OFFICIAL USE ONLY
R2018-0033/1

February 23, 2018

Closing Date: Wednesday, March 14, 2018 at 6 p.m.

FROM: Vice President and Corporate Secretary

India - Madhya Pradesh Rural Connectivity Project

Project Appraisal Document

Attached is the Project Appraisal Document regarding a proposed loan to India for the Madhya Pradesh Rural Connectivity Project (R2018-0033), which is being processed on an absence-of-objection basis.

Distribution:
Executive Directors and Alternates
President
Bank Group Senior Management
Vice Presidents, Bank, IFC and MIGA
Directors and Department Heads, Bank, IFC and MIGA

Document of

The World Bank

FOR OFFICIAL USE ONLY

Report No: PAD1813

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED LOAN

IN THE AMOUNT OF

US$210 MILLION

TO

India

FOR

MADHYA PRADESH RURAL CONNECTIVITY PROJECT

February 21, 2018

Transport and ICT Global Practice

SOUTH ASIA REGION

CURRENCY EQUIVALENTS

(Exchange Rate Effective January 31, 2018)

Currency Unit =	Indian Rupee (INR)
63.60749 INR =	US$1

FISCAL YEAR
April 1 – March 31

ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank
AIIB	Asian Infrastructure Investment Bank
BPL	Below Poverty Line
BT	Bituminous/Bitumen
CEO	Chief Executive Officer
CGM	Chief General Manager
CMGSY	Chief Minister's Gram Sadak Yojana
CPRSP	Community Participatory Road Safety Program
CPS	Country Partnership Strategy
ECoP	Environmental Code of Practice
EIRR	Economic Internal Rate of Return
EMF	Environment Management Framework
ENPV	Economic Net Present Value
FM	Financial Management
GoMP	Government of Madhya Pradesh
GoI	Government of India
HQ	Headquarters
IUFR	Internal Unaudited Financial Report
MDG	Millennium Development Goals
MDR	Major District Roads
MP	Madhya Pradesh
MIRR	Modified Internal Rate of Return
MPRDC	Madhya Pradesh Road Development Company
MPRRDA	Madhya Pradesh Rural Road Development Authority
PAT	Performance Assessment Tool
PDO	Project Development Objective
PMGSY	Pradhan Mantri Gram Sadak Yojana
PIU	Project Implementation Unit
P&RD	Panchayat and Rural Development Department
PRI	Panchayat Raj Institute

PWD	Public Works Department
RES	Rural Engineering Services
RADMS	Road Accident Data Management System
SC	Scheduled Caste
SH	State Highways
SMF	Social Management Framework
ST	Scheduled Tribes
STEP	Systematic Tracking of Exchange in Procurement
SV	Switching Value
UNDP	United Nations Development Program
VOC	Vehicle Operating Cost
VF	Vulnerability Framework

Regional Vice President:	Annette Dixon
Country Director:	Junaid Kamal Ahmad
Senior Global Practice Director:	Jose Luis Irigoyen
Practice Manager:	Karla Gonzalez Carvajal
Task Team Leader(s):	Mesfin Wodajo Jijo, Rakhi Basu

BASIC INFORMATION

Is this a regionally tagged project?	Country(ies)	Financing Instrument
No		Investment Project Financing

[ ] Situations of Urgent Need of Assistance or Capacity Constraints

[ ] Financial Intermediaries

[ ] Series of Projects

Approval Date	Closing Date	Environmental Assessment Category
14-Mar-2018	15-Mar-2023	B - Partial Assessment
Bank/IFC Collaboration		
No		

Proposed Development Objective(s)

To improve durability and enhance resilience to climate changes 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.

Components

Component Name	Cost (US$, millions)
Road Upgrading, Construction and Maintenance*	485.00
Institutional Development	3.00
Road Safety Management Capacity Development	10.00
Design, Implementation and Management Support	4.00

Organizations

Borrower : India

Implementing Agency :	Madhya Pradesh Panchayat and Rural Development Department Government of Madhya Pradesh

PROJECT FINANCING DATA (US$, Millions)

[✓] Counterpart Funding	[✓] IBRD	[ ] IDA Credit	[ ] IDA Grant	[ ] Trust Funds	[✓] Parallel Financing

Total Project Cost:	Total Financing:	Financing Gap:
502.00	502.00	0.00
	Of Which Bank Financing (IBRD/IDA): 210.00	

Financing (in US$, millions)

Financing Source	Amount
Asian Infrastructure Investment Bank	140.00
Borrower	152.00
IBRD-88330	210.00
Total	**502.00**

Expected Disbursements (in US$, millions)

Fiscal Year	2018	2019	2020	2021	2022	2023
Annual	1.50	14.48	22.57	45.56	70.83	55.05
Cumulative	1.50	15.98	38.55	84.12	154.95	210.00

INSTITUTIONAL DATA

Practice Area (Lead)

Transport & Digital Development

Contributing Practice Areas

Climate Change and Disaster Screening

This operation has been screened for short and long-term climate change and disaster risks

Gender Tag

Does the project plan to undertake any of the following?

a. Analysis to identify Project-relevant gaps between males and females, especially in light of country gaps identified through SCD and CPF

Yes

b. Specific action(s) to address the gender gaps identified in (a) and/or to improve women or men's empowerment

Yes

c. Include Indicators in results framework to monitor outcomes from actions identified in (b)

Yes

SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)

Risk Category	Rating
1. Political and Governance	Low
2. Macroeconomic	Low
3. Sector Strategies and Policies	Low
4. Technical Design of Project or Program	Low
5. Institutional Capacity for Implementation and Sustainability	Moderate
6. Fiduciary	Moderate
7. Environment and Social	Low
8. Stakeholders	Low

9. Other	
10. Overall	Moderate

COMPLIANCE

Policy

Does the project depart from the CPF in content or in other significant respects?

[ ] Yes [✓] No

Does the project require any waivers of Bank policies?

[ ] Yes [✓] No

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment OP/BP 4.01	✓	
Natural Habitats OP/BP 4.04		✓
Forests OP/BP 4.36		✓
Pest Management OP 4.09		✓
Physical Cultural Resources OP/BP 4.11	✓	
Indigenous Peoples OP/BP 4.10	✓	
Involuntary Resettlement OP/BP 4.12		✓
Safety of Dams OP/BP 4.37		✓
Projects on International Waterways OP/BP 7.50		✓
Projects in Disputed Areas OP/BP 7.60		✓

Legal Covenants

Sections and Description

The Borrower shall make the proceeds of the Loan available to Madhya Pradesh and Madhya Pradesh shall make available to MPRRDA as a grant and in a timely manner, the proceeds of the Loan made available to Madhya Pradesh by the Borrower, as well as such additional assistance as may be required by MPRRDA for carrying out the Project. (LA, Schedule 2 Section I.A, PA Schedule, Section I.A).

Sections and Description

MPRRDA shall maintain a team of staff and consultants in numbers and with terms of reference, qualifications and

experience adequate to provide high quality technical, social and environmental advice and implementation arrangement support to MPRRDA and the Project Implementation Units, as well as establish, no later than three (3) months after the Effective Date, a dedicated financial management unit under its General Manager (Finance) (PA Schedule, Section I.B.1).

Sections and Description

MPRRDA shall ensure that in each of the Districts where the Project will be implemented, (a) a District Level Coordinating Committee comprising the Department heads of all stakeholders under the chairmanship of the District Collector: (i) is maintained to coordinate with individual departments and monitor the overall implementation arrangements of the Project; and (ii) has the staff and resources required to efficiently provide Project implementation oversight in each of the relevant Project Districts; and (b) (i) a Project Implementation Unit headed by a General Manager is established prior to starting Project activities in such District, and thereafter maintained in each Project District, with the officials, staff, and resources required for the efficient day to day implementation of the Project activities at the District level, including: the preparation of the annual work plans and budgets, procurement plans and reports; the disbursement of funds and review of fund execution and accountability; and the supervision of Project staff and quality control; and (ii) the vacancies of the financial management staff in the Project Implementation Units shall be filled with staff having terms of reference, qualifications and experience satisfactory to the Bank no later than three (3) months after the Effective Date. (PA Schedule, Section I.B)

Sections and Description

Each of the Project Implementing Entities shall ensure that: (i) all terms of reference for any technical assistance or studies carried out under the Project are consistent with, and pay due attention to, the Bank Policies, as well as the Borrower and Madhya Pradesh's own laws relating to the environment and social aspects relevant to the Project; (ii) the Project shall be implemented in accordance with the guidelines, procedures, timetables and other specifications set forth in the Safeguard Documents; and (iii) no activity which would have triggered Bank Policy OP/BP 4.12 (Involuntary Resettlement) will be carried out under the Project. MPRRDA shall: (i) regularly collect, compile and submit to the Bank, on a semi-annual basis and promptly in a separate report whenever the circumstances warrant, reports on the status of compliance with the Safeguard Documents, giving details of: (a) measures taken in furtherance of the Safeguard Documents; (b) conditions, if any, which interfere or threaten to interfere with the smooth implementation of the Safeguard Documents; and (c) remedial measures taken or required to be taken to address such conditions; (ii)maintain and operate throughout the period of Project implementation, a grievance redress mechanism for the handling of any stakeholder complaints arising out of the implementation of the Project activities; on the basis of operation and procedures guidelines agreed between the Project Implementing Entities and the Bank (LA, Schedule 2 Section I.B, PA Schedule, Section I.C).

Sections and Description

MPRRDA shall, no later than three (3) months after the Effective Date, adopt the Project Operations Manual and ensure that it shall be at all time during Project implementation in form and substance acceptable to the Bank and

ensure that the Project is carried out in accordance with the Project Operations Manual. (PA Schedule, Section I.D).

Sections and Description

Each year, MPRRDA shall prepare and furnish to the Bank, not later than later than one (1) month after the Effective Date and then February 15th each year, a draft annual work plan and budget (with a financial plan specifying all sources of financing including the Loan, the Co-financing and any other resources provided by the Borrower or the Project Implementing Entities, if any, and cash flow and disbursement projections) for the Project (an "Annual Work Plan and Budget") for each year of Project implementation, of such scope and detail as the Bank shall have reasonably requested; and (ii) ensure that the Project is carried out in accordance with the Annual Work Plans and Budgets approved by the Bank (PA Schedule, Section I.E).

Sections and Description

Midterm review and corresponding reporting: not later than twenty-four (24) months after the Effective Date, or such other period as may be agreed with the Bank, (PA Schedule, Section II.2).

Conditions

PROJECT TEAM

Bank Staff

Name	Role	Specialization	Unit
Mesfin Wodajo Jijo	Team Leader(ADM Responsible)	Sr. Transport Specialist	GTD06
Rakhi Basu	Team Leader	Institutional Development	GTD06
Jurminla Jurminla	Procurement Specialist(ADM Responsible)	Procurement	GGOPZ
Anantha Krishna Karur	Financial Management Specialist	Finance	GGOIS
Genevieve Maria Dutta	Team Member	Program Support	SACIN
Gopalaswamy Srihari	Social Safeguards Specialist	Social Development	GSU06
Helene Bertaud	Counsel	Legal	LEGES
Hiska Noemi Reyes	Social Safeguards Specialist	Gender	GSU06
Maged Mahmoud Hamed	Safeguards Advisor		OPSES

Neha Pravash Kumar Mishra	Environmental Safeguards Specialist	Environment Safeguards	GEN06
Raman V. Krishnan	Team Member	ICT	GTD09
Reenu Aneja	Team Member	Transport & Operations	GTD06
Tema Alawari Kio-Michael	Team Member	Program Support	GTD06
Victor Manuel Ordonez Conde	Team Member	Finance	WFACS

Extended Team

Name	Title	Organization	Location
Carylann Lobo	Consultant - Transport Specialist		New Delhi,India
KirtiBhushan Bansal	Consultant		New Delhi,South Asia
Sony Thomas	Consultant - Road Safety Communications		Trivandrum,India
Vinod Kumar Gautam	Consultant		

*In this Data Sheet, the amounts indicated for Cost of Part A - Road Upgrading, Construction and Maintenance of the Project, Total Cost of the Project, Borrower's Counterpart Funds and total Financing do not include the cost of Maintenance of the assets upgraded or constructed under Part A of the Project, which is part of the Project, but whose amount will be determined on an annual basis in accordance with the provisions of the Madhya Pradesh Order No. 2093 dated February 4, 2015.

INDIA
MADHYA PRADESH RURAL CONNECTIVITY PROJECT

TABLE OF CONTENTS

I. STRATEGIC CONTEXT

A. Country Context

1. **Madhya Pradesh (MP) is one of the 10 states in India that suffer from poor physical access due to lack of all-weather roads.** As per the 2011 Census of India, total population of MP is 72 million, of which nearly 72.4 percent of the total population, reside in rural areas with an overall rural accessibility of 38 percent.[1] This constrains economic activities in rural areas, with about 36 percent of the rural population living below poverty line, significantly exceeding the urban poverty ratio of 21 percent.[2] A large proportion of rural population is, thus characterized by marginal and underproductive land holdings, periodic droughts, insecure land tenure and a higher dependency on seasonal agricultural and forest labor.

2. **The state records a low human development index score of 0.375 in 2011, well below the national average of 0.55.**[3] National Family Health Survey 3, conducted in 2005–2006 revealed that the state has the lowest nutrition and health indicators in the country.[4] Infant mortality rate was 54 in 2013, maternal mortality ratio was 221 in 2011-2013 against national record of 167, and primary education enrollment was 136.6 in 2011 against national record of 118.6.[5] Evidence suggests that the states like Kerala, Tamil Nadu, Goa, Punjab and Himachal Pradesh that have invested heavily in the provision of better rural connectivity are better placed in terms of human development, endorsing rural connectivity, as an enabler of human development index.

3. **MP lags behind most other states in terms of provision of essential infrastructures**. The infrastructure index of the state is among the poorest[6] in the country, well below that of even other less developed major states like Bihar, Odisha and compares only with north-eastern states. The two critical infrastructure sectors where the state falls behind are roads and power. With regard to rural roads, while the Government of Madhya Pradesh (GoMP) has enhanced funding envelope for road development and maintenance and developed business process in Madhya Pradesh Road Development Company (MPRDC) among others, it still faces critical challenges such as (a) local variation in implementation capabilities, creating a major dent in sustaining the road quality; (b) current low private sector participation, leading to gap in meeting the financing requirements, and improving the quality of services, sector governance and institutional coordination; and (c) steep rise in prices of steel and cement, adversely affecting implementation of projects.[7]

4. **Uncertain climatic conditions and developmental challenges, together with reduced adaptive capacities are making MP highly vulnerable to impacts of climate change.** As indicated in the Madhya Pradesh State Action Plan on Climate Change, some of the projected climate risks are the increase in maximum and minimum temperature, changes in spatial and temporal distribution of monsoon, increase in frequency and intensity of rainfall, loss of rainy days and extended summers.

[1] Situation Analysis of Rural Road Maintenance in Madhya Pradesh International Labor Organization.
[2] Poverty Assessment of Madhya Pradesh, 2017, World Bank analysis based on National Sample Survey rounds (NSS) of 2011-12
[3] UNDP http://www.undp.org//content/india/en/home/operations/about_undp/undp-in-mp/
[4] MP State MDG Report 2014-2015.
[5] MP State MDG Report 2014-2015.
[6] Ranked 19th out of 28 states in 2010.
[7] https://think-asia.org/bitstream/handle/11540/205/madhya-pradesh-infrastructure-challenge.pdf?sequence=1

Studies[8] indicate that impacts of climate change in the districts located in the east and north of MP, are higher due to its low adaptive capacity, arising from low economic competence and literacy rate, limited access to infrastructure, and high exposure to climatic events. While the above also holds good for scheduled tribes[9] (21.6 percent of the State's population), their situation is worsened, given their over dependency on agriculture, forests and fisheries, the three main constituencies, akin to nature. The geographical isolation further deepens their vulnerability to health hazards due to minimal physical connectivity.[10]

B. Sectoral and Institutional Context

5. **There is a substantial deficit in the transport infrastructure:** The compounded rate of road network growth of MP during 2003-08 was 0.11 percent against national annual growth rate of 4.06 percent. The total length of MP's classified road network is approximately 151,006 km comprising National Highways 5184[11] km, State Highways 10,934 km, major district roads (MDRs) 19,429 km, Rural Roads 115,372 km. The current road density of the state is 22.14 km/100, km^2 which is far less than the national average, 37 km/100 km^2. While the state contributes 10 percent of India's land, only 18 of the 200 Indian national highways (5 percent by length) constituting NH network, pass through MP. Because of the central location and being surrounded by five states, traffic from all the neighboring states passes through MP's road network. In a landlocked state like MP, roads play a critical role in economic growth and development. MP, with abundant mineral resources, growth potential in agricultural and industrial production, needs a well-developed road network. The rate of road network growth did not keep pace with the economic growth in general and the traffic[12] in particular.

6. **Gaps in all-weather rural connectivity.** 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 paved, of which, about 73,000 km is done under Pradhan Mantri Gram Sadak Yojana (PMGSY) implemented by Madhya Pradesh Rural Road Development Authority (MPRRDA), and the remaining by Public Works Department (PWD). MPRRDA is further developing about 15,584 km gravel surfaced rural roads under the Chief Minister Gram Sadak Yojana (CMGSY). An estimated 30,000 km earthen tracks that are not accessible all year round are reported to exist. The table below shows connectivity status:

Table 1. Connectivity Status

Connectivity Status		Road Length (km)
Villages Connected by all-weather roads	45,481	
• PWD - NH/SH/MDR/VR (BT)	19,327	61,616
• PMGSY - VR (BT)	19,346	73,306
• CMGSY - VR (Gravel)	6,808	15,584
• Mandi		500
Unconnected Villages	6,636	—

[8] Vulnerability and Risk Assessment Study on Madhya Pradesh conducted by the Ministry of Environment and Forest and the Deutsche Gesellschaft fur Internationale Zusammenarbeit (GIZ)

[9] "Scheduled Tribes" means such tribes or tribal communities or parts of or groups within such tribes or tribal communities as are deemed under article 342 to be Scheduled Tribes for the purposes of this Constitution; THE CONSTITUTION OF INDIA

[10] Madhya Pradesh State Action Plan on Climate Change 2014

[11] MORTH, Basic Road Statistics of India 2013-14 and 2014-15

[12] Estimated at 10.9 percent

Total no. villages	**52,117**	Total network **151,006**

Note: *SH = State Highways, MDR=Major District Road; VR=Village Roads; BT= Bituminous/Bitumen

7. **The preceding table shows the total rural network in MP, Of the 52,117 villages in MP, the network provides access to 45,481 villages that is, 87 percent coverage.** MP has been one of the main beneficiary of the national rural connectivity program – PMGSY. The program was designed to provide a single lane all-weather BT-surfaced road link to villages with population of more than 500 people in normal areas and more than 250 in tribal and desert areas. Although PMGSY connected about 20,000 villages in MP, over 10,000 of smaller villages with population less than 500 would be ineligible for PMGSY and remain isolated. To fill this gap, MP launched the Chief Minister's Rural Roads Program also known as CMGSY in 2010, to connect smaller villages with a population 100-499 by a single lane, well-engineered gravel surfaced road link. Under this program, 9109 villages were identified, over 6000 of them have already been connected and the works to connect the remaining villages is underway. Since rural roads are the last mile connectivity in the network, year-round accessibility is particularly critical to marginal communities. In the context of MP, this becomes particularly important, since MP has the highest percent of (more than 30 percent) schedule caste and schedule tribe populations in the country, residing in remote rural communities where access is via gravel road developed under the CMGSY project. Equitable provision of rural access is critical for sustainable growth and social cohesion. The gravel roads are prone to washout during rainy season and is a huge source of dust pollution which is destroying crop yields in these communities.

MP's Rural Connectivity Program to Address the Gap

8. **Enhancing sustainable connectivity.** The substantial length of unpaved, particularly gravel, roads in the state is becoming increasingly difficult to sustain due to following reasons. They: (1) impose a logistical, technical and financial burden on MP road agencies that are constrained from physical, human, financial and natural resources; and (2) require the continuous use of a non-renewable resource (gravel), which in turn cause serious environmental problems. Despite all the precautions in the design of the gravel surfaced roads, with the growth of traffic, the roadside residents and road users face an increased amount of dust pollution creating health and road safety hazards. The surface quality deteriorates rapidly causing a rapid decline in user's satisfaction and increase in cost and maintenance frequency. Sustaining the initial gains proved to be difficult with the increase in traffic especially farm tractors and trucks. With the deterioration of riding surface, the freight and passenger services which started to increase in the initial years, cut down their frequency and some withdrew as the riding surface got worse.

9. On the other hand, as observed in villages connected by sealed roads, sustained good road surface improves the rural economy by reducing transport costs, lowers the middle men margins, minimizes post-harvest losses by ensuring transport services in all seasons. In addition, sealed roads increase economic and social benefits (more reliable access to jobs, schools, clinics, and so on); reduce adverse environmental impacts and health and safety problems.

10. **Resilience to climate change.** MP is more of a dry state with a mean annual rainfall of 1160 mm. Mean monsoon season precipitation declined significantly in the state during the period 1951-2013, concentrated in the eastern parts of the state. Studies indicate that precipitation will increase by 1.25 times the current observed rainfall in most parts of the state in the next 30-50 years.

11. Gravel surfaced roads are more prone to washouts than paved roads during flood seasons resulting in disproportionately high cost of rehabilitation to bring them back to service. Surface sealing, embankment pitching, balancing culverts are a few resilience measures against the risk of

damages caused by extreme flood events. Historically, the likelihood of occurrence of severe floods that damage road infrastructures in the state has been very low and the risks to investment therefore remained low. The future expectation of an increase in monsoon rainfall by 25 percent in the next 30-50 years, calls for a more resilient design of embankments, pavements and drainage structures with longer design lives. Given the relatively shorter design life of the low volume roads (10-15 years maximum) built under the project, the likelihood of extreme climate event during this period, and the resulting impact on the infrastructure is low. Thus, the risk on the project investment due to extreme precipitation is low.

12. **Temperature.** MP has the mean maximum temperature of 38 degree Celsius. The average surface daily maximum temperature, in the period 2030s is projected to rise by 1.8-2.0^{o}C throughout MP and the daily minimum temperature is projected to rise between 2.0^{o}C to 2.4^{o}C during the same period, which is considered significant. However, MP has taken an advance action to mitigate this risk on the performance of the asphalt surfacing. The state adopted an asphalt binder standard VG-30 that withstands ambient temperature up to 48 degrees Celsius which is much lower than the maximum temperature rise by 2030.

13. **Climate change mitigation.** The transport sector is one of the most significant emitters of greenhouse gases. Thus, cutting down CO_2 emissions in the development and operation of transport infrastructure is crucial. The use of labor intensive technologies in the construction and maintenance of low standard infrastructure cuts down the emission in otherwise machine dominated constructions. Alternative sealing technologies including the use of BT blended with waste plastic, brings down the quantum of petroleum based asphalt binder.

14. **Inadequate maintenance systems and funding.** MP's road network is managed under three institutions: (a) MPRDC manages about 10,000 km of high volume state highways (SH) and a few MDR. MPRDC is developing a Unified Road System (URS) to better manage the network and tolling the corridors to fund maintenance; (b) The PWD manages over 60,000 km of SH and MDR, with no credible maintenance and funding system in place; and (c) MPRRDA manages about 62,000 km village roads; the balance is managed by the Rural Engineering Services.

15. New rural roads contracts have a five-year maintenance period attached to them, which provides certain level of assurance of maintenance for a while, but sustainability of maintenance funding remains a concern. As such, a good part of the SH network is in poor condition. It requires costly major interventions to bring it back to an adequate level of service. MP didn't have a good track record of road maintenance due to absence of a holistic road asset management system and a sustainable funding mechanism. Generally, the state network management system needs to be overhauled for a better service delivery. With PMGSY being implemented by MPRRDA, the state has shown a strong commitment in allocating maintenance funding for the first and second five-year maintenance cycles. The maintenance allocation has almost doubled when increased from INR38.0 million in 2013-14 to INR66.1 million in 2014-15. Approximately 63,000 km is under active maintenance with 30,000 km of PMGSY developed network under post five-year maintenance period. However, it should be noted that with the completion of CMGSY, an additional 19,000 km (total CMGSY network) of sealed roads will be added to the network which will require the necessary budget for maintenance.

16. **Road Safety management** has not been given the attention it deserves. MP is placed among the top ten worst performers in road safety with a fatality of 12.8 persons per 100,000 populations. The State recorded a total of 53,472 crashes in 2015 in which 9,314 persons were killed and 55,815 sustained severe injuries. The fatality rate is 8.7 percent higher than the previous year (8569 in 2014).

The road-wise distribution of crashes, such as: Urban Roads - 32 percent, NH – 26 percent (mostly passes through rural areas), SH – 28 percent (mostly passes through rural areas) and Rural Roads 14 percent, indicate that a great number of accidents occur in rural areas. The fatality rate of two-wheelers (including bicycles) – 38 percent and pedestrians' 20 percent indicate the vulnerability of these road user groups. Road crashes are investigated solely by the police, which may have limitations on analyzing important aspects of crashes like road engineering and vehicle characteristics. Most of the crash information is relied on the statements given by the victims or witnesses. Some of the major causes of crash such as: speeding, impaired driving or driving under the influence, visibility, vehicle defects and poor road conditions and geometry and so on, need to be investigated using scientific methods. Even with the available ad-hoc crash data collection system, a huge under-reporting is expected due to limited capacity of the traffic police to penetrate in the rural road network.

17. **Key recent road safety initiatives by the State.** The State has adopted a Road Safety Policy in 2015, with a goal to reduce the increasing number of road traffic accidents and fatalities. The Road Safety Policy focuses on nine strategic areas for improving the 4 E's of Road Safety that is: (1) Education (2) Engineering (roads) (3) Enforcement and (4) Emergency Care. In response to the direction by the Supreme Court Committee on Road Safety, the State of MP has constituted a State Level Road Safety Committee in May 2015. The Chief Minister is the Chairman of the Committee, and Ministers of Home, Transport, Urban Development & Environment, PWD, Public Health & Family Welfare, Education, Rural Development and the higher officials of concerned departments are also part of the committee.

Gender and Transport

18. Rural women and girls, in general, suffer the most from inadequate access to transport facilities and services. Under the scheme "Free Bicycle Yojana" the Ministry of Education provided 9th grade female students with 40,000 bicycles in 2009 to ease their school trips[13], but beneficiaries[14] found it difficult to use them due to the poor condition of the rural roads. Consultations with potential beneficiaries validated that lack of access to all-weather roads contributes to the wide gap in human development indicators between women and men in the rural MP[15]. Due to problems associated with poor road access, women are mainly confined to working closer to their houses, which is mainly working on their farms, compared to their male counterparts. In this regard while 30 percent of rural males work on non-farm jobs, only 20 percent of females have access to such jobs. Otherwise also, women are deprived of economic power due to lack of access to income earning jobs; only a third of (36 percent)[16] of the rural women participate in the labor force in MP, whereas their male counterparts' participation is as high as 83 percent. There may be a cultural dimension to the problem that women may not be expected to participate on all kind of licit income generating activities as men might. This project may open up new frontiers of engaging women through designing a pilot road maintenance work and demonstrate their potential for more gainful jobs and contribute to the fight against income inequality and absolute poverty. This initiative is in line with the World Bank's Transport and ICT business plan articulated in its companion note[17].

19. Additional vulnerability related to unlit roads, over-congested public vehicles and undefined bus stops, pedestrian crossings and sidewalks, reinforces the already existing barriers to rural women's mobility. About 35 percent of rural women in MP experience spousal gender based violence,

[13] Women's Status in MP and Planned Interventions – A Gender Review 2010 (State Planning Commission)
[14] Beneficiary Consultations under VF
[15] MP State MDG Report 2014-2015
[16] World Bank, Madhya Pradesh, Gender May 2016
[17] Transport & ICT GP's Business Plan for FY17-20 to support the implementation of the WBG Gender Strategy

and about 13 percent of the GBV cases are related to kidnapping and abduction, which could possibly be related to unsafe travel, but no specific study is yet available to corroborate it. Further, geographical isolation of scheduled caste (SC) and scheduled tribe (ST) population and physical inabilities from old age, physical condition and so on, makes it even more difficult for rural women, to at least effectively use the available road resources. MPRCP will follow an engendered road map to ensure women's issues are continuously considered throughout the project's implementation, with additional focus on women belonging to SC and ST, to enable their integration into mainstream socio-economic fabric. The project has developed and disclosed VF to ensure inclusion and compliance with OP 4.10.

Institutions

20. (a) Infrastructure Provision: The responsibility for construction and maintenance of roads in MP rests with the PWD, MPRRDA and MPRDC. PWD oversees SH and MDRs while MPRRDA is in charge of rural roads and is implementing PMGSY (73,000 km) funded by the Government of India (GoI) and Asian Development Bank (ADB). MPRRDA also implements rural roads through Rural Engineering Services (RES) unit. RES carries out civil works, including rural roads, specifically on behalf of Panchayat[18] Raj Institutions. MPRRDA was created recently for the specific purpose of implementing PMGSY projects. A special purpose vehicle company, MPRDC was incorporated in 2004 and was notified as a State Highway Authority. MPRDC has been assigned the role of developing SH on Build-Operate-Transfer basis, with the assistance of ADB and State Budget funds. *(b*) Transport Services and Road Safety: The transport operations in MP is regulated by the transport commission. Public transport is entirely privatized and regulated by the Transport Department. Road safety activities in the state is coordinated by the Home Department and implemented mainly by agencies such as traffic police, transport, PWD, MPRRDA. Currently, there is very little interagency coordination for implementation of transport planning, policy and road sector investment in the state and road safety management.

C. Higher Level Objectives to which the Project Contributes

21. The project will contribute to India's vision for development outlined in the country's Twelfth Five Year Plan (2012-17) and Vision 2018 of the Government of MP, through improving last mile rural connectivity in MP with the largest marginalized groups that suffer from historical exclusion. The project is well aligned with the Integration pillar of WBG's India Country Program Strategy (CPS) FY2013-2017, which among other things, focuses on improved transport connectivity. The overarching objective of the Bank's CPS is to support poverty reduction and shared prosperity in India, by focusing on three main engagement areas: integration, transformation, and inclusion. By integrating the geographically isolated and economically backward rural population of MP with the rest of the state/country and markets through improved and stable rural connectivity, the project will extend economic development to the state. Improved rural connectivity aims to facilitate access to services for the poor and excluded groups in one of the low-income states in India. In line with the "Finance Plus" approach, this operation will leverage resources to support innovation to curb road crash fatalities, reducing carbon footprint in the transport sector by mainstreaming climate resilient technology in road design and construction.

[18] the basic unit of administration in a system of governance

II. PROJECT DEVELOPMENT OBJECTIVES

A. PDO

22. To improve durability and enhance resilience to climate changes 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.

B. Project Beneficiaries

23. The primary beneficiaries are the estimated 1.5 million rural people inhabited in the 5,640 villages connected by the project roads. These include geographically or culturally isolated communities as SC, ST, below poverty line (BPL) youth, and vulnerable sections of the society- women, elderly and people with disabilities, to ensure equity in benefit distribution. Secondary beneficiaries are all road users who travel to and from the villages connected, police, staff of MPRDA, and service providers such as education institutions, hospitals, traders and so on.

C. PDO-Level Results Indicators

(a) Annual maintenance cost per km

(b) Roughness index

(c) Rural road asset management system developed and in use

(d) Share of the state highway network (about 11, 000 km SH and 20,000 km MDR) covered under Road Accident Data Management System

III. PROJECT DESCRIPTION

A. Project Components

Component A: Road Upgrading, Construction, and Maintenance

24. **Subcomponent A1: Surface Sealing of Gravel Roads.** Sealing the surface of eligible existing gravel surfaced roads developed under CMGSY using conventional BT and other alternative options, piloting post construction maintenance through women self-help groups (SHG) in selected districts, providing SHGs with road maintenance training and hand tools.

25. **Subcomponent A2: Provision of Alternative Connectivity.** Providing additional links to eligible villages which 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.

Component B: Institutional Development

26. **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 element 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 demand of traffic and service needs, an estimate of the maintenance needs and cost, a prioritization of the quality and performance objectives, funding scenarios for the regular and timely maintenance and upgrade of the road asset, the definition of a strategy for the maintenance of rural roads and its implementation.

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

Component C: Road Safety Management Capacity Development

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

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

Component D: Design, Implementation and Management Support

30. Providing overall support to MPRRDA with respect to Project management, construction supervision and quality control and technical and financing audits, including by preparing cost-effective, climate resilient engineering designs and related surveys and investigations; carrying out construction supervision of civil works and quality control; implementing independent monitoring of quality of design and works and contract compliance; and carrying out independent monitoring and assessments of safeguards, user satisfaction survey, compliance and the achievement of the Project outcomes.

31. Detailed description of the components is given in Annex 2.

B. Project Cost and Financing

32. The total project cost US$502 million financed from three sources: IBRD $210 million, Asian Infrastructure Investment Bank (AIIB) US$140 million and GoMP US$152 million plus the maintenance cost of the assets constructed/ upgraded under Part A of the project. AIIB to co-finance up to 40 percent of the total loan amount.

Project Components	Project cost ($m)	IBRD Financing ($m)	AIIB ($m)	Counterpart Funding ($m)
A. Road Upgrading, Construction and Maintenance	485.00	203.00	135.00	147.00
A.1 Surface Sealing of Gravel Roads	440.00	184.00	123.00	133.00
A.2 Provision of Alternate Connectivity	45.00	19.00	12.00	14.00
B. Institutional Development	3.00	1.10	0.90	1.00
B.1 Rural Roads Asset Management System	2.00	0.71	0.62	0.67
B.2 Strengthening Design, Research and Quality Assurance Capacity	1.00	0.39	0.28	0.33
C. Road Safety Management Capacity Development	10.00	4.10	2.90	3.00
C.1 Development of Road Accident Database Management System	3.00	1.50	1.00	0.50
C.2 Pilot Comprehensive Road Safety Program	7.00	2.60	1.90	2.50
D. Design, Implementation and Management Support	3.12	1.27	0.85	1.00
Front End Fees – 0.25%	0.88	0.53	0.35	
Total Costs	**502.00**	**210.00**	**140.00**	**152.00**

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

34. **Retroactive financing.** GoMP is requesting authorization to use the proceeds of the Loan to finance eligible expenditures of up to US$ 42 million incurred since May 15, 2017.

C. Lessons Learned and Reflected in the Project Design

35. Keep the project design simple: similar projects with designs packed with complicated institutional development (ID) activities that did not consider the weak capacity of implementing agencies encountered implementation difficulties. ID activities tend to require longer time and need not to be planned to be completed within the project life.

36. Adopt simplified project management tools: The Bank transport practice has successfully implemented Performance Assessment Tool (PAT) for monitoring of highway projects by the Bank teams in Europe and Central Asia Region. This tool has been recently customized for use on rural roads and in this case led by the Client. The customized tool will be used for monitoring the performance of civil works in this project.

37. Road users' friendly design: rural roads are used more often by pedestrians than cars. But the road designs do not take these users into account, as evidenced by the dangerous mix of motor and pedestrian traffic sharing the same road carriageway. Road designs need to consider among other

things the needs of the vulnerable section of the beneficiaries, specifically addressing travel patterns of women and girls.

38. Leverage the project to address sector wide issues not limited to the lowest class network: Although the project investment is focused on rural network assets, it will go beyond to address road safety issues and challenges that impact the entire roads network in MP. The road crash database management system is a good case in point.

IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

39. MPRRDA will have the primary responsibility for project implementation and ensuring that the project development objectives are met. It will be directly responsible for the implementation of the Civil Works Component (Component A), the Institutional Development Component (Component B) and Component D – Design and Project Management Support. MPRRDA together with Home Department will jointly implement Component C. In the Home Department, the ADGP-PTRI (State Road Safety Nodal Officer) will oversee the implementation of the program. In addition, a district level coordinating committee comprising the department heads of all stakeholders under the chairmanship of the District Collector will coordinate with individual departments and monitor the overall implementation arrangements for Component C. However, all procurement, financial management (FM) and safeguard activities will be done by MPRRDA. The Chief Executive Officer (CEO) at MPRRDA will oversee the overall project implementation under the overall guidance of Panchayat and Rural Development Department, GOMP. The day to day implementation will be done by the Project Implementation Units (PIUs) at the districts. The PIUs will be further supported by a Project Management Consultancy (PMC) for the entire duration of the project. The PMC will provide high quality technical, social and environmental advice and implementation support to MPRRDA.

40. The CEO is supported by experienced personnel at state headquarters (HQ) which includes one engineer-in-chief and ten Chief General Managers (CGM) in the rank of Chief Engineer. Of the ten CGM, eight are in the field and two are based in HQ. The CGMs are in-charge of regional divisions which comprise of 5-7 districts each. At present, there are 81 PIUs under MPRRDA, however, the number can be increased based on the workload and the formation of 105 PIUs has been approved.

41. Each district has one or more PIUs headed by General Manager with overall responsibility of project implementation. The General Manager is supported by assistant managers, safeguard cell and accounts officer. The Assistant Manager is further supported by sub-engineers. The PMU which is established within MPRRDA for the overall project management including among other things, Procurement and Financial Management, will prepare annual work programs, budgets, procurement plans, disburse funds, review fund execution and accountability, supervise project staff, prepare reports and other documents and provide quality control. They are fully accountable and responsible to MPRRDA for fund flows, accounting and financial reporting.

42. The field offices will maintain accounting records for completed works. Supervision consultants will be engaged as independent engineers to monitor the quality and progress of works and they will certify the bills for payment. The General Manager of a PIU is authorized to make payments to the contractors. At present, all the payments are being made by e-payment.

43. **MPRRDA follows an e-tendering process.** A single stage two-envelope system is followed. The notice for invitation to tender, bidding documents, pre-bid queries, qualification evaluation report are processed online using the state e-procurement portal. The PIU at the field level are responsible for receiving bids and undertaking technical evaluation. The financial evaluation and contract award are processed at HQ.

44. The PMC/ SQC will assist PIUs to prepare engineering designs, undertake independent audits and implement various institutional development initiatives. MPRRDA will have a Safeguards Cell that would guide and coordinate with PIUs to oversee implementation of SMF and VF. During construction, the PIUs will monitor the work of supervision consultants who will supervise the project on the ground.

45. MPRRDA has a good track record in successfully implementing a total of 63,561 km of rural roads. A total of 63,000 km of rural road is under maintenance of which 30,000 km is under post five-year maintenance. The entire maintenance cost is covered by the state collected through various cess. The total maintenance budget for 2015-16 was INR 5310 million- a significant increase from a budget of INR 4350 million in 2014-15.

B. Results Monitoring and Evaluation

46. The Results Monitoring Framework in Section VII will be used to monitor and evaluate the achievement of the PDO and the outcome indicators. The framework broadly indicates the performance indicators, available baselines and target values at the end of the project.

47. The overall responsibility for monitoring project results would be with the MPRRDA which would receive regular monthly progress reports from the PIUs. Data on the PDO indicators will be collected from MPRRDA. Output data would generally be obtained by MPRRDA assisted by PMC from the various project units including district offices, HQ and some road crash data from the police department.

48. MPRDA would prepare a quarterly progress report regularly and share with the Bank. It forms one of the main means of monitoring project implementation. The report will be prepared in a format agreed with the Bank and would highlight status of achieving agreed targets for various monitoring indicators, detail the implementation progress on all aspects of the project- physical and financial progress, environmental and social management plans, progress on the various project components and activities. Separate interim Financial Reports, and internal and external audit reports shall also be used to monitor the project as detailed in the FM section. MPRDA would also adapt the state quality monitoring system in use in PMGSY for this project to ascertain quality of the civil works through independent experts.

49. **PAT.** The Bank transport practice has successfully implemented PAT for monitoring of highway projects by the Bank teams in Europe and Central Asia. The tool helps the implementing agency to carry out self-assessment of project performance on several parameters on a scale 1-5 or 1-10 as found convenient, and present the findings usually on a spider chart. The visual will help project heads evaluate the project against norms as well its position as relative to previous evaluation period. This tool has been recently customized for use on rural roads led by the Client. The customized tool will be used for monitoring the performance of civil works in this project.

C. Sustainability

50. The main measure of sustainability of the project investment is whether the rural roads financed under the project remain all weather roads and with a satisfactory riding quality for the duration of their design lives of ten years - this will be dependent on their design, construction and maintenance. Furthermore, for rural accessibility to increase in the project areas overall, the ongoing maintenance scheme developed under PMGSY on the existing core rural road network needs to continue with adequate budget allocation by the GoMP.

51. To ensure sustainability of Project investments, benefits and sector improvement, some key principles have been incorporated into the Project design. First, the current practice of performance-based road maintenance approach will be continued. Second, a sound design and construction method will be applied to address the needs of all road users particularly pedestrians, as walking and non-motorized transport is the predominant mode of transport in these areas. The existing maintenance management system for rural roads will be strengthened to manage the rural road network asset more holistically. Institutional capacity to manage the project and road assets will be strengthened under this project, thereby ensuring sustainability.

52. 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. In this regard, a total of 63,000 km of roads constructed under PMGSY are under active maintenance contracts with private contractors. The state budget allocation for maintenance has seen an increase from about US$47 million in FY2011-12 to about US$100 million in FY2014-15.

D. Role of Partners

53. AIIB will co-finance up to 40 percent of the total loan amount, equivalent to US$140 million. AIIB and the World Bank will enter into a co-lender agreement to outline a number of services to be rendered by the Bank to AIIB, with respect to Project preparation and supervision.

V. KEY RISKS

A. Overall Risk Rating and Explanation of Key Risks

54. **The overall risk for the proposed Project is rated Moderate.** Two key risk areas will need to be highlighted: Institutional Capacity and Fiduciary Risks: Institutional risk is rated moderate. MPRRDA has the requisite institutional capacity and proven track record of delivering rural road works financed from multilateral agencies and its own resources. However, MPRRDA will undertake pilots on innovative design and construction technologies, implementation of new institutional development activities such as RAMS, RADMS, and maintenance contracts through women self-help groups. Agencies like MPRRDA tend to focus more on civil works and less on institutional development initiatives. These risks are mitigated through the World Bank's close support to link MPRRDA with good practice example peers in India which have implemented such initiatives.

55. **Fiduciary: Fiduciary risk is rated Moderate.** MPRRDA implemented similar projects financed by multilateral agencies and possessed a reasonable fiduciary experience. However, the agency did not have prior experience on World Bank procurement, hence there are potential risks to complying the Bank's procurement guidelines. There have been incidences of rebidding of substantial size of civil works proposed to be financed under this project, because of poor bid response and bidders' failure

to meet qualification requirements. The risk is being mitigated though workshops for potential bidders and revision of packages in line with the local markets.

VI. APPRAISAL SUMMARY

A. Economic and Financial (if applicable) Analysis

56. **Economic analysis.** Economic analysis of the proposed project was carried out in accordance with the World Bank guidelines on Economic Analysis of Investment Operations and Economic Analysis Guidance Note. MPRCP road improvement component has coverage of 4,421 roads with a total length of 10,510 km (10,000 km for upgradation and 510 km for new connectivity) and the average road length is 2.38 km. 284 daily vehicular trips were carried out on the project roads, on an average. Evaluation findings of the completed PMGSY Roads in India were used appropriately in project benefit estimates.

57. Under MPRCP, the existing gravel roads which are already giving connectivity with considerable daily traffic are proposed to improve to paved roads. Hence the consumer surplus approach was found to be appropriate for economic analysis for the project road network, among the different approaches used for economic analysis for low volume rural roads. Under this approach, only the primary traffic benefits including (a) savings in vehicle operating cost (VOC); (b) savings in travel time and (c) reduction in carbon savings were considered.

58. To understand the cost side of the analysis the characteristics of access being provided under MPRCP were assessed. On an average 1.28 habitations are linked by a 2.38 km road at a cost of US$0.11 million for new links or US$0.046 million per km for upgrading works. Routine maintenance costs have been set at US$ 1,119 per km per annum and periodic maintenance at US$14,925 per km at sixth year. The economic rate of return (EIRR) for the project under the base case as well sensitivity analysis is found to be higher than the social discount rate (SDR) or economic opportunity cost of capital (EOCC) of 6 percent and hence the investment under MPRCP found to be economically viable. Detailed economic analysis is presented in Annex 7.

Table 2. 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	20% increase in Construction Cost	18.2%	10.8%	30,852	172%
3	20% increase in O&M Cost	21.4%	11.5%	33,675	570%
4	20% decrease in project benefit	18.1%	10.5%	25,236	72%
5	Combined effect (Worst Scenario)	15.4%	9.5%	22,552	

Note: EIRR = Economic Internal Rate of Return; MIRR = Modified Internal Rate of Return in which positive cash flows are reinvested at 6 percent social discount rate; ENPV = Economic Net Present Value discounted @6 percent; SV = Switching Value

59. **Financial analysis.** Fiscal analysis indicates that counterpart fund requirement (US$147 million) for the six-year project during project implementation would be about 1.4 percent of GoMP's

fiscal allocation for Rural Development Department of GoMP[19] during the same period. To maintain the project sustainability, the government would need to allocate about INR 2,164 million per annum, on an average, for project operation and maintenance over the period 2024 to 2037, or about 1.9 percent of GoMP's annual rural development budget. GoMP has confirmed that such levels of maintenance support would be maintained through MPRRDA.

60. **Carbon/GHG analysis.** Rural road improvement from gravel to BT with related improvements will reduce the VOC and fuel consumption. Reduction in fuel consumption will lead to reduction in carbon emissions, which is a co-benefit in this project. Using the working model developed for the economic analysis, carbon emission reduction estimates have been derived using the available guideline—GHG Analysis Road Improvement, Guidance Note, World Bank Group, February 2016. Because the number of vehicles on the road due to the project would necessarily increase—but with reduced carbon emission rate due to improved road surface - the project will result in marginal increase in carbon/GHG emission. With the assumption of improved road surface under 'with project' scenario with reduced VOC, related fuel consumption savings and carbon emission rate (0.0023 ton/ liter), the additional annual average carbon emission for the project is estimated for the MPRCP covering 10,510 km at (-) 140,283 tons, equivalent to (-) US$15.64 million. However, for economic analysis, carbon emission for the normal traffic and generated traffic were treated separately.

B. Technical

61. **Selection of roads for Subcomponents A1 and A2:** Both road categories under A1 and A2 are part of the rural roads network, and meant to provide connectivity to smaller villages with population between 150 and 499 in normal areas and 100-249 in tribal areas. A1 roads are gravel surfaced and will be upgraded to sealed surface; and A2 are existing seasonal tracks to be built as new, to serve as an alternate to the existing all-weather connectivity. A1 roads are those constructed under CMGSY but phased on the basis of (a) the extent of maturity of ongoing 2 years maintenance contracts attached to the original gravel road construction and; (b) the population of the villages. A2 roads are selected on the basis of (a) economic activity, (b) traffic on the existing links and; (c) population of the villages.

62. **Engineering designs.** The road upgrading works in A1 are designed to receive a thin BT surface after providing suitable sub-base and base layers underneath. Generally, the rural roads will have single lane carriageway of 3.0 m. with shoulders of 1.0-1.5 m on either side on a formation of 5.0-6.0 meters. Typical pavement structure comprises sub-base course of 300 mm thick, base course 150 mm and a pre-mix BT concrete layer of 20 mm overlain on a prime coat or tack coat.

63. All roads and bridges (existing / new proposed) will be designed / up graded to all-weather standards prescribed by the Indian Roads Congress (IRC) for rural roads and already used in CMGSY. However, it will not be practical to comply with those uniformly due to the variability in the existing right-of-way and works already undertaken. Typical examples are built-up village areas. In such situations, the design will be suitably customized by making optimal use of the available right-of-way to serve the basic purpose of providing accessibility, carefully avoiding additional land requirements.

64. All roads will have provisions for road safety engineering measures such as improved road markings, protection structures, and road signs as prescribed by the IRC. Road safety improvements would mainly be curve flattening, junction improvement if any, widening/repair of narrow/weak bridges, physical segregation to the extent possible of the vehicle and pedestrian traffic by edge

[19] Based on the data from 'State Finances, A Study of State Budgets of 2016-17', Reserve Bank of India, May 2017.

marking, animal under-passes (viaducts), provision of truck laybys and other measures as appropriate. In addition, MPRRDA will undertake simple road safety audits during the design and construction stage as well as consultations with the local communities to identify the needs for any road safety enhancements. Due to land constraints, it may not be feasible to meet the prescribed geometric standards. In such cases, suitable information boards and other engineering measures will be used.

65. **Quality control mechanism.** The quality of the project roads will be monitored through the three-tier quality assurance system: (a) Quality Control of works through the Independent Construction Supervision Consultants; (b) PIUs directly responsible for quality control of the works, materials and workmanship and random tests of the quality of works by the CGMs of MPRRDA; (c) Independent SQMs to undertake quality monitoring and submit their report to MPRRDA. The scope of SQMs will be enhanced to include overall compliance to contract conditions, physical and financial progress, and consultations with local communities to collect their feedback about the quality of the work and any modification required in the engineering design.

66. **Pilot projects on new technologies.** Being a mineral rich state, MP has significant quantities of quarry wastes which could be effectively used in road construction for new connectivity. There is also a need to find cost-effective solutions to provide road access to sparsely populated areas in the State as conventional technologies are costly and unaffordable under such low-traffic situations. The project will pilot new technologies for cost-effective and environmentally friendly road construction such as plastic wastes blended with BT, and utilizing quarry wastes in road construction. This will include use of crushed rock or improved aggregate-based roads covered with chip sealing or thin BT surfacing. Mechanical and chemical stabilization to enhance the performance of otherwise weaker locally available materials will be explored and piloted.

C. Financial Management

67. MPRRDA, the implementing agency, is a registered society under Society Registration Act 1973. This society has been created to implement GoI sponsored PMGSY, partially funded by the World Bank and ADB. MPRRDA, headed by the CEO will have the overall accountability of the maintaining the FM systems and ensuring that these are carried out in accordance with the Project's legal agreements.

68. Funds will be allocated to MPRRDA for this project through the state finance department under a separate budget head. Separate bank accounts for the project excluding maintenance and another one for maintenance have been opened, in the HQ of MPRRDA which will receive funds through treasury. The existing Bank Authorization system will be used for PIU level payments. Existing system of payments by electronic transfer will be used for the project.

69. A simple FM Manual, as part of the project's operation manual will be prepared and submitted to the Bank for review before project negotiations. At HQ, CGM (Finance) will have overall responsibility of FM for the project and separate FM cell would be established under the supervision of CGM (Finance) within three months of effectiveness. PIUs at district level have three positions for accounts and vacancies of Accounts Officer in 8 PIUs are expected to be filled within 3 months after effectiveness of the project. The HQ finance staff will provide training to the PIUs for the project as per FM Manual at least once in a year. The Bank will also provide training to HQ/PIU staff on interim unaudited financial reports (IUFRs) and World Bank FM procedures after effectiveness of the project.

70. GeoReach (Geomatics-based Rural Road Enterprise Application to connect the habitations) is an online web-based software application being designed & developed by NIC. The new system

enables MPRRDA for making construction related payment to contractors. All these bills will be submitted and paid online by PIU through this software. At present, accounts at MPRRDA and district PIU are maintained in existing computerized Tally accounting system and separate leger account will be opened in the system to capture project related cost and expenditure. There will also be an integration between GeoReach and Accounting Module to capture construction related payment transactions and auto generation of IUFR claims. The financial information from the PIUs flow to MPRRDA monthly and regular bank reconciliation is to be carried out at MPRRDA and PIUs).

71. The external audit of the project shall be carried out by an independent firm of private chartered accountants empaneled with the C&AG and the terms of reference for the same will be agreed with the World Bank. The audit report will be submitted within 9 months from the close of each financial year.

72. Internal audit will be an integral part of the project design. MPRRDA has a system of internal audit by, an organization of retired finance officers of AG/CAG.

73. The CGM finance and support staff are familiar with Bank's FM procedure and requirements. MPRRDA through its PIUs is successfully implementing PMGSY funded by ADB and has adequate fiduciary capacity in carrying out FM functions. The existing robust FM policies, procedures and staff may be considered adequate to support the use of funds under the loan. Hence, the FM risk of the project is assessed as Moderate.

D. Procurement

74. Procurement for the Project shall be carried out in accordance with the World Bank'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 provision stipulated in the Financing Agreement.

75. MPRRDA established a Project Management Unit (PMU), and a procurement sub-unit which is responsible for all procurement activities in consultation with line departments using e-procurement portal www.mpeproc.gov.in. This e-procurement portal has been assessed and cleared by the Bank to be used for all Bank funded project in MP.

76. As a part of preparation process, procurement capacity assessment was carried out using PRAMS questionnaire and accordingly, the risk mitigation measures were proposed. MPRRDA is currently implementing PMGSY project under ADB funding. They also have procurement unit with adequate staff. The size of the procurement packages under the proposed projects are quite similar to the packages under PMGSY project and similar approach will be followed for the proposed project. Therefore, the overall risk is rated as "Moderate".

77. The proposed project shall use procurement management documentation system called Systematic Tracking of Exchanges in Procurement (STEP) in preparing their procurement plan (PP). A 2 (two) day training on STEP was organized in Mumbai and 2 participants from MPRRDA had attended the training.

78. The MPRRDA shall follow their own system for the expenses incurred on project implementation support cost that are recurrent in nature.

E. Social (including Safeguards)

79. Limited mobility from lack of all-season rural road networks, is evidenced as one of the key constraints to social empowerment particularly among the vulnerable populations and this was revalidated through a series of preparatory desk and field studies that were carried out as part of project preparation. According to the study reports, two types of vulnerability were identified in the context of distribution of project benefits and inclusion in access. They are:

a. Vulnerability in the context of rural India based on gender and birth identity (scheduled caste[20] and scheduled tribe).

b. Vulnerability related to physical condition (people with disabilities), and poverty status combined with age of the individual (BPL, elderly, and youth). Thus, six categories of vulnerable populations are identified and these are: women; scheduled caste (SC) population; scheduled tribes (ST); people with disabilities; BPL elderly (above 60 years); and BPL youth

80. The project triggers OP 4.10 on Indigenous People, as the project proposed up-gradations and connectivity links cover 21 tribal districts, among others. The project does not trigger OP 4.12 on Involuntary Resettlement, as the project does not anticipate land acquisition and if any additional land is required, it would be done only through voluntary land donation. To mitigate any negative potential impacts during pre-construction stage and/or during construction stage, such as, temporary disturbance, disruption to access, dust emission, and so on, and to also ensure continued beneficiary participation (including SC, STs, and women), the project has prepared Social Management Framework (SMF) and VF.

81. Specifically, the SMF instrument includes: (a) relevant legal and regulatory framework; (b) stakeholders' consultation framework; (c) social screening checklist to identify adverse impacts prior to DPR preparation; (d) documentation of voluntary donation; (e) provisions to mitigate losses/impacts; and (f) framework to enhance community participation and guide project preparation and implementation. This includes modules on information dissemination, implementation, monitoring arrangements, capacity building and grievance redress mechanism (Annex 4 provides details). The VF ensures that the development process generated by the project fully addresses the needs of the vulnerable population and enables measures to promote distributional equity among the project affected populations (PAPs). It therefore endorses information sharing, consultation and collaboration, warrants inclusion of these groups of population in design, implementation and monitoring, thus empowering them from beneficiary to a primary stakeholder in the processes.

82. **ESHS and Labor influx**: Past experiences from implementation PMGSY and CMGSY schemes shows that small civil works under the project are unlikely to attract contractors and migrant labor force outside the state. However, in the unlikely event there are instances of labor influx, the bid documents incorporate requirements for Environment, Social, Health and Safety (ESHS) including list of applicable labor laws and provision and the metrics for periodic reporting by contractors. Specific ESHS instruments also include ESHS performance security, ESHS strategy and implementation plan, code of conduct and declaration of past ESHS performance. These documents are to be submitted by the contractor as part of the technical bid. The reporting requirements and the built-in grievance

[20] ""Scheduled Castes" means such castes, races or tribes or parts of or groups within such castes, races or tribes as are deemed under article 341 to be Scheduled Castes for the purposes of this Constitution;" THE CONSTITUTION OF INDIA

redressal mechanism will also enable project implantation units to monitor performance of ESHS more rigorously and address issues before and after they arise.

83. **Disclosure:** The Borrower 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 at the Bank's PIC on June 28, 2017. Further an in-country disclosure workshop with representatives from relevant departments was held on November 9, 2016 in project area.

84. **Gender Issues and Actions.** In rural MP with India's largest tribal population, vulnerability is characterized by social isolation and marginalization resulting from gender bias or social identities. Consultations with potential beneficiaries validated that lack of access to all-weather roads contributes to the wide gap in human development indicators between women and men in the rural MP[21]. Due to problems associated with poor road access, women are mainly confined to working closer to their houses, which is mainly working on their farms, compared to their male counterparts. In this regard, while 30 percent of rural males work on non-farm jobs, only 20 percent of females have access to such jobs. Otherwise also, women are deprived of economic power due to lack of access to income earning jobs; only a third of (36 percent)[22] of the rural women participate in the labor force in MP, whereas their male counterparts' participation is as high as 83 percent. There may be a cultural dimension to the problem that women may not be expected to participate on all kind of licit income generating activities as men might.

85. Additional vulnerability related to unlit roads, over-congested public vehicles and undefined bus stops, pedestrian crossings and sidewalks, reinforces the already existing barriers to rural women's mobility. About 35 percent of rural women in MP experience spousal gender based violence, and about 13 percent of the GBV cases are related to kidnapping and abduction could possibly be related to unsafe travel, but no specific study has is yet available to corroborate it. Further, geographical isolation of scheduled caste (SC) and scheduled tribe (ST) population and physical inabilities from old age, physical condition and so on, makes it even more difficult for rural women, to at least effectively use the available road infrastructure.

86. MPRCP will follow an engendered road map to ensure women's issues are continuously considered throughout the project's implementation, with additional focus on women belonging to SC and ST, to enable their integration into mainstream socio-economic fabric. The project has developed and disclosed VF to ensure inclusion and compliance with OP 4.10. *Action*: The project's main intervention of improving the rural roads will contribute to alleviating some of the issues related to lack of all-weather access. Girls may start using their bikes to school, and women may consider participating in jobs away from their houses, given better transport services on better roads. A more women focused intervention will be a pilot initiative to engage women on road maintenance work and demonstrate their potential for more gainful jobs and contribute to the fight against income inequality and absolute poverty. Once successful, this initiative shifts the paradigm of a men-dominated construction/maintenance sector to engage women on road maintenance and scale it up to a wider network. *M&E:* The project has built in the M&E framework indicators to measure the share of females with access to all weather roads, and number of women self-help groups engaged in road maintenance.

[21] MP State MDG Report 2014-2015
[22] World Bank, Madhya Pradesh, Gender May 2016

F. Environment (including Safeguards)

87. **Potential environmental impacts and management.** Under the project, most of the civil works comprise of sealing of existing 10,000 km gravel roads and new construction a smaller network of (510 km) of rural roads. Sub projects under the project are likely to create some limited adverse environmental impacts in the local context while the exact, nature and magnitude of impacts will vary in accordance to the location and type of engineering intervention. Deficiencies in planning and design of sub-projects can lead to insufficient arrangements to conserve natural drainage pattern leading to impairment to or worsening of the local drainage. Adverse environmental impacts resulting from sub-project locations and/or design, borrowing of earth, erosion, siltation of water bodies, obstacle for access to crop fields/community properties, construction materials management, debris disposal, worksite safety, EHS issues at labor camps, and so on, are other environmental aspects that will require attention. Possible adverse impacts on any locally important cultural property would be examined, for appropriate mitigation during planning and implementation stages, as provided in the EMF. Most of the environmental impacts are expected to be site specific, temporary in nature and can be mitigated with good design and appropriate construction management practices. Accordingly, the Bank's OP 4.01 on Environmental Assessment and OP 4.11 on Physical Cultural Resources have been triggered, and the project is designated as Category B.

88. It has been ensured by MPRRDA that no road traversing through a designated protected area, environmental sensitive areas and natural habitats, is included in the sub projects under MPRCP. During DPR preparation, checklists based screening exercise, transect walk and public consultations have been carried out to identify key environmental issues pertaining to each sub project. Environmental Management Framework (EMF), which includes Environmental Codes of Practices (ECoPs) has been prepared. These two documents will guide and deal with environmental issues during planning, design, pre-construction construction and operation of sub projects.

89. On the positive side, the strengthening of human capital from enhanced habitation connectivity, reduction of dust levels from gravel roads, reduction in travel time and fuels consumption, increased access to employment, health, education and other social services are some of the benefits anticipated from the project.

90. **Environmental management capacity.** The existing environmental management policies and guidelines as well as current the MPRRDA's institutional capacity to implement these instruments provides a good base to implement the proposed project with additional capacity augmentation as needed. MPRRDA had been engaged in construction of large numbers of rural roads across the State under PMGSY and financed by ADB. For MPRCP, MPRRDA has created Safeguard Cell at Head Quarter and PIUs will also have designated Safeguards Officers to ensure field implementation of the provisions of the EMF and mitigation measures during construction. Project Management Consultant (PMC) has been appointed to monitor the planning, design and construction of rural road works. The PMC has deployed Environment Officer at MPRRDA Head Quarter, who is responsible to take appropriate steps to advice, interact, train, document, report for implementation of Environmental Management Framework. The assessment indicates that MPRRDA has moderate capacity for implementation of the proposed safeguard instruments for MPRCP.

91. The project proposes to introduce /mainstream environmental sustainability through appropriate strategies and mechanisms that would be integrated to institutional systems. The up-grading of gravel road to BT road and construction of new rural roads will also include introducing alternative environmentally friendly, climate resilient, and cost-effective surfacing options and roads construction technologies.

92. **Disclosure.** The two environment management tools, namely, EMF and the ECoPs have been disclosed in the Bank's website (June 28, 2017) and in the MPPRRDA's website (October 28, 2016). The executive summary of the documents has been translated in vernacular language (Hindi) and made public in the Project Authority's website (March 22, 2017). Once the project commences implementation, the project team is expected to have regular consultations with local stakeholders on issues related to environmental, health and safety aspects.

93. More details on Environmental Management are given in Annex 5.

G. Other Safeguard Policies (if applicable)

94. No other safeguard policies are triggered for the project

H. World Bank Grievance Redress

95. Communities and individuals who believe that they are adversely affected by a World Bank (WB) supported project may submit complaints to existing project-level grievance redress mechanisms or the WB's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the WB's independent Inspection Panel which determines whether harm occurred, or could occur, as a result of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS), please visit http://www.worldbank.org/en/projects-operations/products-and-services/grievance-redress-service. For information on how to submit complaints to the World Bank Inspection Panel, please visit www.inspectionpanel.org.

VII. RESULTS FRAMEWORK AND MONITORING

Results Framework
COUNTRY : India
Madhya Pradesh Rural Connectivity project

Project Development Objectives

To improve durability and enhance resilience to climate changes 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.

Project Development Objective Indicators

Indicator Name	Core	Unit of Measure	Baseline	End Target	Frequency	Data Source/Methodology	Responsibility for Data Collection
Name: Annual maintenance cost per km		Amount(USD)	1000.00	750.00	Annual	The baseline value is derived from maintenance expenditure of sample gravel roads candidate 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	MPRRDA and Supervision Consultants

Indicator Name	Core	Unit of Measure	Baseline	End Target	Frequency	Data Source/Methodology	Responsibility for Data Collection
						percent) project roads.	
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 roads candidate 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 component A.1 and A.2. respectively.							
Name: Roughness index (m/Km)		Meter(m)	7.00	3.50	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.	MPRRDA
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.							

Indicator Name	Core	Unit of Measure	Baseline	End Target	Frequency	Data Source/Methodology	Responsibility for Data Collection
Name: Rural road asset management system developed and in use		Text	No fully GIS based network inventory data, no scientific based maintenance prioritization, and 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.	MPRRDA
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.							
Name: Share of the state highway network (about 11, 000 km SH and 20,000 km MDR) covered under RADMS		Percentage	0.00	100.00	Annual	RADMS	Home Department, MPRDA
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 citizen's engagement wherever feasible.							

Intermediate Results Indicators

Indicator Name	Core	Unit of Measure	Baseline	End Target	Frequency	Data Source/Methodology	Responsibility for Data Collection
Name: Roads constructed	✓	Kilometers	0.00	10510.00			
Roads constructed - rural	✓	Kilometers	0.00	10510.00	Quarterly	Progress reports	MPRRDA
Roads upgraded to bituminous surface		Kilometers	0.00	10000.00	Quarterly	Progress report	MPRRDA
New road construction (multiple connectivity)		Kilometers	0.00	510.00	Quarterly	Progress reports	MPRRDA
Length of roads on which alternative surfacing technology piloted		Kilometers	0.00	2100.00	Annual	Progress reports	MPRRDA and supervision consultant
Description:							
Name: Rural population connected by all weather paved roads		Number	35000000.00	36500000.00	Anual	MP Department of Planning, Economics and Statistics	MPRRDA
Percentage of highschool girls shifting from walking		Percentage	10.00	80.00	Annual	Supervision consultant's report	Consulting firms and MPRRDA

Indicator Name	Core	Unit of Measure	Baseline	End Target	Frequency	Data Source/Methodology	Responsibility for Data Collection
to biking to schools							
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 season roads.							
Name: Dust concentration in the ambient air along the project roads		Microgram/ m3	0.00	0.00	Once after each of the sample roads are completed	Field measurement of PM10 on sample gravel roads under Component A1	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 a representative sample roads out of the 10,000 km gravel roads. Note: The baseline and Targets will be set before Loan Effectiveness.							
Name: Number of Women Self-Help Groups (SHGs) engaged in post construction maintenance contracts		Number	0.00	5.00	Quarterly	Progress reports	MPRRDA
No of women participated in road maintenance within self-help group		Number	0.00	50.00	Annual	Progress Reports	MPRRDA
Description: This is an initiative to empower women especially where these group are most marginalized. The activity includes a pilot operation under Component A.1 for off carriage way road maintenance through self-help women groups identified from five tribal districts, on five road links.							
Name: Rural roads asset		Text	No	Comprehen		Consultant's report,	

Indicator Name	Core	Unit of Measure	Baseline	End Target	Frequency	Data Source/Methodology	Responsibility for Data Collection
management system developed			comprehen sive network based asset manageme nt system	sive network based asset manageme nt system developed		and progress report	
Description: This indicator monitors outputs to the development and use of RAMS for the rural roads in Madhya Pradesh.							
Name: Design and Research Unit established in MPRRDA		Text	No Design and Research Unit in MPRRDA	A functional design and research unit is in place	Annual	Progress Reports	MPRRDA
Description: A small design unit will be set up under MPRRDA							
Name: Number of Gram Panchayats reporting on road traffic crashes		Number	0.00	500.00	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.							

Indicator Name	Core	Unit of Measure	Baseline	End Target	Frequency	Data Source/Methodology	Responsibility for Data Collection
Name: Number of crash locations/ blackspots/ junctions/ pedestrian facilities improved		Number	0.00	50.00	Annual	Police accident records. MPRRDA will partner with Homes Department for exchange of crash data, which will help identify the accident spots and improve them.	MPRRDA, Traffic Ploce
Description: This indicator measures the numbers of repeated traffic accident locations improved under component C.2.							
Name: Number of MPRRDA's staff trained		Number	0.00	300.00	Annual	Progress Reports	MPRRDA
Training on WB Procurement Policies, Contract Management and quality assurance		Number	0.00	100.00	Annual	Progress Reports	MPRRDA
Staff trained on Environment and social safeguards		Number	0.00	100.00	Annual	Progress Report	MPRRDA
Staff in the new design unit trained on Alternative Design and Construction		Number	0.00	25.00	Annual	Progress Reports	MPRRDA

Indicator Name	Core	Unit of Measure	Baseline	End Target	Frequency	Data Source/Methodology	Responsibility for Data Collection
Technologies							
Staff trained on Design Software		Number	0.00	25.00	Annual	Progress reports	MPRRDA
Description: This involves training of staff in different areas to build their capacity in implementing the project and beyond							
Name: Citizen satisfaction index		Number	0.00	3.50	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	1.50	3.50			
Males satisfaction index		Number	1.50	3.50			

Indicator Name	Core	Unit of Measure	Baseline	End Target	Frequency	Data Source/Methodology	Responsibility for Data Collection
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	1000.00	0.00	0.00	750.00	750.00	750.00	750.00
Roughness index (m/Km)	7.00		3.50	3.50	3.50	3.50	3.50
Rural road asset management system developed and in use	No fully GIS based network inventory data, no scientific based maintenance prioritization, and 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	0.00		10.00	50.00	80.00	100.00	100.00

Intermediate Results Indicators

Indicator Name	Baseline	YR1	YR2	YR3	YR4	YR5	End Target
Roads constructed	0.00						10510.00

Indicator Name	Baseline	YR1	YR2	YR3	YR4	YR5	End Target
Roads constructed - rural	0.00			150.00	250.00	110.00	10510.00
Roads upgraded to bituminous surface	0.00	2000.00	3500.00	4000.00	500.00		10000.00
New road construction (multiple connectivity)	0.00						510.00
Length of roads on which alternative surfacing technology piloted	0.00		500.00	1000.00	600.00		2100.00
Rural population connected by all weather paved roads	35000000.00	150000.00	600000.00	600000.00	150000.00		36500000.00
Percentage of highschool girls shifting from walking to biking to schools	10.00						80.00
Dust concentration in the ambient air along the project roads	0.00		0.00	0.00	0.00	0.00	0.00
Number of Women Self-Help Groups (SHGs) engaged in post construction maintenance contracts	0.00		2.00	5.00	5.00	5.00	5.00
No of women participated in road maintenance within self-help group	0.00		20.00	50.00	50.00	50.00	50.00
Rural roads asset management system developed	No comprehensive network based asset	Procurement of system definer (SD) consultant for	(i) SD consultant in place and define the	(i) RAMS developed and data for 10,000 km of rural		GIS based network data and information	Comprehensive network based asset management

Indicator Name	Baseline	YR1	YR2	YR3	YR4	YR5	End Target
	management system	RAMS advanced	RAMS system requirements; (ii) Procurement of System Provider (SP) consultant is advanced	roads entered and RAMS tested; (ii) Procurement of data collection consultant done, and consultant mobilized		collected for about 116,000 km rural roads	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 oprational			A functional design and research unit is in place
Number of Gram Panchayats reporting on road traffic crashes	0.00			100.00	400.00		500.00
Number of crash locations/ blackspots/ junctions/ pedestrian facilities improved	0.00			25.00	25.00		50.00
Number of MPRRDA's staff trained	0.00	110.00	125.00	40.00	15.00	10.00	300.00
Training on WB Procurement Policies, Contract Management and quality assurance	0.00	50.00	25.00	25.00			100.00
Staff trained on Environment and social	0.00	50.00	50.00				100.00

Indicator Name	Baseline	YR1	YR2	YR3	YR4	YR5	End Target
safeguards							
Staff in the new design unit trained on Alternative Design and Construction Technologies	0.00	10.00	15.00				25.00
Staff trained on Design Software	0.00		25.00				25.00
Citizen satisfaction index	0.00	1.50		3.50		3.50	3.50
Females satisfaction index	1.50						3.50
Males satisfaction index	1.50						3.50

Annex 1 Detailed Project Description

Component A: Road Upgrading/Construction and Maintenance (Total US$485 million, IBRD US$203 million; AIIB US$135 million; GoMP US$147 million)

1. This 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: provides 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.

2. **Gender equality**: with a view to promote women's benefit in the job market in the rural infrastructure development sector, women 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 prism, while the main carriageway maintenance will remain part of the original contractor's contract. 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.

Selection Criteria of Roads

A.1 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 taken up for upgrading in reducing order of population in a phased manner;

- Tribal area: Only roads constructed under CMGSY shall be eligible. In tribal areas, only roads connecting villages of population 100 – 249 population will be taken up for upgrading in reducing order of population in a phased manner;

A.2 Roads - additional links (510 km)

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

A.1: Surface Sealing of Gravel Roads, approx. 10,000 km, (Total US$440 million: IBRD financing US$184 million; AIIB financing US$123 million; GoMP US$133 million)

3. This sub component supports the upgrading of 10,000 km 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 5400 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, 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 increases job opportunity.

4. The component also includes a pilot operation of off carriage way road maintenance through self-help women groups identified from five tribal districts. The SHGs will be provided with training on road maintenance and supplied with maintenance hand tools. 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.

A.2: Provision of Alternative Connectivity - approx. 510 km, (Total US$45 million: IBRD financing US$19 million; AIIB financing 12 million; GoMP US$14 million)

5. This sub component supports the provision and long-term maintenance of additional links to about 240 villages which 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 benefiting 240 villages. The proposed alternative surfacing options will also be applied in this sub component as appropriate.

6. 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 Indian Roads Congress (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 NCB procedures; generally comprising of packages of INR 10-50 million (approx. USD150,000-750,000) in line with existing PMGSY practice.

Component B: Institutional Development (Total USD 3.0 m: IBRD Financing US$1.10 million, AIIB US$0.90 million; GoMP US$1.00 million)

7. 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 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: (1) improving asset management capacity, (2) strengthening design research and quality assurance of civil and maintenance works.

B.1: Rural Roads Asset Management System (RRAMS) (Total US$2.00 million: IBRD Financing US$0.71 million, AIIB US$0.62 million; GoMP US$0.67 million)

8. MPRRDA manages over 90,000 km of rural road asset. 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 population 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 a 3-year maintenance contracts for gravel roads and now 5-years maintenance for paved roads under MPRCP. There are also other schemes involved in rural roads which renders a fragmented network management with no integrated information on asset registry, condition, asset 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.

9. A modern asset management provides systematic process of 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[23]. Such an approach is critical especially when the 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:[24]

- Establish a complete inventory of all 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 the regular and timely maintenance and upgrade of the road asset
- Define a strategy (RRAM Plan)
- Implement the RRAM Plan

10. 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 envisage defining the system requirements (overall system architecture, data collection and analytical modules), and framing a term 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.

B.2: Strengthening Design, Research and Quality Assurance capacity: (Total US$1.0 million: IBRD Financing US$0.39 million; AIIB financing US$0.28 million; GoMP US$0.33 million)

[23] Asset Management for the Roads Sector, OECD, 2001
[24] Road Asset Management, European Union Road Federation, An ERF position paper for maintaining and improving a sustainable and efficient road network

11. MPRRDA does not have a well-equipped and resourced design, research and quality control unit. It rather outsources engineering surveys/ investigations, design, environmental and social impact assessment and the resulting EMPs to private consulting firms. Even then, the in-house capacity to review consultant's outputs is far from adequate to ensure the delivery of comprehensive DPRs that addresses site specific issues, and lacks considerations of optimizing cost and maximizing efficiency. Similarly, the agency is dependent on outsourced experts on 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 researches 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.

12. The subcomponent component 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 able to review consultant's designs; (c) review and update of the current rural roads design standards and technical specifications to MP's context and recent developments in the sector; (d) reinforce field laboratories in selected districts and train laboratory technicians and PIU staff on laboratory and field tests; (e) study tour to good examples of rural road design and research in India and abroad.

Component C: Road Safety Management Capacity Development (Total US$10 million: IBRD financing US$4.10 million; AIIB financing US$2.90 million; GoMP US$3.00 million)

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

C1: Road Accident Data Management System (RADMS) (Total US$3.00 million: IBRD financing US$1.50 million; AIIB financing US$1.00 million; GoMP US$0.50 million)

14. 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. 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 the 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 HQ, 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. Training module will follow a 'training of trainers' module which 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 US$7.00 million: IBRD financing US$2.60 million, AIIB financing US$1.90 million; GoMP US$2.50 million)

15. It is becoming glaringly clear that roads 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 all done in isolation to each other. Road safety interventions proved to be impactful when high risk road network is identified and optimal combination of multi sectoral interventions are taken based on a reliable accident data. MP recently recognized this reality and has taken steps to approach road safety multi-sectorally, but must go a long way to operationalize it. This can effectively be done by piloting multi-sectoral road safety initiatives at a smaller scale. PCRSP will be a pilot program in a district with 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. Communities participation may include: identification of accident locations, causes, other contributory factors; suggestion 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 a strong coordination of agencies responsible for road safety and by improving 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: RS Engineering (US$5.75 million):

16. **Technical Assistance (Cost: US$250,000).** 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, blackspot 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.

17. **Road Safety Engineering Interventions (Cost: US$5.50 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 consultant 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 an active participation of the local community, at existing black-spots and black-stretches of the selected district and prepare a comprehensive road safety engineering improvement plan/DPR and BOQ. Once the plan is approved by the State road safety council, the MPRRDA will take necessary steps to initiate the 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 ODRs, Construction of footpaths/pedestrian facilities at major towns/cities, Signs and markings including Gateway markings and signs, 'Urban-street design' with priority for VRUs and local communities, School-zone treatment, Speed-calming treatments, and so on.

C2.2: Enforcement (US$600,000)

18. **Technical Assistance (US$100,000).** The CPRSP Consultants will conduct specialized trainings (domestic and international) through experts to build capacity of the Police and Transport Departments to enable them to effectively carryout road safety enforcement, such as: handling road safety violations, enforcement of helmet, seatbelt, speed management, driving under influence (DUI), understanding road user behavior and correctional program, crash investigation and data management.

19. **Equipment for RS Enforcement to Police (US$500,000).** 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 & MPRCP.

C2.3: Post-crash Emergency Management (US$500,000)

20. **Technical Assistance (US$100,000).** 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 (ATLS) for doctors, Advance Trauma Care for Nurses (ATCN), International Trauma Life Support (ITLS) to Doctors, Nurses and Paramedics, Advance Life Support Training to Doctors and Nursing staffs, Basic Life Support (BLS) to Para medics and Volunteers from Police and Communities. The above training programs will be conducted onsite by a Training Organization (TO). The Post-Crash Emergency (PCE) Specialist of the CPRSP will oversee the training activities.

21. **Equipment and Trauma Care Facilities (US$400,000).** The Post-crash Emergency 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 MPRCP and Health Department.

C2.4: Road Safety Education and Awareness (US$150,000)

22. The CPRSP Consultants 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 roped in to implement 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 Police Department.

Component D Design, Implementation and Management Support: (Total US$3.12 million: IBRD financing US$1.27 million; AIIB financing US$0.85 million; GoMP US$1.00 million):

23. This component supports MPRRDA in the overall project management, construction supervision, and quality control, 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; (f) carrying out independent monitoring/assessments of safeguards, user satisfaction survey, compliance and the achievement of Project outcomes.

Annex 2 Climate Change Risks and Vulnerability in MP

1. The State of MP is one of the most vulnerable in India, as indicated by Madhya Pradesh State Action Plan on Climate Change, developed by the Housing and Environment Department, GoMP in collaboration with UNDP in 2012. Reasons for high vulnerability include low adaptive capacity to the impacts of climate change due to low economic capacity and literacy rate and low access to infrastructure.

2. The Vulnerability and Risk Assessment Study on MP conducted by Ministry of Environment and Forest, GoI, and the Deutsche Gesellschaft fur Internationale Zusammenarbeit (GIZ) provided an assessment of the preparedness of the various districts of MP to cope with the impacts of climate change. The findings show that the north, east, south east and south western districts are more vulnerable to climate change due to exposure to drought and climate extremes, as well as due to low levels of technology and socio-economic and infrastructure development.

3. India's National Disaster Risk Reduction Portal reports that MP in the year 2005 had 10 districts and in year 2006 had 27 districts affected by flooding. In the last 26 years, there were 32 districts of the State affected by flooding.

4. The climate risk screening analysis conducted by the World Bank project team, in collaboration with country government counterpart, indicates that the project location is slightly exposed to extreme temperature, precipitation and flooding. However, the risks to future service delivery was graded moderately for extreme precipitation and flooding indicating a moderate level of potential impact when these events occur.

5. The projected increase in average surface daily maximum temperatures is 1.8-2 degrees and the daily maximum temperature is projected to rise between 2 degrees and 2.4 degrees, for the 2030s in relation to the 1970s. Note that by 2080, the maximum temperature is projected to rise between 3.4-4.4 degrees centigrade with expectations of warmer temperatures in northern region.

6. In the Monsoon period, precipitation is expected to increase by 1.25 times in most parts of MP from 1970s to 2030s. Though in pre-monsoon period the rainfall will increase only in the Southern part and decrease in all other parts of MP. In post-monsoon period, the Western end is likely to face decrease in rainfall with no change or little increase in rainfall in most other parts of the state.

7. In 2100 there is an overall increase in rainfall in southern districts. The increase in rainfall during the post and pre-monsoon periods are projected to be more than the increase in rainfall projected for the monsoon period.

Impacts of Climate Change on Road Infrastructure

8. Rainfall and flooding washes away gravel roads and impairs accessibility of earthen tracks. 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. MPRRDA is developing about 15,584 km gravel surfaced under CMGSY. An estimated 30,000 km earthen tracks that are not accessible all year-round are reported to exist.

9. Gravel surfaced roads are prone to washouts during flood seasons resulting in 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. Equitable provision of rural access is critical for sustainable growth, social cohesion and resilience to climate change impacts like flooding. Despite the impressive strides made in rural connectivity, there is still a long way to go in ensuring a sustainable access to essential social and economic services to all the rural poor. MP has 52,117 villages out of which 6,636 are unconnected.

Enhancing Resilience of Road Infrastructure

11. The project foresees the deployment of resilience measures against damages caused by extreme flood events such as surface sealing, embankment pitching, balancing culverts.

12. Project Component A foresees the surface sealing of 10,000 km of gravel roads. On completion, a total of 5,400 villages will benefit from all weather, resilient sealed road connectivity, enhancing the resilience of road infrastructure and consequently the resilience of communities served by the improved road connectivity.

13. In addition, Project Component A foresees the provision of alternate connectivity through additional links to villages that are connected by a single road link. A total of 510 km of such links will be constructed benefiting 240 villages. The proposed innovations in the surface sealing operations will also be applied in this sub component as appropriate.

Project Climate Co-Benefits

14. Project Components 1 (A1 and A2) will have climate co-benefits. The scope of Component A1 involves sealing of the existing gravel surface which otherwise would be washed away during rains and floods, costing the road agencies huge resources to bring it back to service, while sealing would prevent washouts; and the whole investment in A1 could be considered as a climate co-benefit. Similarly, the sealing part of the investment in component A2 could be considered as a climate co-benefit.

Annex 3 Fiduciary

Procurement

1. Procurement of goods, works and services under the proposed project will be carried out in accordance with the World Bank'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 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 provision stipulated in the Financing Agreement.

2. MPRRDA head quartered in Bhopal has been identified as an Implementing Agency (IA) for this project. The Project Management Unit (PMU) is housed in MPRRDA all procurement activities will be conducted through the procurement unit under PMU, in consultation with PIUs using e-procurement portal *www.mpeproc.gov.in*. This e-procurement portal has been assessed and cleared by the Bank to be used for all Bank funded project in MP.

3. Procurement of goods works and non-consulting services shall be conducted using the Bank's Standard Bidding Documents (SBD). Procurement of Consulting Services may be switch over to e-procurement platform when the model RFP for e-procurement becomes ready. General Procurement Notice (GPN) for this project was published on May 2, 2016 in UNDB and Specific Procurement Notice (SPN) shall be published against corresponding contract packages when it becomes ready.

Methods of Procurement

Selection of Consultants

4. For the selection of Consultants, Quality and Cost Based Selection (QCBS) method is a preferred selection method. Single-Source Selection (SSS) method of consulting firms and individuals may be used only if it presents a clear advantage over competition for the required consulting services in accordance to paragraph 3.8.

5. Selection of Consulting Firms through Consultants' Qualification (CQS) may be appropriate for assignments estimated to cost up to US$300,000 or equivalent in accordance with paragraph 3.7 of the Consulting Guidelines. Shortlist of consultants for services estimated to cost less and US$800,000 equivalent per contract may be composed entirely of national consultants (paragraph 3.7). In addition, other selection methods may be adopted depending upon size and complexity of assignments and as agreed in the Procurement Plan.

- Quality Based Selection (QBS);
- Selection under Fixed Budget (FBS);
- Least Cost Selection (LCS);
- Single Source Selection (SSS); and
- Individual Consultant (IC).

Procurement of Works and Goods

6. International Competitive Bidding (ICB) is the preferred method for procurement of goods, works and non-consulting services. However, it is unlikely that there will be any ICB contracts as almost all the packages fall below the ICB threshold value.

7. National Competitive Bidding (NCB) shall be adopted for all other contract exceeding shopping threshold. The model bidding documents for NCB for procurement of works/goods as agreed with the GoI Task Force (and as amended from time to time), shall be used for bidding. The following NCB provisions shall apply:

(a) Only the model bidding documents for NCB as agreed with the GoI Task Force (and as amended from time to time), shall be used for bidding.

(b) Invitation to bid shall be advertised in at least one widely circulated national daily newspaper (or on a widely used website or electronic portal with free national and international access along with an abridged version of the said advertisement published in a widely circulated national daily inter-alia giving the website/electronic portal details from which the details of the invitation to bid can be downloaded), at least 30 days prior to the deadline for the submission of bids;

(c) No special preference will be accorded to any bidder either for price or for other terms and conditions when competing with foreign bidders, state-owned enterprises, small-scale enterprises or enterprise from any given State;

(d) Except with the prior concurrence of the Bank, there shall be no negotiation of price with the bidders, even with the lowest evaluated bidder;

(e) For prior review contracts, extension of bid validity shall not be allowed with reference to Contracts subject to Bank prior review without the prior concurrence of the Bank (i) for the first request for extension if it is longer than four weeks; and (ii) for all subsequent requests for extension irrespective of the period (such concurrence will be considered by Bank only in cases of Force Majeure and circumstance beyond the control of the Purchaser/Employer);

(f) For prior review contracts, re-bidding shall not be carried out with reference to Contracts subject to Bank prior review without the prior concurrence of the Bank;

(g) The system of rejecting bids outside a pre-determined margin or “bracket” of prices shall not be used in the project;

(h) The Borrower may use Government of India’s eMarketplace (GeM) (i) in lieu of shopping up to US$ 30,000 in catalogue mode; (ii) in lieu of shopping up to US$ 100,00 provided there are at least 3 suppliers for the item on GeM and the Purchaser uses reverse-auction or bidding among supplier’s feature on GeM to discover the final price;

(i) Two or three envelop system will not be used (expect when using e-procurement system assessed and agreed by the Bank.

8. Procurement of goods, works and non-consulting services may be carried out using Shopping method (paragraph 3.5) for procurement of readily available off-the-shelf products of value estimated to cost less than US$100,000, or simple civil works of value estimated to cost less than US$1,000,000. Such method, if any, shall be agreed in the procurement plan. The implementing agency (ies) shall solicit at least three price quotations for the purchase of goods, materials, small works, or services (non-consulting), to formulate a cost comparison report.

9. Direct Contracting for the procurement of civil works and goods (paragraph 3.7 of the procurement Guidelines) may be used to extend an existing contract or award a new contract. For such contracting to be justified, the Bank shall be satisfied that the price is reasonable and that no advantage could be obtained by further competition. The direct contracting may be from the private sector, UN agencies/programs (for goods), or contractors or NGO that are already mobilized and working in the emergency areas.

10. Force Account may be used when contractors/suppliers are unlikely to bid at reasonable prices because of the location and risk associated with the project or a certain government agency has exclusive rights in certain type of works/supply, borrowers may use their own government departments' personnel and equipment or government owned construction unit may be the only practical method, provided that the borrower has sufficient managerial capacity and possesses the required technical and financial controls to report to the Bank on expenditure as per paragraph 3.9 of the Procurement Guidelines.

11. Borrower may establish Framework Agreements (para 3.6 of Guidelines) for those items that are required on recurrent basis. For that matter, Government of India's GeM (i) in lieu of shopping up to US$ 30,000 in catalogue mode; and (ii) in lieu of shopping up to US$ 100,00 provided there are at least 3 suppliers for the item on GeM and the Purchaser uses reverse-auction or bidding among suppliers feature on GeM to discover the final price. State level rate contracts will be examined by the Bank and if agreed, may also be used as framework agreements.

12. Use of government Institutions and/ or Enterprises owned by the government in India may be hired for its unique and exceptional nature, if their participation is considered critical to the project implementation. In such cases, the conditions given in clauses 1.13 of Consultant Guidelines shall be satisfied.

13. Further, it is envisioned piloting post-construction maintenance through women self-help groups in selected districts. The government will adopt a simplified maintenance contracts as per para 3.19 of the procurement guidelines (Community Procurement) developed for community based maintenance works in consultation with the Bank.

14. Any Operational expenses (incremental cost) which are recurrent in nature and would be financed by the project may be procured using the implementing agency's administrative procedures.

Implementation Arrangements

15. The GoMP had identified MPRRDA headquartered in Bhopal as an Implementing Agency (IA). The Project Management Unit (PMU) shall be housed in MPRRDA in Bhopal. MPRRDA follows centralized procurement system and procurement unit is housed in MPRRDA HQ in Bhopal with staff strength of 7

personnel. For the procurement of works, the PIUs will assist in preparing DPRs and BoQ and once finalized, will be submitted to PMU. The PMU will review the technical requirements, obtain financial and technical section from the competent authority and then initiate procurement using e-procurement portal *www.mpeprocure.gov.in*. The procurement will be conducted following single stage two- envelope system. As per the current practice, the opening and evaluation of technical bid is carried out at respective districts and financial bid opening of the technically qualified bidders are conducted at HQ level chaired by CEO or as nominated by CEO. Following financial evaluation at HQ, the tender committee headed by CEO or as designated by CEO clears the combined evaluation report and respective PIUs are authorized to sign the contract agreement depending upon the delegation of financial powers. The same procedure shall be adopted for this project.

Capacity Assessment of the Implementing Agencies

16. As a part of project preparation process, Capacity assessment of MPRRDA was carried out using Procurement Risk Assessment System (PRAMS) followed by desk review of existing procurement procedures in MP and face to face discussion with the relevant officials during preparation stage. The assessment team reviewed the following: legal aspects on procurement practice; procurement cycle management; support and control system; staffing; grievance redressal system and general procurement environment and so on.

17. While there is good control system in MPRRDA, grievance redressal system on procurement process is not available. The assessment team recommended to institute grievance redressal system within the MPRRDA and create complaint register that would provide audit trails for grievances related to procurement.

18. The staff working in procurement unit understands Bank's procurement procedures. However, refreshers course on Bank procurement is recommended. The overall risk rating of MPRCP is rated as "Moderate"

Table 3.1. Procurement Risk and Mitigation Measures

Risk Factor	Initial Risk	Mitigation Measure	Residual Risk
Record keeping and documentation	Moderate	IA including all line departments will continue using existing MIS system for record keeping	Low
Fiduciary Risk relating to main principles of the Bank Procurement Guidelines	Substantial	Attend training in ASCI/NIFM on Bank procurement procedures Conduct training on Bank procurement procedures Regular supervision support and monitoring	Moderate
Inefficiencies and delays in procurement process	Substantial	Regular monitoring through STEP Use of e-procurement platform	Moderate
Insufficient competition in procurement	Substantial	Use of e-procurement platform Proper packaging shall be carried out wherever feasible	Moderate
Contract Management	Substantial	Disclosure of all contract awards in IA website as well as central portal website Training on Contract management Establish grievance mechanism cell	Moderate

Risk Factor	Initial Risk	Mitigation Measure	Residual Risk
Probability of staff handling procurements being transferred	Low	Continue dialogue with IA to retain trained staff	Low
Governance issues	Substantial	Disclosure of procurement plan Disclosure of contract awards Creating awareness on effects of fraud and corruption Regular reviews such as PPR, internal Audit, external audit and so on. Promoting transparency through use of MIS	Substantial
Absence of complaint redress system	High	Institute complaint redressal system Disclosure of complaint redress procedure in project website	Substantial
Overall Risk	**Substantial**		**Moderate**

Procurement Plan and Use of STEP

19. The Procurement Plan for the project shall be prepared detailing the activities to be carried out reflecting the actual project implementation needs. For each contract to be financed under the project, different procurement methods, the estimated cost, prior review requirements and time frame will be agreed between the Borrower and the Bank. The Procurement Plan once finalized will be made available in the projects database and in the Bank's external website. The Procurement Plan shall be prepared using STEP. The officials of borrower have already attended the training on STEP in Mumbai May 2016.

Frequency of Procurement Supervision and Review by the Bank

20. Frequency of Supervision. The Bank normally carries out the implementation support mission on semi-annual basis. The frequency of the mission may be increased or decreased based on the procurement performance of the project.

21. Review by the Bank. The Bank will prior review the following contracts:

- Works (including turnkey, supply & Installation of plant and equipment and PPP): all contracts more than US$15.0 million equivalent;
- Goods (including information technology and non-consulting services): all contracts more than US$4.0 million equivalent;
- Consultancy Services: all contracts more than US$4.0 million equivalent for firm; and US$400,000 for individuals.

22. The above thresholds shall apply for Direct Contract for works and goods and Single Source Section (SSS) for consultant's service as well and there are no separate threshold values prescribe for it.

23. All Direct Contract/SSS for consultants shall be reflected in procurement plan in STEP and should be supported by justifications duly approved by the Project Director up to the specified threshold limit set above. Any contract exceeding above threshold values shall be subject to prior reviewed by the Bank.

These thresholds are for the initial 18 months' period and based on the procurement performance of the project, these thresholds will be modified.

24. All contracts below the specified prior review threshold value shall be subject to Post Procurement Review (PPR). For the avoidance of doubts, the Bank shall be entitled to conduct, at any time, Independent Procurement Reviews (IPR) of all the contracts financed under the Credit. The IA shall prepare a list of contracts and submit it to the Bank for conducting PPR. The PPR will be conducted on annual basis.

Use of e-procurement Portal

25. Procurement of goods works and non-consultancy services shall be conducted using the e-procurement portal *www.mpeprocure.gov.in*. This portal had been assessed and cleared by the Bank to be used for all Bank financed projects in MP.

Procurement Methods

26. The table below provides highlights of various procurement methods to be used for this project. These methods along with agreed threshold should be reflected in the procurement plan.

Table 3.2. Procurement Methods

Category	Method of Procurement	Threshold (US$ Equivalent)
Goods and Non-consulting services (including IT contracts)	ICB	>3,000,000
	LIB	wherever agreed by Bank
	NCB	Up to 3,000,000 (with NCB conditions)
	Shopping	Up to 100,000
	DC	As per para 3.7 of Guidelines
	Force Account	As per para 3.9 of Guidelines
	Framework Agreements	As per para 3.6 of Guidelines
Works	ICB	>40,000,000
	NCB	Up to 40,000,000 (with NCB conditions)
	Shopping	Up to 100,000
	DC	As per para 3.7 of Guidelines
	Force Account	As per para 3.9 of Guidelines
Consultants' Services	CQS/LCS	Up to 300,000
	SSS	As per para 3.9-3.11 of Guidelines
	Individuals	As per Section V of Guidelines
	QCBS/QBS/FBS	for all other cases
	(a) International shortlist (b) Shortlist may comprise national consultants only	>800,000 Up to 800,000

Financial management

27. **Implementing entity**. MPRRDA is a society registered under Society Registration Act 1973. This society has been created to implement GOI sponsored Pradhan Mantri Gram Sadak Yojana (PMGSY),

partially funded by the World Bank. The total expenditure for last 5 financial years of MPRRDA under PMGSY & CMGSY scheme is INR 69,000 million (Appx US$1 billion). A Chief Executive Officer heads the Authority. Engineer-in-Chief will be the Project Director for the project and will report to the Chief Executive Officer.

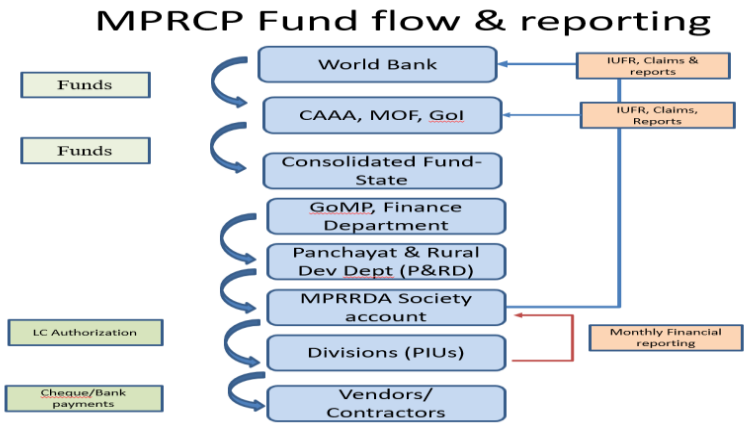
28. Budget allocations and funds flow to MPRRDA are handled by the state finance department. District level PIUs serve as branches of MPRRDA in implementing the project. The PIUs are fully accountable and responsible to MPRRDA for fund flows, accounting, financial reporting and audit compliance. At present, 81 Project Implementation Units (PIUs) have been constituted at district level to co-ordinate the works executed by the contractors and supervised by the consultants. These PIUs are headed by General Managers who are of the rank of Superintending/Executive Engineer. The existing system of PIUs will continue for implementing this Project and the number of PIU's may increase or decrease depending on the work load.

29. MPRRDA will have the overall responsibility for maintaining the financial management system of the project and ensuring that project activities are carried out in accordance with the Project's legal agreements. These activities would include:

a) Adequate annual budgetary provision and effective utilization of project funds
b) Sufficient and timely flow of funds for project activities
c) Maintenance of adequate and competent financial management staff at all levels
d) Appropriate and regular accounting of project expenditures
e) Preparation and timely submission of Interim Unaudited Financial Reports (IUFR's) to the Bank
f) Timely submission of internal audit reports, annual audit reports and Project financial statements to the Bank.

30. **Budget and Fund flow.** The Budget estimates of the MPRRDA will be prepared annually by Chief General Manager (Finance) under the overall guidance of the Chief Executive officer. The estimates will be based on Annual Work Plans in consultation with district PIUs for each financial year. The estimates will be approved by the Chief Executive Officer of MPRRDA and submitted to Panchayat and Rural Development Department (P&RD) and the P&RD will submit consolidated budget figures to Finance Department of GoMP for approval.

31. Funds will be allocated to a separate budget head opened for this project through state finance department. A separate bank account for the project already opened by MPRRDA to receive funds through treasury. The existing bank authorization system will be used for PIU level payments. The bank authorization is released to the PIUs based on the demand received.



32. **Payment System:** E-Marg is a monitoring and payment system used for maintenance works of MPRRDA and OMMAS is a monitoring, payment and FM system for PMGSY, which also has an accounting module. GeoReach is an online web-based software application being designed & developed by NIC. The new system enables MPRRDA for making data entry, uploading inspection reports and make payment to contractors. All contractor's bills will be submitted and paid online by PIU through this software. This new system is being designed to include an accounting module and also auto-generate IUFR claims that need to be submitted to the World Bank.

33. **Accounting:** MPRRDA has double entry book keeping system and all financial transactions are captured in existing computerized Tally accounting system. At present, accounts are maintained in existing computerized Tally accounting system and separate leger account will be opened in the system to capture project related cost and expenditure. GeoReach is an online web-based software application being designed & developed by NIC. The new system enables MPRRDA for making construction related payment to contractors. All these bills will be submitted and paid online by PIU through this software. And also, there will be an integration between GeoReach and Accounting Module to capture construction related payment transactions and auto generation of IUFR claims. The financial information from the PIUs flow to MRRDA monthly and regular bank reconciliation is to be carried out at MPRRDA and PIUs.

34. **Reporting and Disbursement:** Interim Unaudited Financial Reports (IUFR) based disbursement will be followed for the project, which will also be used for reporting and financial monitoring. The IUFR shall be submitted to on a quarterly basis within 45 days from the end of each quarter to the Bank. The IUFR will disclose receipts and utilization of project funds (including at PIUs), and will be reconciled with the project accounts prior to submission to the Bank. In terms of disbursement, MPRRDA will first make expenditure from the funds allocated under the budget and subsequently claim reimbursement from the Bank through CAAA. All expenditure reported in the IUFRs will be subjected to annual project audit. Mobilization advances will be reimbursed upon payment to the contractors, however, machinery advances will be reimbursed only after utilization.

35. **FM Staffing and Training:** At HQ, CGM (Finance) will have overall responsibility of financial management for the project. It was agreed that a separate FM cell of 4 staff for the project would be established under the supervision of CGM (Finance), which will include an Assistant Manager, Accountant and two Data Entry Operators. The existing Accounts Officer of HQ will also oversee the work of FM cell

of the project. There are 81 PIUs at district level having three positions for accounts (Accounts Officer, Accountant and Data Entry Operator). Currently there are vacancies of Accounts Officer in 8 PIUs and these vacancies are expected to be filled within 3 months after effectiveness of the project. The project can also appoint contractual staff with adequate qualification and experience based on the progress of the project. There is a system of annual training of three days for accounts staff which is conducted by HQ Finance unit and the last training was held in June 2015. The HQ finance staff will provide training to the PIUs for the project as per FM Manual at least once in a year. The Bank will also provide training to HQ/PIU staff on IUFR reports and World Bank FM procedures after effectiveness of the project.

36. **FM Manual:** MPRRDA has a manual of Administrative and Financial Regulations issued in 2001 and various circulars have been issued subsequently. The Regulations cover topics such as functions of various committees of the society, budget estimates, maintenance of accounts and records, delegation of powers, TA/DA Rules and financial rules for advances etc. The Regulations were reviewed during the mission. It was agreed that MPRRDA would prepare a short FM Manual (FMM) to document key FM arrangements for the project. The FM Manual will not duplicate the procedures in the Regulations, such as delegation of authority, TA/DA rules etc. and project staff will refer to the Regulations for the same. The FM Manual will document procedures for budgeting, flow of funds, accounting, financial reporting (IUFRs), internal controls, disbursement, audit, FM staffing and training arrangement for the project. The FM Manual will also include description of flow of funds under existing bank authorization system, including diagrams to depict the process flow. The manual will include chart of accounts, IUFR formats and terms of reference of statutory and internal audit. The World Bank will share a sample manual with MPRRDA.

Internal audit: MPRRDA has a system of internal audit by IPAI (Institute of Public Auditors of India), an organization of retired finance officers of AG/CAG. This is an existing audit arrangement of MPRRDA which focuses on review of internal control processes adopted by HQ and PIUs to assess functioning of Financial Management System twice in a year. The audit for FY 2016-17 has been completed. Consolidated report for Apr-Sep 2015 was reviewed and it showed that most observations pertained to contract management and the report included only a few observations on FM issues. The terms of reference of the internal audit will be agreed with the World Bank and the scope will include integrated Procurement, Financial Management and Contract management reviews. The internal audit will be undertaken and reports will be submitted once in six months. The internal audit report will provide feedback to management on control weaknesses and issues that require management attention. Compliance with the audit report shall be monitored at HQ level. The internal audit reports along with the corrective actions taken by the project to address the control weaknesses (if any) will be shared with the Bank.

37. **External audit.** Annual audit for the project will be conducted by a firm of chartered accountants empanelled with the C&AG (Comptroller and Auditor General). The terms of reference of audit will be agreed with the World Bank. The audit report would consist of: (i) audit opinion; (ii) Project Financial Statements; and (iii) Management letter highlighting weaknesses, if any.

Implementing Agency	Audit Report	Auditors	Audit Due date
MPRRDA	Project Financial Statements	C&AG empaneled auditors	9 months after the end of each fiscal year (March 31st) i.e. by December 31

38. The Bank would consider accepting the audit reports issued by the existing PMGSY's auditor based on their credentials.

39. **Retroactive Expenditures**. This will include eligible expenditures related to advance activities carried out under this project. Retroactive financing of up to US$42 million may be provided for such eligible expenditures since May 15, 2017. The following are the rules for retroactive financing:

a. The activities financed are included in the project description.
b. The payments are for items procured in accordance with applicable World Bank procurement procedures.
c. Expenditure incurred by the project within one year prior to the Loan signing date.

40. **Disbursements**: For disbursements, there would be one category to be disbursed at 42 percent. The total project cost is US $ 502 million, from three sources: IBRD $210 m, AIIB $140 m and the balance US $152m plus such amount as will be determined from time to time pursuant to Order No. 2093 dated February 4, 2015 for the maintenance of the assets constructed/ upgraded under Part A of the project will be financed by GoMP. As this project, would be co-funded by Bank and AIIB, the reporting systems would be common. The project component costs and the disbursements are outlined below:

Category	Amount of the Loan Allocated (expressed in USD)	Percentage of Expenditures to be financed (inclusive of Taxes)
(1) Goods, works, non-consulting services, and consultants' services for the Project, including Incremental Operating Costs and Training but expressly excluding maintenance of the assets constructed or upgraded under Part A of the Project	209, 475,000	42
(2) Front End Fees	525,000	Amount payable pursuant to Section 2.03 of the Loan Agreement in accordance with Section 3.01 (a) of the General Conditions

41. **Supervision Plan:** MPRRDA is successfully implementing PMGSY and has adequate fiduciary capacity for carrying out financial management functions. The existing robust financial management policies, procedures and staff may be considered adequate to support the use of funds under the loan. The CGM finance and support staff are familiar with Bank's financial management procedures and requirements. Hence the financial management risk of the project is assessed as Moderate.

42. In the first year of implementation, Bank team would conduct supervision missions at least twice in a year to ensure that laid down processes and procedures are appropriately followed and supervision will also involve review of IUFRs and Audit reports.

Annex 4 Social Management (Including Safeguards)

1. A diagnostic assessment was undertaken to: (a) identify gaps, if any, in the existing guidelines for CMGSY roads, and its adherence in the already prepared and implemented DPRs; (b) determine key environment and social impacts of the proposed sub-projects (up-gradation and additional links); and c) assess implementation set up, capacity and mechanisms to monitor and redress grievances.

2. MPRRDA and RES, under the Department of Panchayati Raj and Rural Development, had been responsible for construction of CMGSY roads. Approximately 8000 km of roads were constructed by MPRRDA in 11 districts of the state. MPRRDA followed the guidelines issued under PMGSY by NRRDA for the construction of CMGSY roads. Review of the implementation process, indicates that while MPRRDA was in overall compliance with PMGSY's technical guidelines, other social guidelines such as mitigation of identified impacts, if any, documentation of land donation, and so on were not fully complied, though it has a Safeguards Cell for ongoing ADB funded PMGSY roads, comprising of: Safeguard Officer, Assistant Safeguard Officer and two support staff, besides designated officials at PIU. It was also supported externally through Project Implementation Consultant, besides having Technical Support Consultants (agency) to undertake periodic review of implementation. Hence, assessment concluded that MPRRDA has moderate in-house capacity to implement the proposed safeguard instruments for MPRCP.

3. OP 4.12 on Involuntary Resettlement is not triggered as the project does not anticipate land acquisition and if any additional land is required, it would be done only through voluntary land donation. While existing CMGSY gravel roads (10000 km) would be upgraded by resurfacing to BT standards additional multiple connectivity links (510 km) would be taken on existing earthen tracks built under other government schemes and wherein land take, if any, is minimal. In case there are objections from communities, such roads would either be dropped or taken up a later date once objections are resolved. Other options to avoid or minimize impacts would include: design modifications by reduction of the land width, alignment shifts, continuing with same alignment curvature along with appropriate safety signs, modifications in cross-sections and so on to the extent possible keeping in safety considerations.

4. OP 4.10 on Indigenous Peoples is applicable as there are twenty-one (21) recognized tribal districts and many of the road up-gradations and additional links are proposed in these areas. These districts also include the notified Scheduled Tribal districts of Jhabua, Mandla, Surguja and Bastar.

5. Interactions indicated that communities have benefitted from up-gradation of the earthen tracks to CMGSY gravel roads in many ways, such as: (a) improving access to education and health institutions, markets (mandis); (b) enabling transportation of goods using different modes of transport; (c) increasing access to work opportunities in nearby areas supplementing their incomes, particularly during failures of monsoon; (d) bettering social status of villages, as other villages were keen to have social relationships into these well-connected villages; and (e) enabling police to reach their villages faster than before, thus leading to reduction in crimes and improving timely address in case of accidents, ailments, pregnancy; (f) improved access to girls to school (or reach near-by bus-stops).

6. To mitigate potential impacts at pre-construction stage such as loss of land, community structures, trees and other construction stage impacts such as temporary disturbance, disruption to access, dust emission, and so on and also to enhance community participation (including SC, STs, and women) during project cycle, the Project has prepared a SMF and a VF. Specifically, these instruments

include: relevant legal and regulatory framework, stakeholders' consultations, social screening checklist to identify adverse impacts prior to DPR preparation, documentation of voluntary 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 a grievance redress mechanism. MPRRDA would sign Memorandum of understanding (MOU) to document voluntary land donation from each individual.

7. The VF ensures that the development process generated by the CMGSY fully addresses the needs of the vulnerable population and enables measures to promote distributional equity among the project affected populations (PAPs). The framework endorses information sharing, consultation and collaboration as participatory techniques to develop the abilities and reinforce the capacities of the vulnerable while preserving their historical identity. The framework warrants inclusion of these groups of population in design, implementation and monitoring, thus empowering them from beneficiary to a primary stakeholder in the process. In particular, the guidelines stated in the framework will ensure that the above populations do not suffer any negative effects during the project that they receive gender sensitive benefits compatible with their traditions and they participate as stakeholders in planning, implementing and evaluating the Project.

8. The borrower disclosed the completed SMF and VF and translated version of the Executive Summary of these documents on its website on October 28 2016, besides disclosing at district level. These document as authorized by the borrower were also disclosed at the Bank's PIC on June 28, 2016. Further an in-country disclosure workshop with representatives from relevant departments was held on November 9, 2016 in project area.

9. MPRRDA will guide, coordinate and oversee implementation of SMF and VF. It would be supported by a Social Expert in the Project Management Consultant agency that would be contracted by MPRRDA for entire project duration. Further, as instructed by MPRRDA, HQ, most PIUs have designated an Environmental and Social Officer who will coordinate with Assistant Managers (AM) and Sub Engineers (SE) to ensure implementation of SMF and VF. At each PIU an Assistant Manager, already designated as the Gender focal person would continue to ensure focus on gender aspects. As all DPRs would be reviewed at the PIU level capacity building of PIU officials to build awareness and comply with provisions under SMF and VF, would be ensured. MPRRDA has appointed Project Management Consultant (PMC) comprising a Social expert to regularly monitor the planning, design and construction of rural road works and to confirm that actions taken at each stage of the MPRCP project cycle are in compliance with the safeguard instruments

10. **Citizens Engagement Strategy**: Citizens will be engaged in the implementation of the proposed project in four areas to strengthening accountability within the project.

(a). consultations as the primary tool to promote stakeholder participation in the process of project design and implementation through transect walks, community consultations;

(b). grievance redress mechanism (GRM) to respond to the needs of beneficiaries and to address and resolve their grievances and serve as a conduit for soliciting inquiries, inviting suggestions, and increasing community participation including training members of panchayats. PAPs can seek redress of grievances either through MPRRDA’s five tier GRM or

through Chief Minister's (CM helpline) or through Public Hearing *(Jan Sunwai)* system;

(c). User Satisfaction Surveys to obtain feedback on citizens' perceptions of the adequacy and efficiency of services provided through improved connectivity. 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 by Citizen Engagement indicator: Satisfaction index of beneficiaries, which measures on scale 1-5, the level of satisfaction of road users with the infrastructure developed by the project (disaggregated by gender);

(d). Community based road accident reporting is a proposed initiative to engage residents to report on road crashes through the use of smart phone loaded application. This is critical in villages where police penetration is weak to nonexistent. Local volunteers will be trained on the use of a smart phone with a customized accident recording and reporting application and will be tasked with reporting accidents fresh from the scene, which will go directly to the central road accident database management system supported under the project, and sends alerts to the nearest police and emergency trauma care centers.

11. Besides concurrent internal monitoring, the Project shall appoint a Third Party/Independent Consultant Audit for auditing of application, verification and efficacy of implementation of these safeguard instruments. Furthermore, the Project management System, GeoReach, to be used in the management of this project will also be enhanced to include a module to support public grievance management and citizens feedback.

Annex 5 Environmental Management (Including Safeguards)

1. **Key Environmental Impacts:** Under the MPRCP, 10,000 km gravel rural roads and 510 km new sub-projects have been included. Gravel roads will be upgraded to BT roads mainly through surface sealing with required profile correction and construction of CD structures as per local requirement. Therefore, up-gradation of gravel roads is not likely to create significant adverse environmental impacts like new roads particularly during the construction stage. While construction of new roads cumulative direct, indirect and induced adverse impacts resulting can cause some damage to environment, if not addressed appropriately. Deficiencies in planning and design of new sub-projects can lead to insufficient arrangements to conserve natural drainage pattern, inadequate slope stabilization provisions, improper disposal of construction wastes/debris, soil erosion, siltation of water bodies, obstacle for access to crop field, damage to irrigation pipes crossing, degradation of scenic value, and so on. Therefore, more robust planning and design of sub-projects will be required to avoid, minimize and manage adverse environmental impacts.

2. In addition, for new sub-projects, felling of trees; impact on local water bodies; improper management of materials and their sources (such as aggregates, sand, earth and water); increased traffic (in case of through-routes) causing safety concerns for both road-users and road-side residents; occupational health related issues faced by construction workers and construction-stage nuisances such as dust and noise require attention.

3. During sealing of existing gravel roads and new construction of rural roads, most of the environmental impacts are expected to be site specific, temporary in nature and can be mitigated with good design and appropriate construction management practices. Accordingly, the Bank's OP 4.01 on Environmental Assessment and OP 4.11 on Physical Cultural Resources have been triggered, and the project is designated as Category B.

4. On the positive side, the strengthening of human capital from enhanced habitation connectivity, reduction and dust and noise levels, reduction in travel time and fuels consumption, increased access to employment, health, education and other social services are some of the benefits anticipated from the project.

5. **Environment Management Approach:** MPRRDA in principle has adopted the norms/guidelines developed for the centrally funded PMGSY, which includes the ESMF and ECoPs to guide and deal with environmental issues during planning, design, construction and operation of rural roads in the state of MP. For sub projects under MPRCP, EMF and ECoPs have been prepared. The EMF will be an 'up-to-date' or a 'live document' enabling revision, when and where necessary, but only subject to compliance with the Bank's Environmental and Social Safeguards Policies, especially (but without limitation) with respect to substance, consultation of the stakeholders and disclosure of the revised document, and agreement by the Bank in writing. Unexpected situations and/or changes in the project would therefore be assessed and appropriate management measures will be incorporated by updating the Environment Management Framework.

6. **Innovative Technologies/Alternative Materials for Rural Roads:** MPRRDA has used alternative materials/ innovative technologies under the PMGSY project which involves use of waste plastics in hot BT mixes in wearing courses, cold mix technology, roller compacted cement concrete and paver blocks.

Under MPRCP project, waste plastics in hot BT mixes, cold mix technology and other innovative technologies shall be used for construction of rural roads up to extent possible. The selection and adoption of innovative technologies/alternative materials in rural roads shall be adopted at DPR preparation stage providing technical specifications as per IRC guidelines.

7. **Implementation Arrangement for EMF:** A diagnostic assessment was carried out for assessing understanding of policies, guidelines and existing institutional capacity of MPRRDA for environmental safeguards implementation in rural roads. MPRRDA has been engaged in construction of rural roads in entire MP State under PMGSY programme. The assessment and review of DPRs preparation and implementation process indicate that MPRRDA was in overall compliance of PMGSY's technical guidelines, EMF, ECOPs during planning, design and implementation of environmental mitigation measures and documentation through the Safeguards Cell at Head Quarter for ADB funded PMGSY roads and designated Safeguards Officers at PIUs. MPRRDA had also been responsible for construction of 8000 km CMGSY roads in 11 districts of the state. In CMGSY also, MPRRDA followed the guidelines issued under PMGSY by NRRDA. The assessment indicates that MPRRDA has moderate capacity for implementation of the proposed safeguard instruments under this project.

8. For this project, MPRRDA has created safeguard cell at Head Quarter and designated Safeguards Officers at PIUs, responsible for addressing environmental management aspects in sub projects. The PIUs will have the responsibility of field implementation of the provisions of the EMF along with the other project components. MPRRDA has appointed Project Management Consultant (PMC) to regularly monitor the planning, design and construction of rural road works and to confirm that actions taken at each stage of the MPRCP project cycle are in compliance with agreed procedures and standards. The PMC has deployed Environment Officer at MPRRDA Head Quarter, who is responsible to take appropriate steps to advice, interact, training, documentation, reporting for implementation of Environmental Management Framework. All the Detailed Project Reports (DPRs) prepared by the PIUs shall be certified by the Safeguard Cell at the MPRRDA for compliance with the provisions of EMF/ECoPs

9. **Monitoring & Reporting-** The PIUs will report to MPRRDA on monthly basis towards status of implementation of EMF/environmental management measures. MPRRDA will prepare comprehensive assessment report on environmental performance at mid-term and end-term.

10. **Capacity Building for Environmental Management:** For implementation of EMF in sub projects, strengthening of staff capacity for environmental management by providing them adequate orientation/training is essential. The staff in the field divisions/PIUs will also need orientation and sensitization as there is a strong linkage between engineering, environment and social dimensions of road planning, execution and operation. In recognition of the need and importance of capacity building, MPRRDA will utilize the services of reputed institutions for conducting training and capacity building programs for engineers of MPRRDA, PIUs and contractors. It will involve developing systematic curriculum, training materials for imparting core & specialized training modules to the engineers and contractors.

11. **Integration of EHS requirements in the Model Bidding Document:** Inappropriate construction practices can cause adverse environmental, health and safety (EHS) impacts, especially from the improper scheduling of works and haphazard dumping of construction materials/wastes on the roads. To ensure improved environmental management during the construction stage, a section clearly specifying

preventive and mitigation measures to be taken by the contractors, is incorporated into Model Bid Document (MBD). EMF including ECoPs is also a part of the MBD.

12. **Third Party/Independent Consultant Audit:** MPRRDA shall appoint Third Party/ Independent Consultant for auditing of application, verification and efficacy of implemented environmental management measures and EMF in rural roads. Third Party/Independent Consultant shall deploy team(s) of qualified and experienced environmental experts for audit and verification purpose

Annex 6 Addressing Gender Gap

1. ***Analysis***: Rural women and girls, in general, suffer the most from inadequate access to transport facilities and services. Consultations with potential beneficiaries validated that lack of access to all-weather roads contributes to the wide gap in human development indicators between women and men in the rural MP[25]. Due to problems associated with poor road access, women are mainly confined to working closer to their houses, which is mainly working on their farms, compared to their male counterparts. In this regard while 30 percent of rural males work on non-farm jobs, only 20 percent of females have access to such jobs. Otherwise also, women are deprived of economic power due to lack of access to income earning jobs; only a third of (36 percent)[26] of the rural women participate in the labor force in MP, whereas their male counterparts' participation is as high as 83 percent. Under the scheme "Free Bicycle Yojana" the Ministry of Education provided 9th grade female students with 40,000 bicycles in 2009 to ease their school trips[27], but beneficiaries[28] found it difficult to use them due to the poor condition of the rural roads. There may be a cultural dimension to the problem that women may not be expected to participate on all kind of licit income generating activities as men might. This project may open up new frontiers of engaging women through designing a pilot road maintenance work and demonstrate their potential for more gainful jobs and contribute to the fight against income inequality and absolute poverty.

2. ***Action***: MPRCP to the extent of the main project scope, will follow an engendered road map to ensure women's issues are continuously considered throughout the project's implementation. The project is executed by contractors within MP districts, migrant labor influx is not expected, and in the very unlikely event there are migrant labor in the work force appropriate mitigation measures are included in the civil works contract document. Similarly, there is no evidence such project operation has linkages to the spousal gender based violence in the state, hence no related gender action is included in the project. The improvement of gravel roads to asphalt and the long-term maintenance attached to it will improve women's access to the opportunities they have been deprived of as explained in the analysis section above. Besides the benefit from all-weather access as a section of the rural population, the project will support closing gender gaps with regards to women's economic empowerment while ensuring their work site safety. In this context, the project designed two main action areas.

a. The project will engage five women self-help groups as a pilot, on long term road off-carriageway maintenance work. These groups have already been formed under the MP National Rural Livelihood Mission(NRLM). Priority will be given to SHGs in the poor, marginalized ST and SC villages, in consultation with the respective Government and community leaders. Each SHG is expected to mobilize about 10 women for the maintenance work, and about 50 women will participate to test the pilot and based on successful implementation, the scheme may be rolled out state wide to provide job opportunities for tens of thousands of needy women. The project will provide SHGs with maintenance tools and training on labor based routine maintenance. There will be a potential cross Bank's cross sectoral collaboration specifically with the agriculture and

[25] MP State MDG Report 2014-2015
[26] World Bank, Madhya Pradesh, Gender May 2016

[27] Women's Status in MP and Planned Interventions – A Gender Review 2010 (State Planning Commission)
[28] Beneficiary Consultations under VF

livelihood sector which have the potential to mobilize SHGs. In this regard, the local contractors will also receive training on how to manage an inclusive and engendered cadre of road workers.

b. The project will launch an in-depth assessment of causes of gender based violence, specifically kidnapping, abduction and human trafficking that deters school girls to pursue their education beyond primary, and women from expanding their opportunities for better income earning activities. GBV causes that are directly related to poor transportation infrastructure and services might be identified and recommendations and action plans would be formulated to be implemented possibly under the project or on follow on programs.

3. ***Monitoring***: The project will monitor

a. the number of women that will be engaged in road maintenance,
b. the total female population that, for the first time have access to paved all weather road and,
c. Number of school girls using bicycle to go to school
d. the share of female population who satisfied with the implementation of the project (user satisfaction survey).

Annex 7 Economic Analysis

A. The Project

1. Under CMGSY started in 2010, MP State is providing one single-link all-weather connectivity through construction of 'Engineered Gravel Road' with necessary cross-drainage works to the rest of the unconnected villages, having population 150 - 499 for normal areas and 100 – 249 for tribal areas, as identified in the 'Core Network' prepared under PMGSY.

2. Under the present program, it is proposed to upgrade the gravel roads constructed under CMGSY to the standards of paved roads (about 10,000 km length). In addition, it is proposed to provide more than one road connectivity to villages having higher population and status of 'local growth centre or market centre' (new connectivity roads totalling 510 km length). All the works under this program are targeted to complete in 2023.

3. 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 large impact on poverty alleviation. Most of the roads are short in length (2.4 km length on an average).

Project Scope

4. Based on the data provided, the database for average roads was developed in terms of average number of villages connected, beneficiary population, and project cost. Using these averages, the project coverage is estimated as given in Table 7.1.

Table 7.1. Project Roads Under MRRCP Coverage

No. of roads	4,421
Total length km	10,510
Districts covered	51
No. of villages connected	5,675
Average road length (km/road)[2]	2.38
Average population coverage - 2011 (No. / Road)[2]	387
Average population coverage - 2016 (No. / Road)	425
Total population coverage (2016)[1]	18,81,189

Source: MPRRDA

Approach and Methodology

5. The economic analysis adopted for MPRCP has focused on assessing the benefits of the project as a whole after reviewing the methodology adopted to implement PMGSY roads. For carrying out economic analysis, available Bank guideline (Investment Project Financing Economic Analysis Guidance Note, April 2013) is also considered.

6. Considering the low traffic volume (mostly less than 100 vehicle trips in a day), the 'producer surplus' approach was followed for PMGSY roads in economic analysis. In this approach, all socio-economic benefits attributable to the road connectivity were captured, including agriculture productivity increase, employment generation, increased vehicle ownership, improved school attendance and so on. An evaluation study carried out by the Planning Commission of the GoI in 2010[29] to assess the impact of all-weather PMGSY / Bharath Nirman roads has confirmed this.

7. From economic analysis point, there is a marked difference in the methodology between the one followed for PMGSY roads (where low volume earthen roads were improved to paved road) and the methodology followed for the present MPRCP roads (where 'engineered gravel roads' constructed under CMGSY roads with considerable existing vehicular traffic, are being upgraded to paved roads).

8. In arriving the base traffic, the average daily traffic arrived from survey on sample roads is considered for the 10,000 km 'upgradation roads'. However, for the 'new construction roads' of 510 km, the estimate of base traffic on project completion is attempted separately. Existing traffic on the gravel road (510 km) and its potential generated traffic on completion of the road improvement together are verified on sample basis and found to be closer to the average traffic considered for the upgradation roads of 10,000 km network. With this background, the average daily traffic arrived from the traffic survey is considered for the full project of 10,510 km network.

9. From the available guidelines,[30] it is clear that for those projects where traffic levels 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), the consumer surplus method is recommended. Under MPRCP, the gravel roads which are already giving connectivity with considerable daily traffic (284 vehicular trips by motorized and non-motorized vehicles) are planned to improve to paved road. With this background, the 'consumer surplus' approach was used for the present economic analysis, and this is a marked difference to the methodology followed for PMGSY roads. Under this approach, only the primary traffic benefits such as savings in VOC and travel time savings were considered.

Estimating the Benefits

10. For the present analysis, the following benefits under 'consumer surplus' approach were considered:

- Traffic related benefits
  - savings in vehicle operating cost (VOC)
  - savings in travel time cost

[29] 'Evaluation Study on Rural Roads Component of Bharat Nirman', Program Evaluation Organization Planning Commission Government of India, New Delhi May, 2010

[30] 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

- Reduction in carbon emission.

I. Traffic related Benefits

11. On sample basis traffic volume survey was carried out in 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,[31] on average. Of the daily trips, 49 percent were passenger motorized vehicles, 19 percent goods motorized vehicles and the balance 32 percent were slow moving non-motorized vehicles. The traffic was assumed to grow at 5 percent annually, similar to the practice used in rural road projects in India. Also, it is assumed that when villages are connected with an all-weather paved road, their trip generation and vehicle composition pattern will change to approximately to those found in the presently connected villages with paved road, as arrived from the earlier mentioned post evaluation study results. Using this, the 'generated traffic' due to the proposed road development was estimated.

12. The savings in the VOC and passenger time value, for each vehicle category were adapted Indian Roads Congress (IRC) guidelines (2009)[32] with suitable update to 2016, as given in Tables 7.2 and 7.3. Using these unit rates and the projected traffic, VOC and travel time cost were estimated for both 'without project scenario' under gravel road and 'with project scenario' under paved road. Difference 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 7. 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)	Average Speed (Km/Hr)	Average Occupancy (Nos.)	Average Load (Tonne)	INR/Vehicle Km
M/C	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: Estimated based on the data available from Indian Roads Congress (IRC), SP 30, 2009.
Using the Wholesale Price Index (WPI), the unit rates of 2009 were updated to 2016.

Table 7. 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
M/C	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

[31] Based on the traffic Survey conducted in March 2015 by RES, GoMP on 63 roads on sample basis
[32] Manual on Economic Evaluation of Highway Projects in India (Second Revision), Indian Roads Congress, 2009 (IRC SP 30-2009)

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: Estimated using the estimated travel time cost/vehicle km in the previous table and the ratio of cost data among different roads categories available in IRC, SP 30, 2009; For road roughness, the average values of 8 IRI for gravel road and 4IRI for paved roads are considered, based on the practice followed in other rural road projects analysis.

II. Carbon Emission Reduction Benefits

13. Improved road surface from gravel to paved condition under the MPRCP will result in travel speed and fuel reduction for the motorized vehicles using the project road network. This reduction in the fuel consumption will lead to reduction in carbon emission into the atmosphere and this is a benefit to the project. With the broad assumption of average 8 IRI road surface for 'without project' engineered gravel road and 4 IRI for 'with project' paved road surface, related fuel consumption quantity, carbon emission rate (0.0023 ton/ liter), carbon cost (US$37.43 per ton in 2022)[33] and the traffic, annual carbon emission for the project under 'without' and 'with' project scenarios were estimated for the project network of 10,510 km. Resultant carbon emission is estimated to increase marginally to 97,516 ton for the project operation start year (2024). This is mainly due to the increased generated traffic after the improvement, but with reduced carbon emission rate. Available guideline (*GHG Analysis Road Improvement, Guidance Note, World Bank Group, February 2016*) was used to estimate the above discussed emission reduction benefit. However, for economic analysis, carbon emission for the normal traffic and generated traffic were treated separately.[34.]

The Cost of Construction and Maintenance

14. Construction cost for the project is estimated at US$485 million (**Table 7.4**) and this is based on the available finalized DPRs. Maintenance costs for gravel road (without project scenario) and paved road (with project scenario) arrived based on the discussions with the officials and NRRDA guidelines,[35] are used to estimate the incremental maintenance cost. 20-year analysis period (six-year program implementation from 2018 to 2023 and fourteen-year operation from 2024) 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.[36]

Table 7.4: 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
Total (Km)	**10,510**	**100**	**2.95**	**0.046**	**485.00**

[33] Estimated based on' CCGCE Guidance note on social value of carbon in project appraisal July 14, 2014, World Bank'
[34] For normal traffic, the difference in fuel consumption under 'without' and 'with' project scenarios is considered as savings and 50 percent of fuel consumption under 'with project' scenario for generated traffic is considered as savings.
[35] Unit rates for maintenance are based on the inputs from MPRRDA and NRRDA.
[36] Conversion factor of 0.85 was used to account the market distortions to financial cost by removing taxes, subsidies, grant components and so on.

Note: (a) US$ = 64 Indian Rupee (INR); (b) Cost of upgradation is based on the DPRs by MPRRDA on May 2017; (iii) Cost of new connectivity roads is based on the input from Engineering Consultant, WB and MPRRDA.

.

Economic Analysis Results

15. Considering the large number of individual project roads (4,421 roads) spread out in 51 districts, the present economic analysis was developed for the state aggregate. Economic internal rate of return (EIRR) and MIRR (assumes that the positive cash flows from the investment are reinvested at the social discount rate (SDR) or economic opportunity cost of capital (EOCC) of 6 percent),[37] and switching values were calculated along with associated ENPV discounted at 6 percent (SDR). EIRR under the base case and sensitivity scenarios for the full MPRCP project was found to be above the minimum required SDR of 6 percent and so this project is viable from the economic feasibility angle (**Table 7.5)**.

16. More than the quantifiable project benefits considered in the economic analysis which are incidental, provision of the minimum required but essential connectivity shall be considered along with the economic feasibility results.

Table 7. 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	20% increase in Construction Cost	18.2%	10.8%	30,852	172%
3	20% increase in O&M Cost	21.4%	11.5%	33,675	570%
4	20% decrease in project benefit	18.1%	10.5%	25,236	72%
5	Combined effect (Worst Scenario)	15.4%	9.5%	22,552	

Note: EIRR - Economic Internal Rate of Return; ENPV discounted @6 percent;

17. Under the counterfactual scenario without the Bank supported program, the target rural villages would continue to face the large rural road connectivity and 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 the State and also achieving the State's objectives of rural development by expanding rural road infrastructure. The World Bank's expertise within support of those areas in India and elsewhere are comprehensive, and the experiences from earlier Bank supported programs show that in addition to the necessary support for financing of these interventions, the expertise the Bank can offer in the support of the design, technical advice, monitoring and backstopping, is highly appreciated and valuable.

[37] World Bank suggested social discount rate of six percent used in other recent rural road projects is followed