

GOVERNMENT OF MADHYA PRADESH

Environment Management Framework for

World Bank assisted

Madhya Pradesh Rural Connectivity Project (MPRCP)

September 2016

**Madhya Pradesh Rural Roads
Development Authority**

**Department of Panchayat
and Rural Development,
Madhya Pradesh**

Abbreviations

AM	Assistant Manager
BT	Bituminous Top / Black Top Surface
CEO	Chief Executive Officer
CGM	Chief General Manager
CPCB	Central Pollution Control Board
CMGSY	Chief Minister Gram Sadak Yojana (Madhya Pradesh Rural Connectivity Project)
DPR	Detailed Project Report
ECOPs	Environmental Code of Practices
EMF	Environmental and Social Management Framework
ESMF	Environmental and Social Management Framework
GM	General Manager
GoI	Government of India
GoMP	Government of Madhya Pradesh
GP	Gram Panchayat
GS	Gram Sabha
IRC	Indian Roads Congress
MoEF&CC	Ministry of Environment, Forest and Climate Change
MoRD	Ministry of Rural Development
MoRT&H	Ministry of Road Transport and Highways
MoU	Memorandum of Understanding
MP	Madhya Pradesh
MPRRDA	Madhya Pradesh Rural Road Development Authority
MPRCP	Madhya Pradesh Rural Connectivity Project
NOC	No-Objection Certificate
NRRDA	National Rural Road Development Agency
PIU	Programme Implementation Unit
PRIs	Panchayat Raj Institutions
PWD	Public Works Department
RoW	Right of Way
SPCB	State Pollution Control Board
WB	World Bank

1.0 INTRODUCTION

1.1 Background and Rational

Madhya Pradesh (MP) located at the center of India, is one of the largest and the most populous Indian states. Over 32 percent of MP's population lives below the poverty line compared to the national average of 22 percent. The per capita income of the state is approximately US\$362 compared to the national average of US\$665. Poverty rates in the urban areas are lower than in rural areas for all social groups. The proportion of rural poverty in the state has declined, but at a slower pace in relation to other states. Despite progress made in recent years, the impact of growth on poverty in MP has been one of the lowest among Indian states and inequality is increasing. MP grew at an annual rate of 3.5 percent between 1999 and 2008, compared to 8 and 12 percent during 2010-11 and 2011-12 respectively, which was accompanied with a significant 12 percentage point decrease in poverty.

Madhya Pradesh has a significant agricultural base and is endowed with vast natural resources and suitable agro climatic conditions. Agriculture provides nearly 72% of all jobs, although it only contributes 33% to the state domestic product. However, with poor transport and storage infrastructure, there is a very high level of wastage in the agricultural sector. MP's industrial base is still predominantly agricultural; manufacturing and service sectors lag behind. In many ways, MP is characterized by the typical set of institutional and development problems faced by the poorest regions of India. As a result of surplus labor, MP has a large subsistent agricultural sector that co-exists with a small modern industrial sector that is localized in specific cities, namely Indore, Gwalior and Jabalpur. The organized industry employs only 6% of the total workforce. Habitation details in Madhya Pradesh are given in **Table 1.1**.

Table 1.1 Habitation Details in Madhya Pradesh

S. No.	Particular	Total Nos.	Habitations with Population			
			> 1000	500-999	250+	<250
1	Habitations in Madhya Pradesh	52117	14366	16277	12141	9333
2	Unconnected eligible Habitation upto Dec'2000	19346	5982	10949	2415	1683
3	Habitations covered in proposals upto Date	17960	5965	9793	2202	1249
4	Balance un-connected Habitations-Eligible under PMGSY	1386	17	1156	213	434

The total achievement of Madhya Pradesh for rural road connectivity up to January 2016 is given below:

Description	No. of Roads Completed	Length Completed (in Km)	Expenditure (Rs. In Crore)
PMGSY	12572	54176	13808
ADB	2554	11312	3065
Total	15126	65588	16873
Bridge	109	-	315
G. Total	15126	65588	17188

In the state, all weather BT surfaced roads already provided connectivity to population upto 500 in general blocks and upto 250 population in the tribal blocks under central government funded PMGSY Scheme. The Department of Panchayat and Rural Development under Government of Madhya Pradesh launched the “Chief Minister Gram Sadak Yojana (CMGSY)” – a Rural Road Program in year 2010 to connect with all-weather gravel standard roads to all rural habitations with population less than 500 (less than 250 in tribal blocks) in the state. The program is primarily funded by the Government of Madhya Pradesh. The Roadway width and Gravel Surface carriageway of CMGSY roads are 6.00m and 3.00m respectively. About 6300 numbers of roads in 14000 km length were already constructed under CMGSY.

After providing connectivity with the gravel standard roads under CMGSY, the social, economic and development activities are increasing manifolds in the connected villages. This resulted in substantial increase in mobility of people, agriculture produce from villages to towns, which mainly includes services (like health, education etc) / products (like agriculture equipments, machines, domestic appliances, FMCGs, etc) to rural areas. However, fugitive dust emissions during vehicles movement causing adverse impact on human health and adjoining crops, road users safety, uncomfortable riding, road safety, etc, are some common concerns associated gravel roads. Therefore further connectivity to lower populated villages through BT surface is felt necessary, which will in turn provide safer, faster, dust less and more comfortable mobility to road users.

The Project, Madhya Pradesh Rural Connectivity Program (MPRCP) is mainly upgradation of rural roads under CMGSY funded by World Bank and it covers connectivity to population less than 500 and upto 150 in general blocks and less than 250 and upto 100 population of villages in tribal blocks by upgrading gravel standards to 3.00m BT wide standard roads and new rural road also.

The World Bank through its Country Assistance Strategy commits to loans/credits to support CMGSY. The Project Development Objective (PDO) as stated in the Government’s proposal is “to upgrade rural roads to gravel standards constructed under CMGSY and to provide new strategic connections which will serve as alternate connections to key activity centers such as markets”. As such the Project Development Objective (PDO) is now to improve sustainability of rural roads constructed under CMGSY program and enhance connectivity of villages with high growth potential.

The rural road connectivity ultimately aims to ensure – (1) to improve the life cycle of CMGSY roads and good riding quality of existing roads to reduce travel time (2) that public services of health, education, employment, income etc. are available to all citizens; and (3) to improve the quality of life of under developed, disadvantaged living in rural and remote areas.

In most of the cases sufficient ROW is available on existing roads. However in some cases, it requires small portions of land from private land owners. Some of the affected persons (PAPs) or families (PAFs) belong to vulnerable/disadvantage sections (SC, ST, BPL Families, Female headed households, etc.). Out dated land records; poor participation of the communities in the program, household/agriculture waste on the side of the road– are some of the other challenges in implementing the program which can be resolved by special efforts.

The Indian Roads Congress (IRC) publication, IRC: SP: 20-2002, Rural Roads Manual, provides guidance on various aspects of rural road development, which can be adopted for

specific requirements of upgradation of existing CMGSY Gravel roads to BT standards and new rural roads under MPRCP. Towards enhancing the assessment and management of environmental and social issues in CMGSY planning and implementation, this Environmental Management Framework (EMF) has been prepared based on the review of the existing safeguard instruments. The EMF comprises of the following safeguard instruments: (i) Environmental Management Framework (SMF), and (ii) Environmental Codes of Practices (ECoPs).

1.2 Objective of MPRCP

The objective of Madhya Pradesh Rural Connectivity Program (MPRCP) is mainly upgradation of rural roads under CMGSY and connectivity to population less than 500 and upto 150 in general blocks and less than 250 and upto 100 population of villages in tribal blocks by upgrading gravel standards to 3.00m BT wide standard roads and new rural roads.

1.3 Project Components

The Chief Minister Rural Roads Program popularly referred to as CMGSY provided all weather, gravel surfaced single connectivity to smaller villages otherwise ineligible to be connected under the centrally sponsored PMGSY scheme. These road links although achieved their purpose for short term, proven to deteriorate fast and loose their riding quality, generate dust which becomes a health and road safety hazard. The Madhya Pradesh Rural Connectivity Project (MPRCP) would support enhancing the sustainability of the investment made in CMGSY by paving the gravel roads with pre-mix bituminous surfacing and other low cost durable surfacing options. The project financing would also extend to supporting the institutional capacity to deliver a timely and quality services to the beneficiaries. The operation would be implemented through two components:

Component A: Road Improvement and Mobility Enhancement (USD 672 mil, Bank financing \$282.24 m). The component has two parts: (i) 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; (ii) provides alternate connectivity to villages that have higher potential to grow faster, given additional linkages to more economic and market centers. In this context the implementation will be carried out through following subcomponents further described as follows:

A.1 Surface Sealing of Gravel Roads (approx. 10,000 km, \$448 m, Bank financing \$188.16 m):

This sub component supports the upgrading of 10,000 km existing gravel surfaced rural roads developed under CMGSY, to a sealed surface standard with a view to improve sustainability of connectivity provided to the villages. Implementation will be in two phases of 5,000 km each to be completed over a total period of approximately 3-4 years. On completion, a total of XX villages will benefit from all weather, resilient sealed road connectivity. In addition to the conventional sealing using pre-mix bituminous concrete, modified asphalt using plastic waste in the area and other surface sealing options that provide cost effectiveness and less carbon foot print will be piloted.

A.2 Provision of Alternate Connectivity (Approx. 3,000 km, \$224 m, Bank financing \$94.08 m):

This sub component supports the provision of additional links to 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 3000 km of such links will be constructed benefiting villages. The proposed innovations in the

surface sealing operations will also be applied in this sub component as appropriate.

Emphasis will be given to the use of locally available materials including for construction of boundary stones, guard stones, km stones etc. Alternative cheaper and greener sealing options such as bituminous binder blended with waste plastic, surface treatment, etc. will be explored and piloted. Given the small size of the roads, it is expected that the civil works will be packaged and procured under NCB procedures; generally comprising of packages of Rs. 10 - 50 m (approx.USD150,000-750,000) in line with existing PMGSY practice.

Component 2: Institutional Development (USD 3.5 million, Bank financing \$1.47 m)

The institutional strengthening will focus on the following key areas: (i) developing automated web project management system (e-PMS) with a capability to collect design, construction, quality control and contract management and payment certificates data electronically on a web based platform; (ii) improving road asset management by enhancing the existing EMARG developed under CMGSY with possible linkages with the Unified Road Information System developed by MPRIDC and maintenance management system developed under PMGS; (iii) reinforcing the engineering design and research unit of MPRRDA to develop capacity to review third party designs, provide support to field based staff on design problems during execution and; (iv) training of MPRRDA staff in design, procurement, contract management, road safety, social and environmental management of road projects.

Component 3: Road Safety Management Capacity Development (USD 13 million, Bank financing USD 5.46 m): this component supports MPRRDA and other Government departments to build their capacity in managing the state's road safety program. The main elements of the component include: (i) developing a Road Crash Database Management System (RCDMS) anchored at MP traffic police but with the capability of crowd sourcing crash data; (ii) establishing MP's road safety training institute in partnership with Coca Cola India and developing a core training curriculum for drivers, mechanics, police, other road users, road safety program managers and technicians, etc.; (iii) making use of the training institution, design an annual statewide Road Safety campaign; and (iv) piloting a speed management program along high risk corridors.

1.4 Project Beneficiaries

MPRCP is likely to cover connectivity to population less than 500 and upto 150 in general blocks and less than 250 and upto 100 population in tribal blocks. It will provide safer, faster, dust less and more comfortable mobility to rural road users. Project beneficiaries include rural population *i.e.* farmers, village communities including, vulnerable sections such as women, schedule castes, schedule tribes who are required to access services and different facilities – educational, medical, mandis (markets). Besides, other beneficiaries would include: traders, merchants, vehicle operators to reach producers and service users' in these villages operators, staff of departments such as Police in reaching crime or accident spots; PHED in supplying water tankers for supplying water to communities in water scarce areas), etc.

1.5 Need for Environmental Management Framework

The rural roads under MPRCP are spread in various parts of Madhya Pradesh with varying geographical, topographical and socio- economic conditions. The heterogeneous characteristics at the rural road roads level, in terms of locations and engineering designs, warrant a mechanism to bring a homogeneous approach in the planning, design and

execution of environmental management activities for such works. This has necessitated preparation of a document that will help and guide the Implementing Agency (MPRRDA, Govt. of Madhya Pradesh) in selection of appropriate technique/s to carry out planning, design and implementation of environmental management activities in line with the type and nature of civil works proposed under the project. Therefore, although the general thrust and broad project interventions are well understood, the specific details pertaining to planning and design of the rural roads that the project envisages to support, will be completely known only later in the project cycle.

In the given context, an Environmental Management Framework (EMF) serves as an appropriate tool, allowing for flexibility within the boundaries set forth by the requirements of the World Bank's operation policies and the country's regulatory mechanisms.

The works proposed under the project have a potential to trigger some adverse environment and social impacts in the process, if the works are not properly planned and managed. Also, some opportunities to enhance the positive benefits of the interventions exist, which can be integrated into the planning and design process early-on, provided a clear-cut guidance is available. Therefore, an Environmental Management Framework (EMF) for the project offers the required flexibility in guiding the process of dealing with the unwarranted environmental impacts and would help in augmenting the positive benefits for both situations – for rural roads where engineering interventions are known and those rural roads where engineering design is yet to be initiated.

The framework describes the principles, objectives and approach to be followed in avoiding, minimizing and mitigating the adverse environmental impacts that are likely to arise as a result of the implementation of the various reconstruction activities under the MPRCP.

The framework details out the various policies, guidelines and procedures that need to be integrated during the planning, design and implementation cycle of the World Bank-financed project in the state of Madhya Pradesh. It also outlines the indicative management measures required to effectively address or deal with the key issues that have been identified. The required institutional arrangements for implementing the EMF have also been outlined as a part of this framework.

1.6 Purpose and Objectives for Environmental Management Framework

Good environmental management practices are essential and integral elements of sound project preparation and implementation. More specifically, the EMF seeks to:

- Establish clear procedures and methodologies for environmental planning, review, approval and implementation of sub-projects to be financed under the Project.
- To provide practical guidance for planning, designing and implementing the environmental management measures.
- Specify appropriate roles and responsibilities, and outline the necessary reporting procedures, for managing and monitoring environmental and related social concerns of the project and;
- Determine the institutional arrangements, including those related to training, capacity building and technical assistance (if required) needed to successfully implement the provisions of the EMF.

The application and implementation of the EMF therefore, will:

- Support the integration of environmental aspects into the decision making process of all stages related to planning, design, execution, operation and maintenance of rural roads under the project, by identifying, avoiding and/or minimizing adverse environmental and social impacts early-on in the project cycle,
- Enhance the positive/sustainable environmental and social outcomes through improved/ sensitive planning, design and implementation of activities,
- Minimize environmental degradation as a result of either individual projects or through their indirect, induced and cumulative effects, as much as possible,
- Protect human health, and
- Minimize impacts on cultural property.

The use/implementation of the EMF will also support the achievement of compliance with applicable laws and regulations as well as with the requirements of relevant World Bank policies on environmental safeguard aspects.

1.7 Key Contents of the Environment Management Framework

The EMF comprises of the following safeguard instruments:

1. Environmental Management Framework (EMF) (this document);
2. Environmental Codes of Practices (ECoPs).

These two documents together are referred as Environmental Management Framework (EMF) in the report.

1.8 Revision/ Modification of the EMF

The EMF will be an ‘up-to-date’ or a ‘live document’ enabling revision, when and where necessary. 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. Such revisions will also cover and update any changes/modifications introduced in the legal/regulatory regime of the country/state. Also, based on the experience of application and implementation of this framework, the provisions and procedures would be updated, as appropriate in consultation with the implementing agencies/ departments and with approval of the World Bank.

1.9 Limitations of the EMF

This Environment Management Framework has been developed in line with applicable World Bank’s Operational Policies (OPs) and is based on the national & state laws and regulations, as applicable at the time of preparation of this document. Any proposed modifications in the laws, regulations or guidelines that were notified as ‘draft’ at the time of preparation of this document have not been considered.

1.10 Disclosure of Safeguard Instruments

The borrower will disclose the completed EMF and ECOPs and translated version of these documents in Hindi language on its website, besides disclosing at district level.

2.0 Environmental Profile of Madhya Pradesh

2.1 Location

Graphically, Madhya Pradesh state located at middle of India in plains between latitude 21°04'N-26.87°N and longitude 74°02'-82°49' E, Madhya Pradesh state is exactly located in center of the India map so it known as the “Central Region” of India and also known as the “Heart of India” or " Central India". In area wise Madhya Pradesh is second largest state of India, with Rajasthan being the first, before making “Chhattisgarh” till year 2000, it was the largest state of India in area-wise. Madhya Pradesh is fifth largest state in population wise.

Madhya Pradesh lies in the middle of India with sharing its border five bordering states. Its south-east border touch Chhattisgarh, south-west border touches Maharashtra, western border touches Gujarat, north-west border touches Rajasthan, and north-east border touches Uttar Pradesh. The total area of Madhya Pradesh state covers is 308245 sq km separated with the 50 districts of the state. District Map of Madhya Pradesh State is shown in **Figure 2.1**

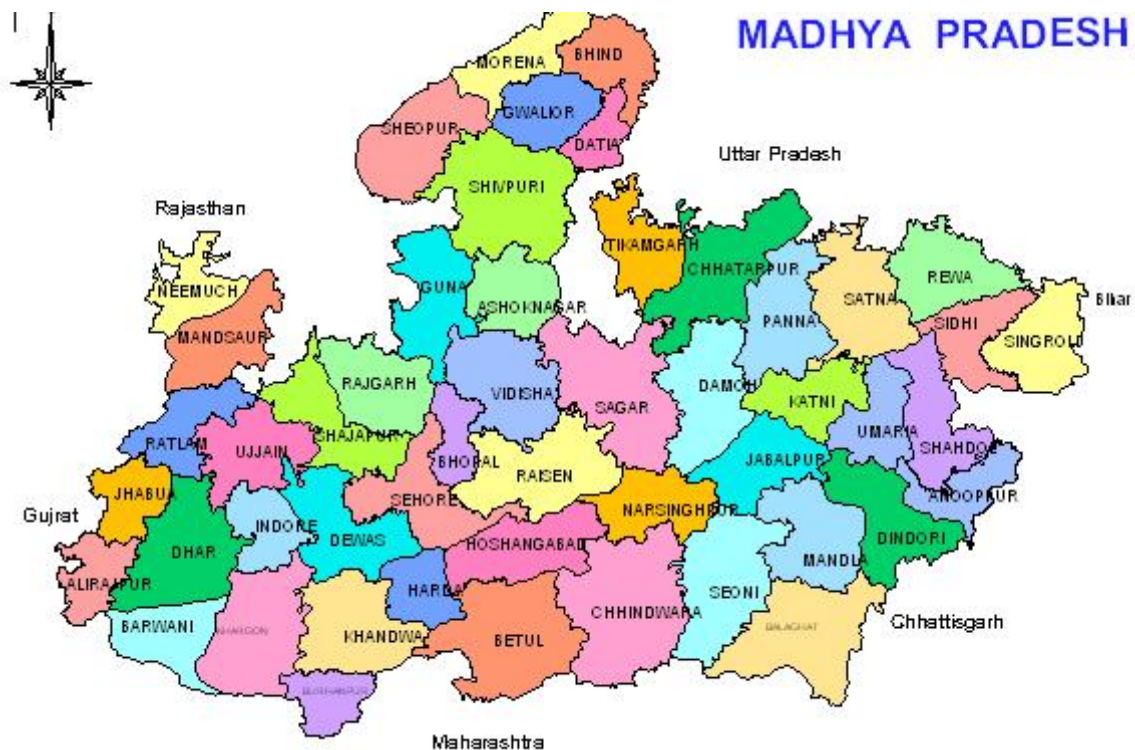


Figure 2.1: District Map of Madhya Pradesh

2.2 Topography

The topography of Madhya Pradesh is defined by the Narmada Sone Valley. It is a narrow and long valley extending through almost the whole of the state from east to west. Sone valley forms the upper part; Shahdol and Sidhi districts lie in this valley. The lower part forms the Narmada valley. It has an average elevation of 300 m above mean sea level and is covered with alluvial

soil. Jabalpur, Mandla, Narsinghpur, Hoshangabad, Raisen, Khandwa, Khargone and Barwani districts lie in this region. The Sone valley is narrower than Narmada valley and alluvial deposit is also comparatively poor and thin, therefore Narmada valley is more important than Sone valley for agricultural activities. To the north of this valley lie the Central Highlands, to the south the Satpura-Maikal ranges and to the south-east, the eastern plateau. These three form the natural physiographic regions-into which the state is divided.

The Central Highlands are spread between the Narmada-Sone valley and the Aravali ranges to the west in a triangular form. The highlands slope towards the north and drain into the Yamuna. The central highlands region in the state includes the following four uplands:

The Rewa-Panna plateau is one, also known as the Vindhyan plateau, lies in the north- eastern part of the central highlands. The main rivers flowing in the area are Ken, Sonar, Barna and Tons. Rewa, Panna, Satna, Damoh and Sagar districts lie in this region. The other is Bundelkhand plateau located to the north-west of the Rewa-Panna plateau. Datia, Chhatarpur, Panna, Tikamgarh and parts of Guna and Shivpuri districts forming the northern part of the state lie in this region. The plateau is bounded in north-east by Vindhyan escarp lands or Rewa-Panna plateau. The average height of the region is 350-450 m above MSL and general slope is towards north. The main rivers flowing in the area are Betwa, Dhasan and Jamner which finally join Yamuna.

Central India plateau is the third that lies to west of Bundelkhand plateau. Shivpuri, Morena and Gwalior districts exist in this region. This plateau has an average elevation of 450 m on highlands and 150-450 m above MSL in valleys. Chambal, Kali Sindh and Parvati are the main rivers flowing in this area. The fourth Malwa plateau covers almost the entire western Madhya Pradesh. The plateau is bounded in the north by Chambal and in south by the Narmada. The average elevation ranges between 300-500 m above MSL. Shajapur, Dewas, Indore, Ujjain, Dhar, Ratlam and parts of Sehore and Jhabua districts lie in this region. Bhopal is situated at the eastern edge of the Malwa plateau. Shipra, Parvati, Kali Sindh, Gambhir and Chambal rivers flow through the Malwa plateau. It also forms the water divide between the Ganga and the Narmada basin. The soil in the area is mostly black cotton as a result of weathering of basalts.

2.3 Climate

Madhya Pradesh has a subtropical climate. Like most of north India, it has a hot dry summer (April–June), followed by monsoon rains (July–September) and a cool and relatively dry winter. The average rainfall is about 1371 mm. It decreases from east to west because monsoon wind moves from east to west and drained clouds in eastern parts takes less quantity of water vapours with them to western parts. The south-eastern districts have the heaviest rainfall, some places receiving as much as 2150 mm, while the western and north-western districts receive 1000 mm or less.

2.4 Soil

Soil of Madhya Pradesh vary as per the structure, colour, texture and composition in the different regions. Madhya Pradesh is that part of the peninsular plateau of India where residual soil are found in an extensive area. The rock formation determines the soil structure and composition in this state. As a result of this, organic materials are found at a large scale in soil. In this state, the problem of soil erosion is almost negligible but due to excessive use of the land. Madhya Pradesh comprises of a variety of soil ranging from rich clayey to gravelly. According to the survey done in the state, the major groups of soil found in the state can be

divided into five major categories namely alluvial soil, black soil or regur soil (medium and deep black, shallow and medium black, mixed red and black coloured), clayey soil, mixed soil, red and yellow Soil.

Alluvial soil is mostly found in the northwest part of Madhya Pradesh, mainly Morena, Bhind, Gwalior and Shivpuri districts. It is spread over a large area in the frontier region of the Gangetic Valley, which is made of Bundelkhand gneiss and soil deposited by the Chambal River and its tributaries. Due to lack of Nitrogen, biotic components and phosphorus, the vegetal cover over the part of land is very thin.

Medium and deep black coloured soil is extensively found in the Valley of Narmada River, Malwa Plateau, and Satpura mountain range, which contains about 20 to 60 percent clay and has a depth of near about 1 to 2 metres. This soil is highly fertile for the production of wheat, oilseeds, and jowar crops. Shallow and medium black coloured soil constitute the maximum part of the black soil. It is comparatively less fertile than the medium deep black soil. The whole northern part of the Malwa plateau and Nimad region comprise this soil. It is 15 cm to one metre depth and the colour of soil is grey or light black. Mixed red and black soil spreads about 75 Lakhs hectares land comprising the Satpura region. Most of the part of the region has very shallow soil. Three districts namely Chhindwara, Betul, and Seoni districts comprise this type of soil.

Clayey soil is mostly found in the flood plain, and it is mainly transported and deposited by the rivers during flood. This soil is favourable for the production of wheat, sugarcane, and cotton. The areas which consist of this type of soil include Bhind, Morena, and Gwalior. Clayey soil is mainly deposited by the river Chambal and its tributaries. Vindhya region and the central part of the state of Madhya Pradesh have a deposition of mixed soil composed by red, yellow and black soil. The soil lacks phosphate, nitrogen, and carbon, and hence it is less fertile. Mostly, millets are grown in this soil. The entire Baghelkhand region including Balaghat district, Mandla, Dindori and Shahdol districts of the state have a deposition of red and yellow soil.

The major types of soil found in the state are:

- Black soil, most predominantly in Malwa region, Mahakoshal and in southern Bundelkhand
- Red and yellow soil, in Baghelkhand region
- Alluvial soil, in Northern Madhya Pradesh
- Laterite soil, in highland areas
- Mixed soil, in parts of Gwalior and Chambal division

2.5 Drainage

Drainage system in Madhya Pradesh is divided into four major divisions including the rivers that are flowing towards the north, the rivers that are flowing towards the west, the rivers that are flowing towards the east, and the rivers, which are flowing towards the south-east direction. In the first group or division of drainage pattern of Madhya Pradesh, the rivers flow into the Yamuna River and the Ganga River. The rivers are Chambal River, Betwa River, Ken River, and Son River and their tributaries. The Narmada River, Tapti River and its tributaries flow towards the west and are fed into the Bay of Cambay. The eastern drainage system is the upper basin of the Mahanadi River and its tributary. Indravati River, the tributary of the Godavari River, flows towards the southwest.

Drainage pattern in the state of Madhya Pradesh is divided into several significant river systems including Narmada River, Tapti River, Chambal River, Betwa River, Kali Sindh River, Son River, etc. Narmada River originating from Amarkantak hills, it flows towards west before entering the state of Gujarat and finally into Bay of Cambay near Bharuch in Gujarat. The total length of the Narmada river is about 1312 km. The Narmada river is considered as a holy river of India. It passes through several cascades, waterfalls, and gorges, during its course. The course of the river also covers the world famous Dhuandhar fall and Bhedaghat gorge near Jabalpur. The Narmada river flows through the many districts such as Mandla, Jabalpur, Narsinghpur, Hoshangabad, Khandwa and Khargone Districts.

The Narmada is the longest river in Madhya Pradesh. It flows westward through a rift valley, with the Vindhya ranges sprawling along its northern bank and the Satpura range of mountains along the southern. Its tributaries include the Banjar, the Tawa, the Machna, the Shakkar, the Denwa and the Sonbhardra rivers. The Tapti River runs parallel to Narmada, and also flows through a rift valley. The Narmada–Tapti systems carry an enormous volume of water and provide drainage for almost a quarter of the land area of Madhya Pradesh.

The Vindhyas form the southern boundary of the Ganges basin, with the western part of the Ganges basin draining into the Yamuna and the eastern part directly into the Ganges itself. All the rivers, which drain into the Ganges, flow from south to north, with the Chambal, Shipra, Kali Sindh, Parbati, Kuno, Sind, Betwa, Dhasan and Ken rivers being the main tributaries of the Yamuna. Shipra River is one of the most sacred rivers of Hinduism. It is the site of the Simhastha Kumbh Mela, which is held every 12 years. The land drained by these rivers is agriculturally rich, with the natural vegetation largely consisting of grass and dry deciduous forest types, largely thorny. The eastern part of the Ganges basin consists of the Son, the Tons and the Rihand Rivers. Son, which arises in the Maikal hills around Amarkantak, is the largest tributary that goes into the Ganga River on the south bank and that does not arise from the Himalayas. Son and its tributaries contribute the bulk of the monsoon flow into the Ganga River, because the north bank tributaries are all snow fed. The forests in their basins are much richer than the thorn forests of the northwestern part of Madhya Pradesh.

The Satpuras, in the Gawilgarh and Mahadeo hills, also contain a watershed, which is south facing. The Wainganga, the Wardha, the Pench, the Kanhan and Penganga rivers, discharge an enormous volume of water into the Godavari river system. The Godavari basin consists of sub-tropical, semi-moist forests, mainly in the valley of the Indrawati. There are many important multi-state irrigation projects under development, including the Godavari River Basin Irrigation Projects in the Madhya Pradesh.

2.6 Land Use Pattern

In the state net sown area in the Madhya Pradesh state was 47.91 % followed by forest area (28.28 %), area not available for cultivation (11.05 %), permanent pastures and other grazing lands (4.38 %), culturable wasteland (3.83 %), current fellow (2.50 %), fellow land other than current fellow (1.99 %), land under misc. trees crops & groves (0.06 %).

2.7 Forest Resource

Madhya Pradesh is endowed with rich and diverse forest resources. It is a reservoir of biodiversity. The geographical area of the state is 3,08,252 sqkm which constitutes 9.38% of the land area of the country. The forest area of the state is 94689.38 sqkm constituting 30.71% of the geographical area of the state and 12.44% of the forest area of the country. Legally forest area has been classified into "Reserved Forest, Protected Forest and Unclassified Forest", which constitute 65.37%, 32.84% and 1.7% of the forest area, respectively. Forest Map of Madhya Pradesh is shown in **Figure 2.2**.



Figure 2.2 Forest Map of Madhya Pradesh

2.8 Flora and Fauna

Madhya Pradesh is home to 9 national parks, including Bandhavgarh National Park, Kanha National Park, Satpura National Park, Sanjay National Park, Madhav National Park, Van Vihar National Park, Mandla Plant Fossils National Park, Panna National Park, and Pench National Park. There are also a number of natural preserves, including Amarkantak, Bagh Caves, Balaghat, Bori Natural Reserve, Ken Gharial, Ghatigaon, Kuno Palpur, Narwar, Chambal, Kukdeswar, Narsingharh, Nora Dehi, Pachmarhi, Panpatha, Shikarganj, Patalkot and Tamia. Pachmarhi Biosphere Reserve in Satpura Range, Amarkantak biosphere reserve and Panna National Park are three of the 18 biosphere reserves in India.

Kanha, Bandhavgarh, Pench, Panna, and Satpura National Parks are managed as Project Tiger areas. Sardarpur sanctuary in Dhar and Sailana are managed for conservation of Kharmor or Lesser Florican. Ghatigaon sanctuary is managed for great Indian bustard or Son Chiriya. The National Chambal Sanctuary is managed for conservation of gharial and mugger, river dolphin, smooth-coated otter and a number of turtle species. Ken-gharial and Son-gharial sanctuaries are managed for conservation of gharial and mugger. Barasingha is the state animal and Dudhraj is the state bird of Madhya Pradesh. Based on composition, the teak and sal forests are the important forest formations in the state. Bamboo-bearing areas are widely distributed in the state.

2.9 Agriculture

The major crops grown in Madhya Pradesh include paddy, wheat, maize and jowar among cereals, and gram, tur, urad and moong among pulses, while soybean, groundnut and mustard among oilseeds. Cash Crops like cotton and sugarcane are also grown in few districts of the state. Agriculture is the mainstay of State's economy as 74.73 per cent of the people are rural. As much as 49 % of the land area is cultivable. The productivity of major crops like wheat, rice, pulses has also been good.

2.10 Minerals

Minerals in Madhya Pradesh occur in abundance in its several districts. The state of Madhya is said to have a favourable geotectonic setting that accommodates every episode of mineralisation the earth has experienced. It includes the occurrences of almost all varieties of minerals required as industrial input in the growing economy. 16 major minerals are considered of specific importance as they contribute significantly in development of economy of the state. These include the Limestone, Bauxite, Coal, Manganese ore, Diamond, Base metals, Dolomite, Rock Phosphate and Granite. Others minerals in the state include Marble, Flagstone, Slate, Calcite, Quartz and Silica sand, Molybdenum and Fire clay.

3.0 Legislations and Policies Applicable

3.1 Legal Provisions - Environmental Management

The legislations of Government of India (GoI)/ Government of Madhya Pradesh applicable for MPRCP regarding environmental aspects and applicable safeguard policies are summarized in the following sections.

i) Environmental Clearance as per Environmental Impact Assessment (EIA) Notification 2006

In the Environmental Impact Assessment (EIA) Notification 2006 as amended time to time issued by MoEF&CC under Environmental (Protection) Act, 1986, construction rural roads are not scheduled activity. Therefore, environmental clearance is not required for any rural roads under MPRCP project.

ii) Forest Clearance as per Forest (Conservation) Act 1980

The Forest (Conservation) Act 1980, (as amended 1998) pertains to the cases of diversion of forest area if rural road is passing through forest land and felling of roadside plantation on forest land.

Applicability: Restrictions and clearance procedure proposed in the Forest (Conservation) Act applies wholly to the rural roads requiring diversion of forest areas, even in case the protected/designated forest area does not have any vegetation cover.

iii) Wildlife Clearance under The Wildlife (Protection) Act, 1972

The Wildlife (Protection) Act provides for the protection of wild animals' birds, plants and for matters connected therewith.

Applicability: Restrictions/protection measures and clearance procedures proposed in the Wildlife (Protection) Act applies to the rural road passing through notified wildlife protection areas, including national park, sanctuaries, bio reserves, etc.

iv) Eco-sensitive Zone Permission as per The Environmental (Protection) Act, 1986

The Environmental (Protection) Act, 1986 declares eco-sensitive area around environmentally sensitive and protected areas like, national park, wildlife sanctuary, etc.

Applicability: It applies to the sub-projects passing through declared/notified eco-sensitive zone, require permission from National Board for Wildlife (NBWL).

v) Consents under Water (Prevention and Control of Pollution) Act 1974, as amended 1988.

The Water (Prevention and Control of Pollution) Act 1974 is enacted to prevent pollution of water sources through the industrial or any other construction activity and for maintaining or restoring of wholesomeness of water. The Contractor needs to take Consent to Establish (CTO)

and Consent to Operate (CTO) under water act.

Applicability: No significant water pollution expected from the project activities as black topping is key activity and construction of new roads, where requirement of water is minimum. However, care will be taken for proper storage of bitumin and lubricants. The project may also include setting up of worker's camp and other construction equipment. The Contractor needs to take consent for setting up and for operation of the equipment/worker's camp.

vi) Air (Prevention and Control) of Pollution Act as amended in 1987

The Air (prevention and control of pollution) Act is enacted to prevent and control air pollution. The Emission and air pollutants standards are prescribed under this Act.

Applicability: The project includes setting up of hot-mix plants, aggregate crushing plants and other construction vehicles and equipment. The contractors need to take Consent to Establish (CTE) and Consent to Operate (CTO) for setting-up hot mix plant (HMP) and crushing plants. The vehicles and equipment to confirm to emission standards as per applicable norms.

vii) Noise Pollution (Regulation and Control) Rules, 2000

The Noise Pollution (Regulation and Control) Rules 2000 are promulgated under Environmental (Protection) Act, 1986.

Applicability: The referred rules will be applicable for meeting noise pollution standards during construction activities, DG sets operation, etc.

viii) Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008

This rule provides 'cradle-to grave' or comprehensive guidance for collection, treatment, transport, storage and disposal of hazardous wastes and requirement to obtain authorization from concerned State Pollution Control Board (SPCB).

Applicability: This rule is applicable, if hazardous wastes like used oil, bitumen waste etc is generated from machineries and hot mix plant required for rural road constructions.

ix) Solid Waste (Management & Handling) Rules, 2016

The Solid Waste (Management & Handling) Rules, 2016 governs collection, segregation, transportation, and disposal of types of solid wastes, This Rules seeks to minimize the burden of on landfills for the disposal of municipal solid wastes by adopting appropriate waste segregation and disposal technologies. Establishing construction camp during construction phase of rural roads will attract the provisions of this rule and warrant proper collection, segregation and disposal of solid wastes, especially from camp and plant sites.

x) Construction and Demolition Waste Management Rules, 2016

This Construction and Demolition Waste Management Rules 2016 governs disposal of construction and demolition wastes. During demolition of old bridge/culverts and construction of new bridges/culverts, construction and demolition wastes will be generated. Such wastes will be properly collected and managed as per this rule.

xi) Ancient Monuments and Archaeological sites & Remains Act, 1958

The provisions of the Act include Conservation of Cultural and Historical remains found in the project area.

Applicability: The provisions of the Act need to be considered during rural roads planning and designing to ensure that any ancient monuments and archeological sites of importance are not affected due to the rural roads under the project. In addition, all the construction related activities shall necessarily avoid such sites (if any).

3.2 Key Statutory Clearance Requirement – Construction Stage

During the construction stage of rural roads under the project, some of the key statutory requirements that need may need to be obtained by the Contractor as a part of mobilization (pre-construction) have been listed in the table given below:

Key Statutory Clearances to be Obtained (as applicable) by the Contractor

S. No.	Clearance Required for	Statute under which Clearance is required	Statutory Authority
1.	Consent to Establish and Consent to Operate for Hot mix plant, crusher and batch mix plant	Air (Prevention and Control of Pollution) Act, 1981 and Noise Pollution (Regulation and Control) Rules, 2000	Madhya Pradesh Pollution Control Board
2.	Hazardous Waste Authorization for Storage, handling and transport of hazardous materials	Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008	Madhya Pradesh Pollution Control Board
3.	Quarries (in case of opening of new quarries)	EIA notification 2006 under Environment Protection Act, 1986	District Level Environmental Impact Assessment Authority
4.	Permission for Sand Mining from River Bed and Borrowing of Earth	EIA notification 2006 under Environment Protection Act, 1986	District Level Environmental Impact Assessment Authority
5.	Forest Clearance /Tree Cutting Permission	Forest Conservation Act, 1980	Forest Department / MoEF&CC
6.	Eco-sensitive Zone Permission	Environment Protection Act, 1986	NBWL/MoEF&CC
7.	Wildlife Clearance	The Wildlife (Protection) Act, 1972	Hon'ble Supreme Court /MoEF&CC

Other Applicable Law

Environmental issues during construction stage of rural roads generally involve equity, safety and public health issues. The road construction agencies require complying with laws of the land, which include *inter alia*, the following:

Workmen's Compensation Act 1923: The Act provides for compensation in case of injury by accident arising out of and during the course of employment;

Contract Labour (Regulation and Abolition) Act, 1970: The Act provides for certain welfare measures to be provided by the contractor to contract labour;

Minimum Wages Act, 1948: The employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act;

Payment of Wages Act, 1936: It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers;

Equal Remuneration Act, 1979: The Act provides for payment of equal wages for work of equal nature to Male and Female workers and not for making discrimination against Female employees;

Child Labour (Prohibition and Regulation) Act, 1986: The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and processes. Employment of child labour is prohibited in Building and Construction Industry;

Inter-State Migrant Workmen's (Regulation of Employment and Conditions of Service) Act, 1979: The inter-state migrant workers, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, travelling expenses from home to the establishment and back, etc.;

The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and the Cess Act of 1996: All the establishments who carry on any building or other construction work and employs 10 or more workers are covered under this Act; the employer of the establishment is required to provide safety measures at the building or construction work and other welfare measures, such as canteens, first-aid facilities, ambulance, housing accommodation for workers near the workplace, etc.;

3.2 Information Disclosure

3.2.1 Right to Information (RTI) Act, 2005

This Act relate to public access to information under the control of public authorities. The Act has provisions access to information held by or under the control of any public authority and includes: (i) the right to: Inspection of work, documents, records; (ii) taking notes, extracts or certified copies of documents or records; (iii) taking certified samples of material'; (iv) obtaining information in the form of diskettes, compact disk, tapes, video cassettes or in any other electronic mode or through printouts where such information is stored in a computer or in any other device.

Applicability: It empowers people to obtain information on the project. To facilitate project stakeholders obtain requisite project information. MPRCP provides for dissemination of information and procedures, entitlements, project costs, selection criteria of roads etc.

3.3 Applicable World Bank Safeguard Policies

The World Bank's safeguard policies applicable to the MPRCP project are detailed below.

Table 3.1: Applicable World Bank Environmental Safeguard Policies

S. No.	World Bank Policy	Applicability Due to	How Project Address Policy Requirements?
1.	Environmental Assessment OP 4.01	Project is likely to have impacts on environmental components such as on ambient air quality water bodies, existing slopes in on embankment, trees along the road, etc.	Preparation and application of environmental Codes of Practice for addressing environmental issues.
2.	Natural Habitats OP 4.04	Some rural roads are likely to be in/close to sensitive natural habitats.	Avoidance measures, including non-inclusion of such sub-projects in the project.
3.	Forests OP 4.36	Some rural roads are likely to be in/close to forest areas and may need forest land diversion, if forest land is involved.	Preparation of a management plan to address impacts, if any and avoidance/minimization of construction and allied activities in forest areas.
4.	Physical Cultural Resources OP4.11	The project entails risk/ damage to cultural properties and has likelihood of chance-finds during construction phase.	Provisions made for relocation of cultural properties and protection of the same through design modifications and other measures.

Apart from compliance to the above policies, the project will comply with the bank procedure, BP17.50. Disclosure shall be carried out at all stages of the project as at planning stage, prioritization stage, project preparation stage and implementation stages. The list of roads shall be displayed at the project planning stage and project information brochure shall be distributed at the prioritization and project preparation stages. Consultations shall be conducted with the community and the PRI at the project preparation and implementation stages.

4.0 Environmental Issues and Management Measures

Under the MPRCP, 10,000 km gravel rural roads and 3,000 km new construction of rural roads have been included. In the 10000 km length, gravel roads will be upgraded to BT roads mainly through surface ceiling with required profile correction and construction of CD structures as per local requirement. Therefore, up-gradation of gravel roads is not likely to create adverse environmental impacts like new road particularly during the construction stage. While construction of 3000 km new road cumulative direct, indirect and induced adverse impacts resulting can cause significant damage to environment, if not addressed appropriately. While deficiencies in planning and design of new sub-projects can lead to insufficient arrangements to conserve natural drainage pattern, inadequate slope stabilization provisions and improper disposal of construction wastes can cause soil erosion, siltation of water bodies and degradation of scenic value. Therefore, more robust planning and design of new sub-projects will be required to avoid, minimize and manage adverse environmental impacts.

Sub projects under MPRCP from gavel surface to BT surface 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/regional drainage. Adverse environmental impacts resulting from poor sub-project locations and/or design; worksite safety management; drainage; and construction materials management are other 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, to be provided in the ESMF.

In addition, for new rural roads, 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.

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

The MPRCP will contribute to positive socio-economic growth both locally and at the regional level by removing barriers to rural connectivity in the project districts. Local farmers and inhabitants in the area of influence of the rural roads as well as the road users are expected to be direct beneficiaries of the MPRCP. These people will have improved access to medical facilities, educational institutions, agricultural markets, etc.

Benefit will also accrue from the savings in travel time and transportation costs. Other expected positive outcomes of the MPRCP include improved access to a larger number of socio-economic opportunities, better health services, facilities and higher levels of education and improved road safety. While socio-economic benefits are likely to accrue due to the rural road works, some adverse cumulative impacts on natural, physical and

social environment are also likely to occur during design, construction and operation phases of the project.

Options to address the various environmental issues identified have been worked out based on review of good practices and compliance to the legal provisions. Inputs from the key stakeholders, including the executing agencies and the line agencies were also used for the said purpose.

4.1 Screening of Rural Roads

A screening and review process for identification of sensitive rural roads with respect to environmental issues has been worked out. The screening exercise shall be carried out by the PIUs prior to initiation of the DPR activities. The screening exercise shall be a useful tool to identify the environmental issues, and thereby integrate them into the project preparation, and not as an exclusion criterion for avoiding environmental impacts. The environmental screening criteria include factors/aspects such as:

- Sensitive areas, natural habitats, protected areas and forests,
- Loss of productive agricultural land,
- Cuts across perennial streams or surface water bodies,
- Vulnerability to natural hazards, flood, and
- Environmental features as marshy areas, sand dunes, etc.

The screening shall enable categorization of rural roads based on their environmental sensitivity as follows:

(i) Rural roads, wherein no significant adverse environmental impacts are expected:

- The environmental impacts will be of the type normally associated with standard rural road construction.
- The measures suggested in the ECoPs shall be adequate to address the general environmental issues likely in rural roads under the project.

(ii) Rural Roads, wherein there is a potential significant adverse environmental impacts:

There is a likelihood of adverse impacts requiring specific interventions such as rural roads passing through forests, sanctuaries and thereby requiring additional environmental analysis. In such cases:

- Rural roads traversing through sensitive natural habitats will be identified and assessed in terms of their impacts. Rural roads where adverse impacts are anticipated will not be included under the project unless proper permission is sought from concern department.
- If the rural roads assessment in cases located close to sensitive habitats reveals that impacts can be avoided/mitigated, a management plan will be prepared in line with ECoP 19.
-
- Vulnerability to natural hazards, flood, etc will be assessed and relevant ECoPs will be applied.

- In addition to the application of ECoPs, the PIU shall undertake the particular road improvement work in compliance with the statutory/regulatory provisions, as applicable.

4.1.1 Avoidance of Rural Roads involving Forests and Wildlife Issues under MPRCP

MPRRDA informed that before construction of 10000 km gravel roads under CMGSY, which are part of MPRCP, status of the wild life and forest was checked/verified and joint inspections were carried by PIUs and concerned Forest Officers to identify involvement of Forest and Wildlife issues in affected rural roads. Broadly, rural roads involving forest land and wildlife issues were constructed after obtaining proper forest and wild life clearance. Further, preparation of DPRs for rural roads under MPRCP, DPR consultant and PIUs shall once again verify Forest and Wildlife issues in the rural roads. MPRRDA has decided that only such road shall be taken under the MPRCP, which are free from Forest and Wildlife issues. In subsequent phases rural roads passing through forest area will be included after obtaining requisite/necessary permission from the forest department.

In the Madhya Pradesh state, roads network connecting habitation with up 100 population was superimposed on GIS based *i-Geo Approach* computer portal, which has been converted to e-MARG. Geo-MMGSY has also been developed for planning of rural connectivity to villages in Madhya Pradesh state. These geo-portals shall also be used of identification and verification of involvement of forest land or existence of wildlife/natural habitats issues in the surrounding of rural roads selected under MPRCP

4.2 Environmental Codes of Practices (ECoPs)

The ECoPs were developed to guide the planning, design, construction and maintenance stages of PMGSY program (also applicable for CMGSY – MP RCP) in terms of avoidance or mitigation of the adverse environmental impacts.

Implementation of environmental measures shall be monitored through the environmental audit procedures provided in ECoPs. This includes format for reporting the addressal of issues in various stages of the project.

Scope of Environmental Code of Practices (ECoPs)

- To form a field guide manual to the planners, field engineers and contractors too.
- To identify project activities that can have potential environmental impacts and to provide mitigation measures.
- Demonstrate road design and construction practices that are cost-effective and address environmental impacts.
- Illustrate recommended practices to address the environmental concerns during project planning implementation and operation.
- Define role of involvement of the rural communities at different stages of the project. and
- Achieve MPRCP objectives of rural connectivity through roads planned and constructed to blend with the natural surroundings.

The Environmental Codes define methods and procedures to be followed by executing agencies, contractors and other agencies involved in the state. The scope of the ECoPs is outlined in the Box given above.

The list of ECoPs prepared and their coverage is presented in **Table 4-1**. Checklist for checking the DPR preparation and for identifying issues to be addressed in pre-construction, construction and post-construction stages will be as per their ECoPs.

Table 4-1: Environmental Codes of Practices and their Coverage

ECoPs	Title	Key Issues Addressed
ECoP 1.0	Project Planning & Design	<ul style="list-style-type: none"> • Incorporation of environmental concerns in project preparation to avoid impacts in construction and operation stages • Avoidance of roads through sensitive areas as reserved forests/sanctuaries/wetlands etc • Compliance with legal requirements • Devising enhancement measures into project design
ECoP 2.0	Site Preparation	<ul style="list-style-type: none"> • Relocation of utilities, common property resources and cultural properties • Avoidance of affect on roadside vegetation.
ECoP 3.0	Construction Camps	<ul style="list-style-type: none"> • Avoidance of sensitive areas for location of construction camps • Infrastructure arrangements for workers and construction equipment
ECoP 4.0	Alternate Materials for Construction	<ul style="list-style-type: none"> • Use of fly ash as per MoEF&CC Notification • Minimizing earth requirement • Use of Plastic Wastes for Road construction • Use of other alternative technologies and materials
ECoP 5.0	Borrow Areas	<ul style="list-style-type: none"> • Avoidance of agriculture lands • Redevelopment of borrow areas
ECoP 6.0	Topsoil Salvage, Storage & Replacement	<ul style="list-style-type: none"> • Topsoil removal from areas temporarily/permanently used for construction • Storage of topsoil in stockpiles and protection from erosion • Reuse of topsoil at areas to be revegetated and in agriculture lands
ECoP 7.0	Quarry Management	<ul style="list-style-type: none"> • Redevelopment of quarries in case new quarries are setup for the project
ECoP 8.0	Water for Construction	<ul style="list-style-type: none"> • Extraction of water in water scarce areas with consent of community • Scheduling construction activities as per water availability
ECoP 9.0	Slope Stability and Erosion Control	<ul style="list-style-type: none"> • Slope stability along hill roads • Protection of land on hill side from stability loss due to cutting • Protection of lands on valley side from debris due to construction • Adequacy of drainage for erosion control
ECoP 10.0	Waste Management	<ul style="list-style-type: none"> • Reuse of cut material in hill roads • Safe disposal of wastes
ECoP 11.0	Water Bodies	<ul style="list-style-type: none"> • Avoidance from cutting due to alignment • Protection of embankment slopes in case of alignment on

**Chief Minister Gram Sadak Yojana (CMGSY)
Environment Management Framework for MPRCP**

ECOPs	Title	Key Issues Addressed
		<ul style="list-style-type: none"> embankments • Rehabilitation of water body
ECOP 12.0	Drainage	<ul style="list-style-type: none"> • Conduct of hydrological investigations during project preparation • Provision of longitudinal and cross drainage as per requirements • Proper location of drainage outfall
ECOP 13.0	Construction Plants & Equipment Management	<ul style="list-style-type: none"> • Compliance of construction plants and equipment with emission standards of Central Pollution Control Board • Maintenance of machinery and equipment to avoid pollution
ECOP 14.0	Public and Worker's Health & Safety	<ul style="list-style-type: none"> • Provision of Personal Protective Equipment to workers • Provision of basic necessities to workers • Public safety while travel along construction sites • Public safety during operation of the road
ECOP 15.0	Cultural Properties	<ul style="list-style-type: none"> • Avoidance of impacts due to project • Protection of precincts from impacts due to construction • Relocation in case impacts are unavoidable
ECOP 16.0	Tree Plantation	<ul style="list-style-type: none"> • Avoidance of impact on trees • Plantation of trees on roadside
ECOP 17.0	Managing Induced Development	<ul style="list-style-type: none"> • Restricting ribbon development at junctions and bus stops • Earmarking areas for commercial activities and other amenities
ECOP 18.0	Environmental Audit	<ul style="list-style-type: none"> • Monitoring of environmental and social parameters during project planning, construction and implementation
ECOP 20.0	Consultation Framework	<ul style="list-style-type: none"> • Aspects for consultation • Stage wise consultations • Consultation schedule and responsibilities

4.3 Innovative Technologies/Alternative Materials for Rural Roads

MPRRDA has used alternative materials/ innovative technologies under the PMGSY program. Alternative materials/ innovative technologies adopted by MPRRDA involve use of waste plastics in hot bituminous mixes in wearing courses, cold mix technology, roller compacted cement concrete and paver blocks. Under MPRCP project, waste plastics in hot bituminous mixes, cold mix technology and other innovative technologies shall be used in 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.

5. Implementation Arrangements

5.1 Assessment of Existing Implementation at MPRRDA

As part of project preparation a diagnostic assessment study was carried out to ascertain: i) suitability of policies and guidelines for implementing CMGSY project in respect of environment and social considerations, ii) existing implementation structure of MPRRDA for funded and own funded projects, iii) experience and exposure to EMF gained under executing similar works for ADB financed PMGSY projects; and iv) finally to identify gaps, if any, that need to be addressed under this project. **Table 5.1** summarizes the findings of the diagnosis assessment.

Table 5.1 :Summarizes the Findings of the Diagnosis Assessment

Sn.	Existing System (Strengths)	Gaps and Challenges	Action Required
1.	Policies, guidelines applicable for CMGSY and Adherence		
	<p>MPRRDA and Rural Engineering Services both had been responsible for construction of CMGSY roads in the state. Specifically MPRRDA had constructed about 2700 Km gravel roads in 11 districts of the state. MPRRDA followed the guidelines issued under PMGSY by National Rural Roads Development Agency (NRRDA) and adopted the same for construction of CMGSY roads.</p> <p>However, MPRRDA and RES both have been implementing these guidelines as part of their ADB funded PMGSY works wherein MPRRDA has fully adhered to Community Participation Framework, Environmental Assessment and Review Framework. Hence, they have understanding and awareness of environmental safeguards for rural roads</p>	<p>Review of the implementation indicates that while the guidelines were adopted but not fully adhered to in practice for CMGSY roads. As technical aspects and codes were adhered to in their works under CMGSY, environmental considerations were not adopted. These included aspects such as Environmental screening, implementation of ECOPs and applicable mitigation measures, which were not adhered to.</p>	<p>Hence, as part of project preparation and in order to meet World Bank requirements, MPRRDA has prepared an EMF that comprises of Environmental Management Framework, and ECOPs that provide for mainstreaming environment considerations across all stages of project/sub-projects.</p>
2.	Institutional Arrangements		

**Chief Minister Gram Sadak Yojana (CMGSY)
Environment Management Framework for MPRCP**

Sn.	Existing System (Strengths)	Gaps and Challenges	Action Required
	<p>MPRRDA at HQ level, currently has a Safeguards Cell for ongoing ADB funded PMGSY that comprises team of four persons. These include Safeguard Officer, Assistant Safeguard Officer and two support staff.</p> <p>Safeguards Cell would continue their role in World Bank funded project – MPRCP too.</p>	<p>The team at MPRRDA -HQ is a designated team having other functions as well. Hence, there is no dedicated Environment & Social Safeguards Expert at MPRRDA Head Quarter for day to day basis coordination with PIUs for implementation of Environment Management Framework.</p> <p>At the field level /PIUs, the Environment Officers are not available, to ensure regular supervision and monitoring of implementation of Environment Management Framework during design and construction of rural roads. However order has been issued by MPRRDA for formation of safeguard cell in each PIU.</p>	<p>MPRRDA at HQ shall be required to strengthen its Safeguard Cell by deploying Dedicated Safeguard Officer and an Assistant Safeguard Officer.</p> <p>At PIUs, designated E&S Safeguard Officer would be necessary since all DPRs that are prepared are submitted to the respective PIUs for their review and onward sending to MPRRDA, HQ and to ensure implementation of ESMF in sub-projects.</p>
3.	Use of New & Innovative Technology		
	<p>MPRRDA has used alternative materials/ innovative technologies like use of waste plastic in hot bituminous and cold mix technology, etc under the ADB funded PMGSY project.</p>	<p>Though the technology was used it was not originally included in the DPRs prepared for the sub-projects with technical specifications. Number of sub-projects wherein such new technologies were adopted less than 15% of the sub-project as per NRRDA guidelines</p>	<p>MPRRDA needs to explore other feasible innovative technologies under MPRCP project up to extent possible as per applicable IRC codes and guidelines. Suitable provisions and specification should be given in DPRs for use of new technologies/ alternative materials. This will further contribute to environmental protection and resource conservation in the MPRCP project.</p>
4.	GIS based Road Database		
	<p>In the Madhya Pradesh state, roads network connecting habitation with up 100 populations was superimposed on GIS based i-Geo Approach computer portal, which has been renamed to e-MARG. Geo-MMGSY has also been developed for planning of rural connectivity to villages in Madhya Pradesh state.</p>	<p>However, the existing GIS based systems are not being used for planning & design of DPRs purposes and identification of environmental sensitive issues like existence of forests and natural habitats.</p>	<p>The database needs to be expanded to include these aspects for DPRs preparation including identification of environmental issues in the rural roads.</p>
5.	Capacity Building/Training		

**Chief Minister Gram Sadak Yojana (CMGSY)
Environment Management Framework for MPRCP**

Sn.	Existing System (Strengths)	Gaps and Challenges	Action Required
	There is mixed capacity at both HQ and PIUs level as while some staff have had experience in ADB projects other do not have any such exposure	There is need for greater orientation and awareness creation on EMF and exposure so as to improve incorporation of environmental concerns during preparation and implementation.	MPRRDA shall ensure capacity building through orientation and refresher training in the initial years and later as required and also experience sharing workshops to enable cross learning on outcomes in respect of EMF implementation.
6.	Monitoring and Evaluation/ Third Party Audit		
	For the purpose of ADB funded PMGSY works, MPRRDA had engaged a Project Implementation Consultant (PIC) for periodic review on sample basis of roads in respect of technical, environmental and social aspects	However, such an arrangement does not exist MPRRDA own funded works and for MPRCP. However there are social and environmental expert in PMC.	Under this project MPRRDA would undertake Third Party/Independent Consultant Evaluation for ongoing and completed works to ascertain status of compliance to provisions of EMF.
7.	Grievance Redressal		
	Three different channels currently exist for people to raise their concerns or record their grievances. These are i) Village level committee and four more levels upto the CEO, MPRRDA, ii) Chief Minister's Helpline and iii) Jan Sunwai (Public Hearing) at the GM, PIU level. The first of these channels has been specifically setup under the ADB financed project, while the other two are routinely available to all persons for any project in the state.	Records of grievances are kept only manually and cumulatively available at the PIU level and not the HQ level	Under this project, grievances (verbal and written) by the type and nature need to be recorded along with their redressal status and be made available cumulatively at the HQ level

5.2 Implementation Arrangement for MPRCP

The MPRRDA will be the executing agency for MPRCP. The PIUs at the districts, will have the responsibility of coordinating and implementing the provisions of the ESMF along with the other project components.

MPRRDA shall appoint 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 shall deploy full time Environment Officer and Social Officer at MPRRDA Head Quarter. Environment Officer and Social Officer shall be responsible to take appropriate steps to advice, interact, training, documentation, reporting for implementation of Environmental and Social

Management Framework (ESMF).

MPRRDA shall deploy Panel of Retired Senior Engineers having extensive experiences in road sector for independent review of DPRs to be prepared for rural roads under the MPRCP. The Environment Officer and Social Officer of PMC will interact and coordinate with this panel to ensure addressing site specific environmental and social issues in DPRs.

MPRRDA shall have Safeguards Cell for MPRCP which will provide overall guidance to Environment Officer and Social Officer of PMC and coordinate with PMC and PIUs for effective implementation of EMF including ECOPs by the participating PIUs. Safeguards Cell shall ensure the EMF/ECOPs are part of bid document.

Towards implementation of the EMF, an Environmental and Social Officer shall be designated (ESO - D) at each PIU. S/he will coordinate with Assistant Managers (AM) and Sub Engineers (SE) for particular sub-project and monitor implementation of EMF provisions in rural roads construction. MPRRDA has instructed each PIU for formation and functioning of Safeguards Cell vide letter 125/5/GMT-/WB/MPRRDA/16 dated 31/05/2016 and most of the PIUs have constituted Safeguards Cell as per refer instruction.

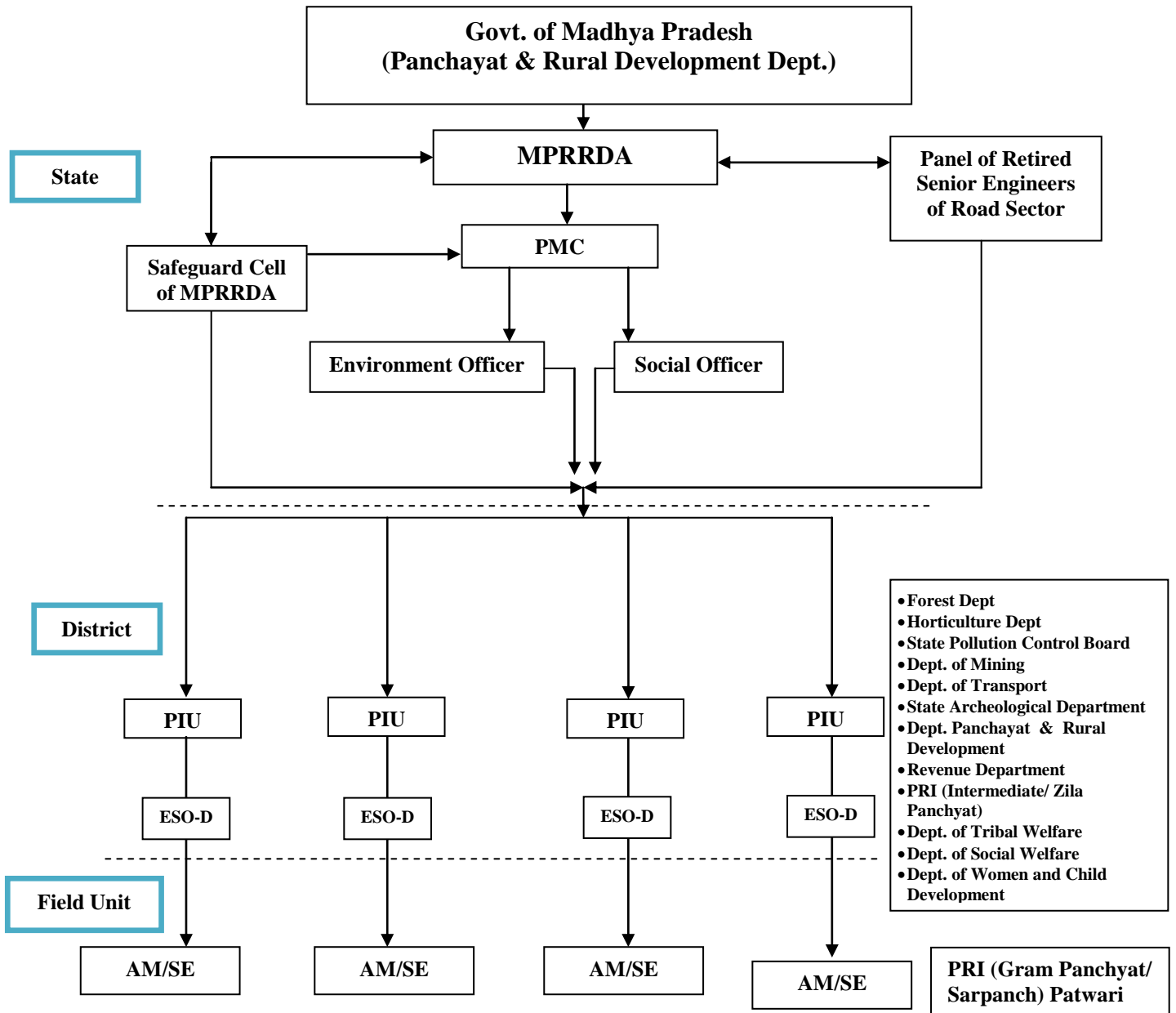
For proposed MPRCP project, arrangement of clearance of technical proposals by MPRRDA will include review and clearance responsibility of compliance with EMF including ECOPs provisions. To this effect, the training and capacity building programs under MPRCP will involve responsible persons/authorities for better understanding of provisions under EMF.

Third Party/Independent Consultant Audit – MPRRDA shall appoint Third Party/Independent Consultant for auditing of application, verification and efficacy of implementation environmental management measures and ESMF in rural roads. Third Party/Independent Consultant shall deploy team(s) of qualified and experienced environmental and social experts for audit and verification purpose.

The organogram for implementation arrangement for MPRCP is presented in **Figure- 5.1**.

The PIUs through the AM/SE will implement all the tasks at the field level with the assistance and participation of PRIs (Sarpanch and Other Panchyat/Ward Members, etc). Each PIU will designate an Environment & Social Officer (ESO-D) for providing inputs on environmental and social aspects and monitoring of implementation of EMF. The designated Environment & Social Officer (ESO-D) will also coordinate with AM/SE and contractors for effective implementation of EMF including ECOPs provisions. The role and responsibility of each of the agency/official involved are presented in subsequent section.

Figure 5.1 Organogram for Implementation Arrangement for MPRCP



5.1.2 Roles and Responsibilities

i) Safeguard Cell at MPRRDA

The roles and responsibilities of the Safeguards Cell at MPRRDA shall include:

- Coordination of planning and implementation of environmental and social management aspects of MPRCP;
- Obtain clearances through concerned PIUs from the line departments, especially MoEF&CC, Forest Department, SPCB (as applicable).
- Monitor MPRCP rural roads for fulfillment of ESMF provisions in co-ordination with the PMC, Panel of Retired Senior Engineers of Road Sector and PIUs.
- Organize training program with the help of PMC for PIUs, Panel of Retired Senior Engineers of Road Sector and Contractors for capacity building for implementation of EMF and ECoPs
- Mobilize community and ensure their participation in addressing ESMF/ECoPs provisions.
- Inspection, monitoring and report progress, highlighting environmental and social issues not addressed, to provide for further course of correction.

ii) Environment Officer of the Project Management Consultant

The Environment Officer shall be responsible for ensuring:

- Proper application of environmental and social screening procedures for the selection of rural roads and DPRs,
- Compliance with applicable standards as well as stipulated environmental management measures as per EMF including ECOPs,
- Provide guidance to PIUs, PRI representatives and contractors on environmental management measures as per EMF and ECOPs
- Supervision of implementation of environmental management measures during construction activities on the rural roads through actual field visits,
- Capacity building of PIU officials, contractors and PRI representatives towards implementation of the EMF provisions by organizing training workshops.

iii) Environment Officer - Designated at PIUs

- Ensure implementation of environmental management measures as EMF during construction activities on the rural roads through actual field visits

5.1.3 Training Plan

Implementation staff of MPRCP would need to be oriented towards environmental management. A two tier-training plan is prepared to orient the staff at PIU Level and field level towards implementation of EMF. The training plan with the mode of training and target groups along with the duration is presented in the **Table 5-1**.

In recognition of the need and importance of capacity building, MPRRDA will utilize the services of Indian Academy of Highway Engineers and other institutions for conducting regular training and capacity building programs for engineers of MPRRDA and PIUs. It will involve developing systematic curriculum, training materials and for imparting core and specialized training modules to the engineers and contractors.

**Table 5-1: Training Plan
(Common Program for effective implementation of EMF, ECoPs)**

Module	Description	Participants	Form of Training	Level	Duration
	Module 1				
Session I	Basic Concept of EMF Screening of Corridors Environmental & Social Concerns in MPRCP	Chief Executive Officer MPRRDA, Chief General Managers, General Mangers of PIU, Safeguards Cell, Designated Environmental and Social Officers from PIUs, Consultants, Revenue Department, Forest Department, Environmental Officer and Social Officer of PMC	Workshop	District	One Session
	Module II				
Session I	Basic Concept of EMF Transect Walk ECoP Provisions and Applicability Preparation of BoQ Integrating EMF provisions into DPR Role and Responsibility Monitoring Mechanism	General Mangers and AMs of PIU, Safeguards Cell, Designated Environmental and Social Officers from PIUs, Environmental Officer and Social Officer of PMC	Lecture	District	One Session
	Module III				
Session I	Identification of Environmental Concerns during construction stage	Managers and Assistant Managers of PIUs, Designated Environmental and	Field based lectures	District	One Session

**Chief Minister Gram Sadak Yojana (CMGSY)
Environment Management Framework for MPRCP**

	ECoPs provisions and its Implementation Reporting formats	Social Officers from PIUs, Environmental Officer and Social Officer of PMC, Contractors and PRI Representatives			
Session III	Institutional Setup Roles and Responsibilities of officials/ contractors/ consultants/ Technical Examiner towards protection of environment Monitoring mechanisms Reporting requirements with targets	Managers and Assistant Managers of PIU, Designated Environmental and Social Officers from PIUs, Environmental Officer and Social Officer of PMC, Contractors and PRI Representatives	Interactive Session	District	

6.0 Guide to Application of ECoPs

6.1 Project Cycle: Rural Roads Details

The entire project cycle or process of rural roads is divided into four phases of work:

- **Project Planning and Design:** The planning and design phases involves:
 - o First task involves, finalization of alignment, inventorization of social including sites for voluntary land donation and environmental features, considering aspects of road safety and scope for future growth, consultation with the land owners/community and identification of likely PAPs through community planning during transect walk.
 - o Second task involves design of road geometrics and enhancement measures based on the outcome of the first task and preparation of Detailed Project Report (DPR)
- **Site Preparation** process involves mobilization of contractor that includes setting up of site, signing of MOU, site clearance, etc. During this stage, the contractor will organize consultations with the community and migrant laborers to discuss temporary impacts during construction including safety and the work schedule. It will be only after the physical possession of land and MOUs for use of local resources that the mobilization of machinery will start on site.
- **Construction Stage:** The stage involves where actual up-gradation of MPRCP Road begins. The stage includes earthwork, sub-base (if required) and base course, BT surface, construction of culverts and drains, etc, with main focus on public and worker safety. Monitoring of implementation of EMF plays the important role in this stage to ensure all measures are followed as per the contract document, which includes DPR.
- **Post Construction Stage:** The post construction scenario tasks include rehabilitation of temporary used land for disposal of wastes, storage of construction materials, etc.; borrow areas, water bodies; etc.

The detailed MPRCP process outline and corresponding EMF provisions and its application are presented in **Figure 6-1** and **Table 6-1**, respectively.

Figure 6-1: MPRCP Process Outline and Corresponding ECOPs Provisions

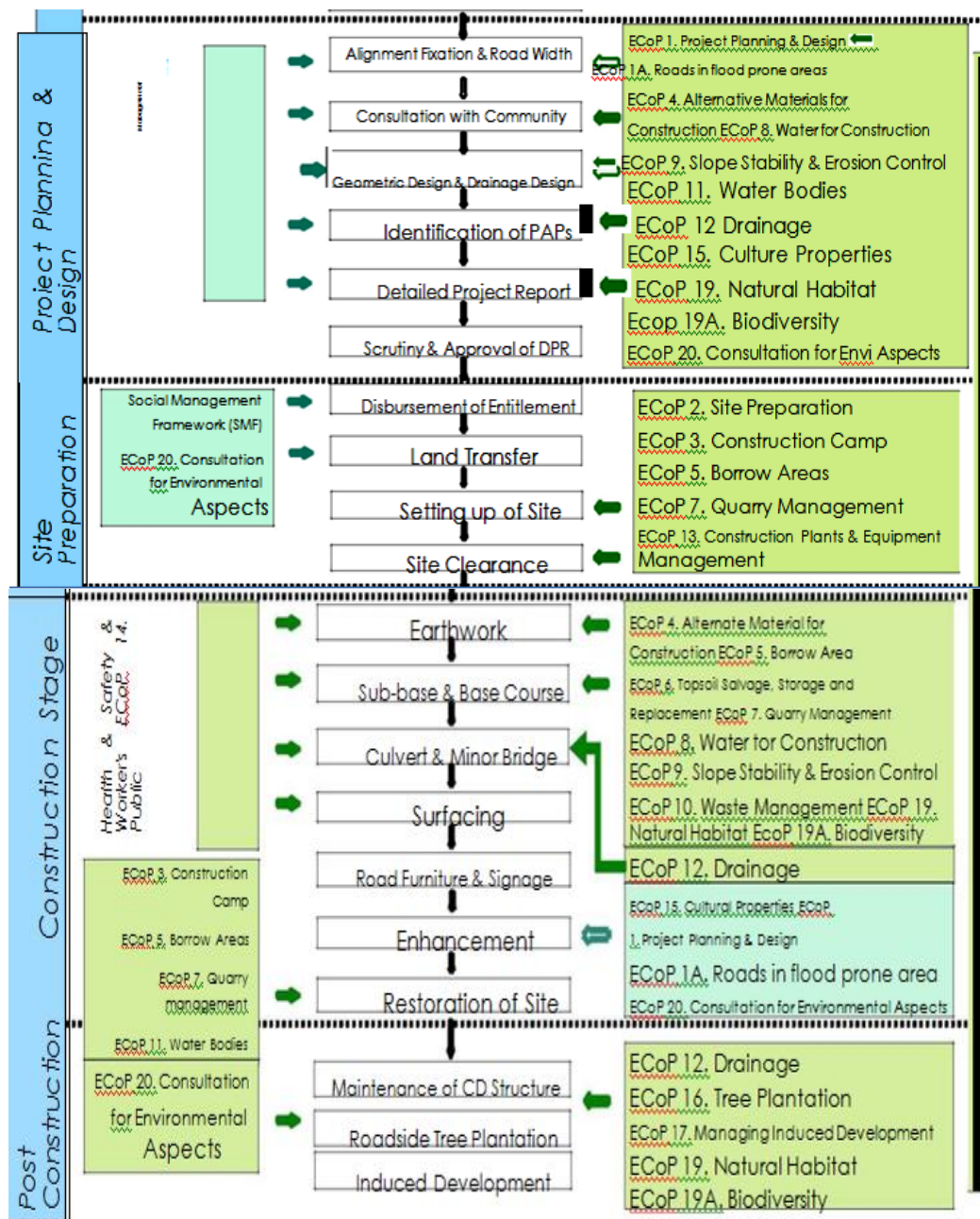


Table 6-1: ESMF Tasks and Implementing Agency

Project Stage	Task	Target Group	Responsibility	Time Frame
1. Project Planning and Design Stage				
i. DPR Preparation Stage	Dissemination of Project Information	Community	PIUs (GM/AM), GP/VC	First Week of DPR Preparation
	Sensitization of Community	Community	PIUs (GM/AM), GP/VC (Sarpanch)	First Week of DPR Preparation
	Finalization of Alignment (Transect Walk, Alignment Shifts incorporating community suggestions)	Community	PIUs (GM/AM), GP/VC (Sarpanch & Ward Members), Revenue Dept and others	
	Geometric Design & Drainage Design	Community	PIUs (GM/AM)	First month of DPR Preparation
	Marking of Alignment		PIUs (GM/AM),	12 th Week of DPR Preparation
	Scrutiny and Approval of DPR		Technical Examiner/Supervision Consultants	
	DPR Auditing		PIUs/CGM	
2. Implementation Stage				
i). Site Preparation Stage	Collection of MoU Affidavits	PAPs	PIUs (GM/AM), GP/VC(Sarpanch & Ward Members),	First month of Implementation after approval of DPR
	Relocation/shifting of common property resources		PIUs (GM/AM), GP/VC(Sarpanch & Ward Members)	By end of 2nd month of DPR
	Temporary impacts during construction	Community	Contractor	From 4th month of project Implementation, till completion of construction work

**Chief Minister Gram Sadak Yojana (CMGSY)
Environment Management Framework for MPRCP**

Project Stage	Task	Target Group	Responsibility	Time Frame
ii). Construction Stage	Health Impacts including HIV/AIDS	Community	Contractor, PHC,	From 4th month of project implementation, till completion of construction work
	Setting up of Site	-	Contractor	First month of Implementation after approval of DPR
	Redressal of Grievances	Community/PAPs	PIU (GM/AM), GP/VC (Sarpanch & Ward Members), Revenue Dept	Throughout project cycle
	Unforeseen Impacts	Community	PIU (GM/AM), GP/VC(Sarpanch & Ward Members), Revenue Dept, Contractor	From 4th month of project Implementation, till completion of construction work
	MoUs for use of local resources	Community	Contractor, GP/VC (Sarpanch)	From 4th month of project Implementation, till completion of construction work
	Monitoring of Construction Work		PMC, PIU (GM/AM)	
iii). Post Construction Stage	Rehabilitation of Temporary used land borrow areas, water body and cultural property	Community	Contractor	
	Tree Plantation	Community	GP/VC (Sarpanch, ward members) Community	
	Managing Induced development	Community	GP/VC (Sarpanch, ward members)	
	Monitoring Progress		PIU	Throughout project cycle
	Project evaluation	Community/PAPs	PIU and GP/VC	After project completion

PIU : Project Implementation Unit; GP/VC: Gram Panchayat/Village Council; RD: Revenue Department; DACS: District AIDS Control Society; PHC: Primary Health Centre;

References

1. Rural Road Manual, IRC: SP: 20-2002, Indian Road Congress (IRC) Publications, 2002
2. Keller, G.; Sherar J.; Best Management Practice Field Guide, Low-Volume Roads Engineering, US Agency for International Development (USAID), Washington, DC. May, 2003.
3. General Conditions of Contract for Central P.W.D. Works, A Government of India Publication, 2003
4. Recommended Practice for Borrow Pits for Road Embankment Constructed by Manual Operation, IRC: 10-1961, Indian Road Congress (IRC) Publication, 1961
5. Permanent Vegetation, CODE 880, Illinois Urban Manual Practice Standard, (online), [Cited on 10th October 2003], Available from World Wide Web: <http://www.il.nrcs.usda.gov/engineer/urban/Standards/urbst880.htm>
6. Water, Clause 1010, Materials for Structures, Section 1000, Specification for Road and Bridge Works (Fourth Revision), Ministry of Road Transport and Highways, Indian Road Congress (IRC) Publications, 2001.
7. Code of Practice for Plain and Reinforced Concrete (Fourth Revision), IS: 456-2000, Indian Standards, 2000.
8. Guidelines for The Design of Small Bridges and Culverts, IRC: SP: 13-1973, Indian Road Congress (IRC) Publication, 1973.
9. Guidelines on Supplemental Measures for Design, Detailing & Durability of Important Bridge Structures, IRC: SP: 33-1989, Indian Road Congress (IRC) Publication, 1973.
10. Recommended Practice for Sight Distance on Rural Highways, IRC: 66-1976, Indian Road Congress (IRC) Publication, 1976.
11. Guidelines on Road Drainage, IRC: SP: 42-1979
12. Manual on Landscaping of Roads, IRC: SP: 21-1979, Indian Road Congress (IRC) Publication, 1979
13. Use of Cold Mix Technology in Construction and Maintenance of Roads Using Bitumen Emulsion, IRC SP 100: 2014
14. Guidelines for The Use of Waste Plastic In Hot Bituminous Mixes (Dry Process) In Wearing Courses, IRC SP 098: 2013
15. Howell John., Road side Bio-engineering
16. Donald H Gray, Robbin B Sotir., Biotechnical and Bioengineering Slope Stabilization-A Practical Guide for Erosion Control. (Wiley)