and no robust mechanism to analyze maintenance needs and resources. MPRRDA has now become the custodian of a huge road asset and has started an initiative to address the needs of a road asset management system.

19. A modern asset management system provides a systematic process for maintaining, upgrading and operating assets, combining engineering principles with sound business practice and economic rationale, and providing tools to facilitate a more organized and flexible approach to making the decisions necessary to achieve the public's expectations.<sup>3</sup> Such an approach is critical especially when network development matures and the state's funding responsibility increases with the addition of more rural roads to the stock. A typical road asset management system encompasses the following:<sup>4</sup>

- Establish a complete inventory of the road network with all its elements;
- Provide a clear picture of the current condition/performance of the road network;
- Estimate the value of the asset;
- Predict future demand of traffic and service needs;
- Estimate maintenance needs and costs;
- Prioritize objectives related to the desired quality and performance of the road network;
- Set up funding scenarios for regular and timely maintenance and upgrading of the road asset;
- Define a strategy (RRAM Plan); and
- Implement the RRAM Plan.

20. The Project will support the assessment of the system requirements and enhance/ upgrade the existing road asset management system. MPRRDA will engage a system defining consultant (SD) to formulate the RRAMS considering the context in the state and other systems in MPRRDA. The consultant's activities will include defining the system requirements (overall system architecture, data collection and analytical modules), and framing terms of reference for the system provider (SP). The SP will provide a commercial off-the-shelf (COTS) software or customized software that meets the system requirements defined by the SD. RRAMS data collection, including asset inventory, condition, cost, traffic will be undertaken by MPRRDA's field units, which will be trained and equipped under the SD consultancy.

***B2: Strengthening Design, Research and Quality Assurance Capacity: (Total USD1.00 million: IBRD Financing USD0.39 million; AIIB financing USD0.28 million; GoMP USD0.33 million)***

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<sup>3</sup>Asset Management for the Roads Sector, OECD, 2001

<sup>4</sup> Road Asset Management, European Union Road Federation, An ERF position paper for maintaining and improving a sustainable and efficient road network

21. MPRRDA does not have a well-equipped and resourced design, research and quality control unit. Rather, it outsources engineering surveys/ investigations, design, environmental and social impact assessment and the resulting EMPs to private consulting firms. In-house capacity to review consultant outputs is far from adequate to ensure the delivery of comprehensive DPRs that address site-specific issues, and lacks considerations of optimizing cost and maximizing efficiency. Similarly, MPRRDA is dependent on outsourced experts for quality control of construction and maintenance works. PIUs are not equipped with the necessary laboratory and field testing facilities to verify quality of works. The capacity to conduct research in-house or through academic institutions to make use of available local materials including enhancing otherwise cheaply available marginally qualified materials is nonexistent within MPRRDA.

22. The subcomponent will therefore support: (a) strengthening the existing design and research unit; (b) training of design staff to enable them do in-house design to support field units as required, and able to review consultant designs; (c) reviewing and updating the current rural roads design standards and technical specifications to MP's context and recent developments in the sector; (d) reinforcing field laboratories in selected districts and training laboratory technicians and PIU staff on laboratory and field tests; (e) undertaking a study tour to good examples of rural road design and research in India and abroad.

**Component C: Road Safety Management Capacity Development (Total USD10.00 million: IBRD financing USD4.10 million; AIIB financing USD2.90 million; GoMP USD3.00 million)**

23. The goal of this component is to support the GoMP's road safety management capacity in three specific areas. These are (a) development of a comprehensive and multi-institutional, multi-sectoral Road Accident Data Management System (RADMS), Community Based Road crash monitoring and reporting system and (b) development of a Community Participatory Road Safety Program (CPRSP).

**C1: Road Accident Data Management System (RADMS) (Total USD3.00 million: IBRD financing USD1.50 million; AIIB financing USD1.00 million; GoMP USD0.50 million)**

24. Reliable data on road accidents play a crucial role in assessing the cause of accidents. Ideally, all road safety measures should be taken based on scientific analysis of road accident data. Effective accident black spot improvement works cannot be implemented without a reliable and powerful accident database. An accident data collection system with multi sectoral inputs is the first step towards achieving scientific road safety management. An ideal database needs to be comprehensive to satisfy not only statistical requirements but also assist in planning accident reduction measures through multi sectoral interventions. RADMS is the first step towards achieving scientific road safety management. The crash data collected in MP has not been scientific and comprehensive. The RADMS will have three subcomponents:

- (a) **Analysis and dissemination.** Accident and related data are input by the key stakeholders: police, first responder/ ambulance services, health, transport/motor vehicles department, road agency, rural/panchayat representatives, insurance companies, and so on and stored in a back-end repository at State Crime Records Bureau and back-up at State Data Center. These stakeholders will be given role-based login access to enable entry of their respective accident related data through a smartphone loaded with the application to enable do so. A separate smartphone app will be developed for use by community participants to engage in the accident reporting process.
- (b) **Comprehensive training** (at both headquarter and district level) on both database development, management and analysis will be provided to the police. It is expected that about 51 Police District headquarters, 1 State Police head quarter offices, 11 Transport Department offices and two other stake holders (Health Department & Urban Department) will use the system for editing and analysis purposes. The program includes training of trainers to ensure sustainability recognizing movement of trained staff. The "training of trainers" module will allow a wider outreach. Community based training will also be provided to enhance community capability in road accident reporting.
- (c) **Data analytics**, to analyze the causes of crash.

**C2: Pilot Comprehensive Road Safety Program (PCRSP) (Total USD7.00 million: IBRD financing USD2.60 million, AIB financing USD1.90 million; GoMP USD2.50 million)**

25. It is becoming evident that road safety issues cannot be addressed through isolated interventions along segments of roads without considering the relationships with other links, or through specific interventions like enforcement, road engineering or trauma care that are all done in isolation to one another. Road safety interventions prove to be effective when a high risk road network is identified, and an optimal combination of multi-sectoral interventions is undertaken based on reliable accident data. MP recently acknowledged this and has taken steps to approach road safety multi-sectorally, but has some way to go to operationalize it. This can effectively be done by piloting multi-sectoral road safety initiatives at a smaller scale. This PCRSP will be a pilot program in a district with the most fatal and serious injuries recorded in the recent past. Planning and implementation will follow a bottom-up approach towards engaging and empowering local communities to develop customized solutions to improve road safety. Community participation may include: identification of accident locations, causes, other contributory factors; suggestions for improvement; consultation and consensus development during implementation of road safety interventions; support for upkeep and compliance of road safety measures taken; monitoring and evaluation; social auditing; identifying local volunteers to involve in various road safety activities, such as: conducting road safety awareness programs, post-crash emergency training for roadside communities and volunteers, compliance of road safety enforcement in local communities; developing community based emergency response and trauma care system; and so on. The program will require strong coordination of agencies responsible for road safety and improvements in the following four key areas: (a) infrastructure; (b) enforcement; (c) road users' awareness; (d) post-crash emergency care. PCRSP is implemented in four interrelated activities:

*C2.1: Road Safety (RS) Engineering (USD5.75 million):*

26. **Technical Assistance (Cost: USD250,000).** The PCRSP consultant will explore opportunities to establish a road safety cell within MPRRDA or PWD and train a team of minimum 15 young engineers in road safety audit, black spot improvement, best practices in road safety engineering, signs and markings. The training includes exposure programs at overseas, internationally certified training programs conducted by well-known road safety research centers, and so on.

27. **Road Safety Engineering Interventions (Cost: USD5.50 million).** For the high-risk network identified for the pilot, engineering interventions will be designed and implemented on black spots defined based on analysis of historical accident data. The design of interventions will be carried out by a firm of RS consultants jointly overseen by a team of engineers from MPRRDA and PWD. The PCRSP consultant, MPRRDA and PWD teams will jointly conduct a RS audit with active participation of the local community at existing black spots and black stretches of the selected district, and will prepare a comprehensive road safety engineering improvement plan/DPR and bill of quantities. Once the plan is approved by the state road safety council, the MPRRDA will take necessary steps to initiate implementation. The implementation will be supervised by the newly formed Road Safety Cell under the guidance and support of the PCRSP Consultants. The engineering interventions may include: identification and development of black spots, junction improvement programs on SH, MDR and Other District Roads, construction of footpaths/pedestrian facilities at major towns/cities, signs and markings including gateway markings and signs, "Urban-street design" with priority for vulnerable road users and local communities, school-zone treatment, speed-calming treatments, and so on.

*C2.2: Enforcement (USD600,000)*

28. **Technical Assistance (USD100,000).** The PCRSP Consultants will conduct specialized trainings (domestic and international) through experts to build capacity of the police and transport departments to enable them to effectively carry out road safety enforcement, such as: handling road safety violations, enforcement of helmet, seatbelt, speed management, driving under influence, understanding road user behavior and correctional program, crash investigation and data management.

29. **Equipment for RS Enforcement to Police (USD500,000).** Road safety enforcement requires sophisticated equipment such as: patrol vehicles, hi-tech speed radars, wayside alcohol testing facilities, surveillance cameras, and so on. This will be procured by a joint team of police and MPRRDA.

### *C2.3: Post-crash Emergency Management (USD500,000)*

30. **Technical Assistance (USD100,000).** The CPRSP Consultants will mobilize a post-crash emergency specialist who would audit the existing trauma care facilities and suggest moderate improvements for stabilization and management of trauma. The Project will train all doctors, nursing staff and paramedics attached to the existing trauma care centers. Training will include: Advanced Trauma Life Support for doctors, Advance Trauma Care for Nurses , International Trauma Life Support to doctors, nurses and paramedics, Advance Life Support Training to doctors and nursing staffs, Basic Life Support to para medics and volunteers from police and communities. The above training programs will be conducted onsite by a training organization. The post-crash emergency (PCE) specialist of the CPRSP will oversee the training activities.

31. **Equipment and Trauma Care Facilities (USD400,000).** The PCE specialist of the CPRSP Consultant will conduct a detailed audit of existing trauma care facilities of the Project area and develop a list of equipment and services to be procured to upgrade the said facilities. The procurement will be jointly carried out by a team of officers from MPRRDA and the health department.

### *C2.4: Road Safety Education and Awareness (USD150,000)*

32. The CPRSP Consultant will have specialists comprising: Community Mobilizer, Road Safety Education & Awareness Specialist and Road User Behavior Specialist. The team will conduct a baseline survey and observational study by employing local agencies/NGOs. Based on the survey and observational study, a comprehensive CPRSP will be prepared and rolled out with the support of NGOs. Local panchayats, police stations and community organizations will be involved in implementing the program. It will also train community volunteers to develop a community network of post-crash emergency volunteers and road safety educators. The implementation will be monitored by the police department.

### **Component D Design, Implementation and Management Support: (Total USD3.12 million: IBRD financing USD1.27 million; AIIB financing USD0.85 million; GoMP USD1.00 million):**

33. This component supports MPRRDA in overall Project management, construction supervision, and quality control, and technical and financial audit, with the support from independent consultants. The support includes: (a) operational activities of MPRRDA and its field PIUs to implement the Project; (b) preparing cost-effective, climate-resilient engineering designs and related surveys and investigations; (c) carrying out construction supervision of civil works; (d) providing quality control; (e) implementing independent monitoring of quality of design and works, and compliance with contract agreements; and (f) carrying out independent monitoring/assessments of safeguards, user satisfaction survey, compliance and the achievement of Project outcomes.

### Annex 3: Economic and Financial Analysis<sup>1</sup>

#### A. Introduction

1. The Project is proposed to upgrade the gravel roads constructed under CMGSY to the standards of paved roads (about 10,000 km). In addition, 510 km of new connectivity roads are proposed to provide more connectivity to villages with higher population and better status of “local growth center or market center.” All the works under this program are targeted to be complete in 2022.

2. Most of the habitations served by these gravel roads are populated by the poorer sections of society, and thus the proposed roads are likely to have a large impact on generating economic activities and improving livelihood of poorer rural population. Most of the roads are short in length (2.4 km length on average).

#### B. Project Scope

3. Based on the data provided, the database for the Project roads was developed in terms of average number of villages connected, beneficiary population, and Project cost. Using these averages, the coverage for the Project is estimated as given in Table A3.1.

**Table A3.1: Roads Under Project Coverage**

No. of road sections	4,421
Total length km	10,510
Districts covered	51
No. of villages connected	5,640
Average road length (km/road)	2.38
Average population coverage - 2011 (No. / Road)	387
Average population coverage - 2016 (No. / Road)	425
Total population coverage (2016)	1,881,189

Source: MPRRDA

#### C. Economic Analysis Approach and Methodology

4. The economic analysis adopted for the Project has focused on assessing the benefits of the Project as a whole after reviewing the methodology adopted to implement PMGSY roads. For the economic analysis, the WB guideline (Investment Project Financing Economic Analysis Guidance Note, April 2013) was also considered.

5. From the available guidelines,<sup>2</sup> the consumer surplus method is recommended rather than the producer surplus method for projects where traffic volumes are likely to be sufficient for road-user cost savings to justify funding of a project (normally a minimum of about 100 daily vehicular trips). Under the Project, the gravel roads which are already providing connectivity with considerable daily traffic (approximately 284 vehicular trips by motorized and non-motorized vehicles) are planned to be upgraded to paved road. Therefore, the “consumer surplus” approach was used for the economic analysis for the Project, and only the primary traffic benefits such as savings in VOC and travel time were considered.

#### D. Estimating the Benefits

6. The following benefits under the consumer surplus approach were considered:

- (i) Traffic related benefits

<sup>1</sup> Source: WB Project Appraisal Document (2017)

<sup>2</sup> Dr. Richard Robinson (1999) A new approach to quantifying economic and social benefits for low-volume roads in developing countries, Impact Assessment and Project Appraisal <http://dx.doi.org/10.3152/147154699781767891> published online: 20 Feb 2012; Notes on the Economic Evaluation of Transport Projects, Transport Note No. TRN-21, THE WORLD BANK, WASHINGTON, DC, January 2005

- a) savings in vehicle operating cost (VOC)
- b) savings in travel time cost
- (ii) Reduction in carbon emission.

7. **Traffic analysis and forecast.** A sample basis traffic volume survey was carried out for 63 Project roads spread across the state to assess the existing traffic pattern and the results were used in the analysis. About 284 daily vehicular trips were made on the Project roads,<sup>3</sup> on average. Of the daily trips, 49 percent were passenger motorized vehicles, 19 percent goods motorized vehicles and the remaining 32 percent were slow moving non-motorized vehicles. The traffic was assumed to grow at 5 percent annually, similar to percentage used in other rural road projects in India. Also, it was assumed that trip generation and vehicle composition pattern would change to match those found in villages already connected by paved roads. Based on the assumptions, traffic forecast was estimated for the analysis.

8. **Traffic-related benefits.** The savings in the VOC and passenger time value, for each vehicle category were adapted from Indian Roads Congress (IRC) guidelines (2009)<sup>4</sup> with suitable update to 2016, as given in Tables A3.2 and A3.3. Using these unit rates and the projected traffic, VOC and travel time cost were estimated for both “without project scenario” using gravel road and “with project scenario” using paved roads. The differences between these two scenarios were considered as traffic-related benefits. For benefit calculations, existing traffic and generated traffic were treated separately. For generated traffic, 50 percent of the VOC and time cost for the improved situation were treated as Project benefit.

**Table A3.2: Estimate of Vehicle Travel Time Cost (INR / Vehicle Km) – 2016**

Vehicle Type	Value of Travel Time – Paved Road					
	INR/Hr (2009)	INR/Hr (2016)	Av. Speed (Km/Hr)	Average Occupancy (Nos.)	Average Load (Ton)	INR/Vehicle Km
Two Wheelers	22.0	32.4	25	1.5		1.95
Car	52.5	77.4	20	4		15.48
Tractor	5.4	7.9	15		2	1.06
Bus	14.5	21.4	20	25		26.72
Truck	6.7	9.9	15		9	5.95

Note:

- i. Estimated based on the data available from Indian Roads Congress (IRC), SP 30, 2009.
- ii. Using the Wholesale Price Index (WPI), the unit rates of 2009 were updated to 2016.

**Table A3.3: Unit Rates for Calculating VOC and Travel Time for Rural Roads (at 2016 Price)**

Vehicle Type	Value of Time: INR/ Vehicle Km			Vehicle Operating Cost: INR / Vehicle Km		
	Earth	Gravel	Paved	Earth	Gravel	Paved
Two Wheelers	5.0	3.2	1.95	4.5	2.9	1.64
Car	31.7	20.6	15.48	16.2	11.1	6.60
Tractor	2.3	1.5	1.06	21.3	17.2	14.78
Bus	55.7	44.5	26.72	21.9	17.7	14.49
Truck	10.6	8.5	5.95	22.5	17.4	14.78

Note:

- i. Estimated using the estimated travel time cost/vehicle km in the previous table and the ratio of cost data among different road categories available in IRC, SP 30, 2009.
- ii. For road roughness using the International Roughness Index (IRI), the average values of 8 IRI for gravel

<sup>3</sup> Based on the traffic survey conducted in March 2015 by RES, GoMP on 63 roads on sample basis

<sup>4</sup> Manual on Economic Evaluation of Highway Projects in India (Second Revision), Indian Roads Congress, 2009 (IRC SP 30-2009)

road and 4 IRI for paved roads are considered, based on the practice followed in other rural road project analyses.

9. **Carbon emission reduction benefits.** Improved road surface from gravel to paved condition under the Project will result in travel speed increase and fuel reduction for the motorized vehicles using the Project road network. This reduction in fuel consumption will lead to reduction in carbon emission to the atmosphere, which is a benefit of the Project. The emission reduction benefit for the Project was estimated following the GHG Analysis Road Improvement, Guidance Note, World Bank Group, February 2016. The key assumptions for carbon emission reduction benefits are reduction of International Roughness Index from 8 (“without project” gravel surfaced road) to 4 (“with project” paved road surface), carbon emission factor of 0.0023 ton/ liter and carbon cost of USD37.43 per ton in 2022.<sup>5</sup>

10. **Non-quantitative benefits.** The expected non-quantitative benefits of the Project are the following:

- (i) Improved rural economy by increasing agricultural and non-agricultural productivity, minimizing post-harvest losses, and providing more economic opportunities to villagers, especially women;
- (ii) Prompt emergency response (ambulance, firefighting, police, etc.) and easier access to the health care system;
- (iii) Reduced adverse environmental impacts and health and safety problems, especially for maternal health care; and
- (iv) Reduced teacher absenteeism and increased school enrollment and attendance, especially of girls

11. Under the counterfactual scenario without the Project, the target rural villages would continue to face the lack of rural road connectivity as well as road quality related issues. The absence of necessary investments in infrastructure and institutional capacity needed in the targeted villages would hinder the economic development of MP and the achievement of the state’s objectives to increase rural development by expanding rural road infrastructure.

## E. Cost of Construction and Maintenance

12. Construction cost for the Project is estimated at USD485 million (Table A3.4) and this is based on the available finalized DPRs. Maintenance costs for gravel road (without project scenario) and paved road (with project scenario) were estimated based on the discussions with officials and NRRDA guidelines,<sup>6</sup> and are used to estimate the incremental maintenance cost. A 20-year period is considered for analysis. A standard conversion factor (SCF) of 0.85, as followed in other rural roads projects in India, was assumed to convert the financial costs to economic costs.<sup>7</sup>

**Table A3.4: Details of Project Cost**

Component	Length Km	%	Construction Cost (INR Million/Km)	Construction Cost (USD Million/Km)	Construction Cost (USD Million)
Upgradation Roads (Km)	10,000	95.15%	2.82	0.044	440.00
New Connectivity Roads (Km)	510	4.85%	5.65	0.088	45.00
<b>Total (Km)</b>	<b>10,510</b>	<b>100.00%</b>	<b>2.95</b>	<b>0.046</b>	<b>485.00</b>

Note: (i) USD = 64 Indian Rupee (INR); (ii) Cost of upgrading is based on the DPRs by MPRRDA on May 2017; (iii) Cost of new connectivity roads is based on the input from MPRRDA

<sup>5</sup> Estimated based on “CCGCE Guidance note on social value of carbon in project appraisal July 14, 2014,” World Bank.

<sup>6</sup> Unit rates for maintenance are based on the inputs from MPRRDA and NRRDA

<sup>7</sup> Conversion factor of 0.85 was used to account the market distortions to financial cost by removing taxes, subsidies, grant components and so on.



## F. Economic Analysis Results

13. Considering the large number of individual Project roads spread out in 51 districts, the present economic analysis was developed for the state aggregate. Economic internal rate of return (EIRR), modified internal rate of return (MIRR) (assumes that the positive cash flows from the investment are reinvested at the social discount rate [SDR] or economic opportunity cost of capital of 6 percent),<sup>8</sup> and switching values were calculated along with associated Economic Net Present Value (ENPV) discounted at 6 percent (SDR). The results of the economic analysis including sensitivity analysis are shown in Table A3.5. EIRR under the base case and sensitivity scenarios for the Project was found to be above the minimum required SDR of 6 percent and so the Project is economically feasible.

**Table A3.5: Results of Economic Analysis**

Sl. No.	Sensitivity Scenario	EIRR	MIRR	ENPV @ 6% INR Million	SV
1	Base Case	21.7%	11.9%	34,899	
2	Without Carbon Benefits	20.9%	11.6%	32,903	
3	20% increase in Construction Cost	18.2%	10.8%	30,852	172%
4	20% increase in Operation and maintenance Cost	21.4%	11.5%	33,675	570%
5	20% decrease in Project Benefit	18.1%	10.5%	25,236	72%
6	Combined Effect (Worst Scenario)	15.4%	9.5%	22,552	

Note: ENPV- Economic Net Present Value discounted @6 percent; SV- Switching Value

## G. Financial Analysis

14. Fiscal analysis indicates that the counterpart funding requirement (USD147 million) for the Project Component A during Project implementation would be about 1.4 percent of the GoMP's fiscal allocation for the Rural Development Department during the same period. To maintain Project sustainability, the government would need to allocate about INR2,164 million (USD33.5 million) per year for Project operation and maintenance over the period 2024 to 2037, or about 1.9 percent of the GoMP's annual rural development budget. The GoMP has confirmed that such levels of maintenance support would be provided through MPRRDA.

<sup>8</sup> WB suggested social discount rate of 6 percent used in other recent rural road projects is followed

## Annex 4: Sovereign Credit Fact Sheet

### A. Recent Economic Development

India is a lower-middle-income country, with a population of 1.31 billion. Indian real GDP expanded at an average annual rate of 7.3 percent between FY2003 and FY2012; however, growth slowed to 5.6 percent and 6.4 percent in FY2012/13 and FY2013/14 because of growing imbalances, binding supply constraints, and subdued sentiment. Since 2014, the Indian economy has been on a gradual cyclical recovery, helped by lower commodity prices, bringing about an improvement in the current account. The Indian economy is also supported by structural reforms, such as a new bankruptcy code and the implementation of the pan-India goods and services tax (GST). A range of supply-side measures (including release of surplus grain buffer stocks), an appropriate monetary stance and lower oil prices have also contributed to the decline in inflation, from an average of about 9.8 percent during 2011–13 to 4.9 percent in FY2015/16. Nevertheless, the demonetization initiative<sup>1</sup> resulted in slower growth in FY2016/17. The Rupee also weakened with global capital outflow from emerging market assets.

### B. Economic Indicators

**Selected Macroeconomic Economic indicators (2013/14-2017/18)**

Economic Indicators	2013/14	2014/15	2015/16	2016/17*	2017/18*
National income and prices (change %)					
Real GDP Growth	6.4	7.5	8.0	7.1	6.7
Inflation (change %, average)	9.4	5.8	4.9	4.5	3.8
Central government operations (% of GDP)					
General government overall balance	-7.6	-7.3	-7.0	-6.8	-6.6
External debt (% of GDP, EOP)	23.9	23.3	23.4	22.9	22.7
Nominal gross public debt (% of GDP)		68.3	69.8	69.6	68.8
Money and credit					
Broad money (% annual change, EOP)	13.4	10.9	10.5	12.0	13.4
Direct investment in India (net, % of GDP)	-1.2	-1.5	-1.7	-1.7	-1.7
Gross reserves (months imports)	6.7	8.5	8.6	8.1	7.9
Current account balance (% of GDP)	-1.7	-1.3	-1.1	-0.7	-1.4
Exchange rate (Rupee/\$, end period)	61.0	62.6	66.6	68.4	

Note: \* denotes projected figures. Source: IMF Country Report No. 17/54, February 2017, WEO April, July, October, 2017.

### C. Economic Outlook and Risks

Looking ahead, India's growth is projected to slow to 7.1 percent in FY2016/17 before rebounding to 7.4 percent in FY2018/19. This is due to the temporary disruptions, particularly in private consumption, caused by cash shortages accompanying the demonetization. The current account deficit is expected to widen to about 2 percent of GDP over the medium term on the back of stronger domestic demand and possible increase in commodity prices. External risks include financial market volatility and slower growth in China, the EU and the US. Internally, India faces some risk arising from potential deterioration of corporate and public bank balance sheets, and setbacks in the reform process including implementation of GST on the domestic side. India's public debt remains sustainable given manageable interest rate costs and robust growth outlook. Assuming gradual fiscal consolidation and implementation of GST, the public debt-to-GDP ratio is forecast to decline gradually to around 61 percent of GDP in the medium term from the current level of almost 70 percent. Negative growth shocks represent one of the major risks to the debt outlook. India's external debt, currently at 23.5 percent of GDP, remains sustainable.<sup>2</sup>

<sup>1</sup> Demonetization initiative: On Nov. 8 2016, India's government announced withdrawal of the legal tender of INR 500 and INR1000 notes, which accounted for 86 percent of the value of currency in circulation, and introduction of new INR500 and INR2000 notes.

<sup>2</sup> International Monetary Fund (IMF), 2017. Country Report No. 17/54— 2017 Article IV Consultation—Press Release; Staff Report; and Statement by the Executive Director for India, February, 2017.