INITIAL ENVIRONMENTAL EXAMINATION

May 2015

IND: Rural Connectivity Investment Program – Project 3

Batch 3 Roads, Chhattisgarh

Prepared by the National Rural Road Development Authority, Government of India for the Asian Development Bank

CURRENCY EQUIVALENTS

as of May 2015

Currency unit	—	Indian rupee (Rs)
Rs 1.00	=	$ .01572
$1.00	=	Rs 63.5981

ABBREVIATIONS

ADB	:	Asian Development Bank
BIS	:	Bureau of Indian Standards
CD	:	Cross Drainage
CGWB	:	Central Ground Water Board
CO	:	Carbon Monoxide
COI	:	Corridor of Impact
DM	:	District Magistrate
EA	:	Executing Agency
EAF	:	Environment Assessment Framework
ECOP	:	Environmental Codes of Practice
EIA	:	Environmental Impact Assessment
EMAP	:	Environmental Management Action Plan
EO	:	Environmental Officer
FEO	:	Field Environmental Officer
FGD	:	Focus Group Discussion
FFA	:	Framework Financing Agreement
GOI	:	Government of India
GP	:	Gram panchyat
GSB	:	Granular Sub Base
HA	:	Hectare
HC	:	Hydro Carbon
IA	:	Implementing Agency
IEE	:	Initial Environmental Examination
IRC	:	Indian Road Congress
LPG	:	Liquefied Petroleum Gas
MFF	:	Multitranche Financing Facility
MORD	:	Ministry of Rural Development
MORTH	:	Ministry of Road Transport and Highways
MOU	:	Memorandum of Understanding
NAAQS	:	National Ambient Air Quality Standards
NGO	:	Non Governmental Organisation
NOx	:	Nitrogen Oxide
NC	:	Not Connected
NGO	:	Non-Government Organization
NRRDA	:	National Rural Road Development Agency
PIU	:	Project Implementation Unit
PIC	:	Project Implementation Consultants
PRIs	:	Panchyati Raj Institutions
PMGSY	:	Pradhan Mantri Gram Sadak Yojana
POL	:	Petroleum, Oil and Lubricants
PPTA	:	Project Preparation Technical Assistance
ROW	:	Right-of-Way
RPM	:	Respirable Particulate Matter

RRP	:	Report and Recommendation of the President
SRRDA	:	State Rural Road Development Agency
SBD	:	Standard Bidding Documents
SO_2	:	Sulphur di-Oxide
SPM	:	Suspended Particulate Matter
TA	:	Technical Assistance
TOR	:	Terms of Reference
TSC	:	Technical Support Consultants
UG	:	Upgradation
WBM	:	Water Bound Macadam
CGRRA		Chhattisgarh Rural Road Development Agency
ZP	:	Zilla Parisad

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EXECUTIVE SUMMARY

A. Background

1. The Government of India (GOI) launched PMGSY in year 2000 with the objective of providing all-weather road connectivity to all rural habitations with a population of more than 500 persons in plains and 250 persons in hill states. This program is being implemented through National Rural Road Development Authority (NRRDA) under Ministry of Rural Development (MORD) at central level and through State Rural Road Development Authority/Agencies (SRRDA) at state level. The Rural Connectivity Investment Program (RCIP) is continuation of Rural Road Sector II Program (RRS IIP) and is a multi-tranche financing facility (MFF) that aims to construct or upgrade to the all-weather standard about 9,000 km of rural roads connecting around 4,800 habitations in the states of Assam, Chhattisgarh, Odisha, Madhya Pradesh and West Bengal. Under RCIP Project 1 (Loan 2881-IND) sub-projects cover about 3,530 km in total (426.43 km in Assam, 1,009 km in Chhattisgarh, 1,187 km in Madhya Pradesh, 757 km in Odisha, and 151 km in West Bengal) while the RCIP Project 2 (Loan 3065-IND) covers about 3,693 km in total (499 km in Assam, 429 km in Chhattisgarh, 654 km in Madhya Pradesh, 1,184 km in Odisha, and 930 km in West Bengal). The amount funded for the states under ADB RCIP Project 1 is approximately $381.44 million while funding under Project 2 is about $275 million. The subprojects are at various stages of implementation.

2. The Government is submitting the third Periodic Finance Request (PFR) to cover 320 roads with a total length of 1055.88 Km spread in 12 districts in the state of Chhattisgarh. The Chhattisgarh Rural Road Development Agency (CGRRDA) is the implementing agency (IA) for the ADB funded subprojects in the state. Tranche III as per classification of ADB has been categorised as ‘Category B’ project and therefore requires an Initial Environmental Examination (IEE).

3. These roads has been selected following PMGSY guidelines for the selection of roads under this programme and satisfy the following environmental safeguards: i) the selected road shall not disturb any cultural heritage designated by the Government or by international agencies, such as UNESCO, and shall avoid any monuments of cultural or historical importance; ii) the selected road shall not pass through any designated wildlife sanctuaries, national parks, notified ecological sensitive areas or area of internationally significance (e.g., protected wetland designated by the Wetland Convention); and iii) the sub projects shall only involve activities that follow Government of India laws and regulations and meets funding agency safeguard policies

B. Description of Project

4. The proposal for rural road construction works typically considers a 10-12 m right of way (ROW), which includes side slopes for embankment, side drains on either side of the alignment. The roads consists both Black Top (B.T.) and Cement Concrete (C.C.) as per the ROW availability. The construction proposals are confined to the existing alignment of the unpaved tracks. The broad specifications for road alignment selection, pavement design, construction methodology, and geometric design are in accordance with the “Specification for Rural Roads” published by IRC on behalf of the Ministry of Rural Development, Government of India (GoI). The design details presented in this chapter highlights the PMGSY specifications. Minor changes will apply depending on road specific issues and design consideration. Since topography of Assam state is largely flat, the design details applicable to flat terrain.

5. The proposed rural road construction work will provide 7.5 m roadway width (this may be reduced to 6 m as per latest guidelines) with 3.75 m carriageway in accordance with the IRC-SP 20: 2002 in plain terrain. The proposal considers a 3.75 m cement concrete pavement with lined storm water drains for stretches passing through built-up areas, waterlogged/water overtopping/ flood prone areas. The pavement design considers a base layer of variable thickness as per the design with granular sub base, 150 mm thick water bound macadam (WBM grade I & II) and finally topped with 20 mm thick bituminous pavement. Adequate cross drainage structures like pipe or slab culverts/bridge structures are considered for drainage channels across the roads. Few minor bridges are also proposed to be constructed.

6. Considering the sub-grade strength, projected traffic and the design life, the pavement design for low volume PMGSY roads are proposed to be carried out as per IRC guidelines IRC: SP: 72 – 2007 or IRC SP:77 “Design of Gravel Road” and IRC SP:62-2004 “Cement Concrete roads”. In built up area for hygienic and safety reasons, C.C pavement is proposed with a hard shoulder and appropriate line drain. A design life of 10 years is considered for the purpose of pavement design of flexible and granular pavements. The embankment height considered as 1m (average) from ground to crust except at the approaches of cross drainage structures. The embankment height will vary in flood prone area as per the HFL. The design speed considered is as per recommended design speed of 50 Km/h.

C. Description of Environment

7. Located between the northern latitude of 17°52’ and 24° and east longitude 78°58’ and 84°28’, the state of Chhattisgarh was carved out of the state of Madhya Pradesh. Its land area is 135,194 sq km divided into 27 districts which is further divided into 146 blocks. The Batch 3 roads are located in Raipur, Durg, Bilaspur, Jaspur, Janjgir-Champa, Kawardha, Raigarh, Korba, Koriya and Mahasamund districts. Total forest (55,863 sq km and 41.3% of the total geographic area). With 35.4% of Net Sown Area, it is one of the most intensely cultivated regions in the country, with paddy being the main crop.

8. The topography of Chhattisgarh is divided into three regions, the Northern Hills, the Central Plains and the Bastar Plateau. Ground elevation of the project districts vary from 250 to 450 m above mean sea level, but the topography of the project region is mostly flat . The climate of Chhattisgarh is mainly tropical, humid and sub-humid. The climate is hot because of its position on the tropic of cancer. May is the hottest month and December-January is the coldest. The maximum temperature during summers ranges from 33ºC to 46ºC while minimum temperature from 30ºC to 19ºC. The Temperature during the winter season ranges between of 27ºC to 9ºC. The state receives an annual average rainfall of 1524 mm. The vagaries of monsoon and uneven distribution of rainfall causes at times severe drought conditions. The winter rainfall is meagre.

9. Most of the project area lies in vast open agricultural land and is largely free from air pollution sources other than traffic and few brick-kilns existing in the area. As such, the ambient air quality (for parameters SO2, RSPM and NOX) is expected to be within the limits in most of rural and semi urban areas. The ambient noise levels are also expected to be within the National Ambient Noise Standards due to absence of any high noise sources in proposed road vicinity.

10. Chhattisgarh has very low rates of seismic activity.The project region falls in Zones II and III described as low to moderate risk zone.

11. The main rivers that flow in the state are Mahanadi and its tributaries like Seonath, Hasdeo, Mand, and Arpa which drains part of Raipur, Durg, Rajnandgaon, Bilaspur, Raigarh and Surguja districts. Most of the rivers are perennial in nature. Generally the drainage patterns are of dendritic, parallel, angular and radial types. Son, the tributary of Ganga drains part of Sarguja and Koriya districts. The sample roads are normally cross small drainage channels, which eventually join the major channels/rivulets. All of these channels generally remain dry for most part of the year and drain the storm water for few weeks only during or after the monsoon.

12. Chhattisgarh is rich in biodiversity. The State's forests are of two major types: Tropical Moist Deciduous and the Tropical Dry Deciduous. Composition wise, there are four important formations: Teak forests, Sal forests, miscellaneous forests and Bamboo forests. The chief NTFPs (non-timber forest produce) of the State are tendu leaves (*Diospyros melanoxylon*), sal seeds (*Shorea robusta*), harra (*Terminalia chebula*), gum, and chironji (*Buchanania lanzan*). The project area lies in tropical climate zone; it has a medium range of flora and fauna. However, none of the sample roads will require the removal of any rare, endangered or threatened floral species**.**There are 11 sample roads traversing patches of forestland. Although, none of the will require forestland conversion and forest clearance, tree cutting permit is required. In most of cases, tree cutting has been minimized by suitably modifying the alignment.

Chhattisgarh has a total population of 21.8 Mn personnel largely rural. Tribals constitute about 33% of the population, and scheduled castes form about 12%. The project area has access good access to postage and telephone system. Educational facilities are available in the village areas but still depend on urban areas for undergraduate level education. The economy of Chhattisgarh is primarily agriculture based. The state has various industrially developed estates as well. The major industrial produce includes cement, pig iron, and steel ingots. Industrialization is low in the subproject areas.

D. Anticipated Environmental Impacts and Mitigation Measures

13. Road improvements work brings substantial economic and social benefits to rural communities and national economies. However, it may also cause adverse environmental impacts though of smaller magnitude, since rural road subprojects are planned to follow the existing alignments and will be of 6 to 7.5 m width only. The impacts are largely expected to be during construction phase, which can be mitigated through engineering measures and adoption of best construction practices.

14. All project roads are subjected to environmental screening using the ECOP checklist. A sample size of 10% was selected by the CGRRDA with support from the Project Implementation Consultant (PIC) from which this state level IEE was based. Separate environmental checklist were prepared for bridges with length greater than 50m. All sample roads included under RCIP were selected based on ecological and climate change consideration defined under EARF. Accordingly, none of the sample roads passes through protected areas or encroaches precious ecology (sensitive or protected areas) or any historical or archeologically protected areas. No forestland diversion is involved either.

15. By the 2050s, the average annual minimum temperature is expected to increase from 1.76oC to 3.10^{o}C, but the global climate change models are not in agreement on the future trend of change in precipitation in Chhattisgarh. There are limited natural hazards that can be affected by the projected change in temperature as the entire state l is almost free from earthquake and landslide. Tropical depressions have passed over the state particularly the districts of Mahasamund, Bilaspur, Korba, and Raigar causing little damage. The riverine

flooding particularly when tropical depression passes the area has resulted to wide displacement but limited mortality. To address the limited risk of flooding and erosion over the project roads, Project 3 has devoted Rs 55.850 million of which RS18.750M is for constructing cross and side drains, Rs279.370M is for bridges and culverts, Rs247.840M is for increasing road embankment height, and 12.540 is for slope stabilization. Compensatory tree plantations[1] (1:3) will be made to compensate the loss of trees cut for construction of subproject roads.

16. No land acquisition is involved due to various measures considered for finalisation of road alignment. Villagers have volunteered to donate their land if at certain stages land is required for geometrical correction or alignment adjustment for avoiding tree cutting or shifting of community structure. Chhattisgarh has many wildlife sanctuaries but none of the sample road is located within 10 km radius of the sample project roads. The nearest national parks and sanctuaries (Guru Ghasidas National Park in Koriya, Achanakmar in Bilaspur, Badalkhol in Jaspur, Barnawapara and Udanti in Raipur, Gomarda in Raigarh and Bhoramdev in Kawardha district) are located at a distance of minimum 10km away from the project roads. Nine out of the 30 sample roads pass through forest area and the PIUs have already obtained clearance from the Forest department

17. Site clearing operations may have impact on common utilities, community properties, and land use. These will be avoided by limiting most of the construction activities along the alignment and strictly implementing the utility and road furniture shifting plan; ground staking of RoW; prior informed consent on vegetation clearing, tree felling with permission from Forest Department, and utility shifting; and preservation and re-use of all topsoil.

18. Impacts related to health, safety of the labourers at the construction campsites, availability of safe drinking water, sanitation, and collection, storage, and disposal of oily wastes addressed in the EMP mostly through good housekeeping and linking with local health protection programs. All construction camps and hotmix plant will be set up at least 500 m away from habitat or forest areas.The contractor will prepare appropriate traffic diversion scheme, which shall be implemented in different stretches of the road as per the progress of the construction work to avoid or minimize disturbance to existing traffic. All excavated materials from roadway, shoulders, verges, drains, cross drainage shall be used for embankments formation if feasible, filling pits, and landscaping. Unusable debris material should be suitably disposed off at pre-designated disposal locations, with approval of the concerned authority. The bituminous wastes shall be disposed in secure landfill sites only in environmentally accepted manner. To minimize deterioration of air quality during construction the following will be implemented as part of the civil works: i) use of covered haul trucks, ii) regular sprinkling of water on active construction fronts and materials storage areas; iii) hot mix plants and diesel generating sets comply with stack height requirements and secure clearance from the State Pollution Control Board, and iv) mandatory use of PPEs to all construction workers.

19. Borrowing earth from agricultural land shall be minimised to the extent possible. Further, no earth shall be borrowed from already low-lying areas. The borrow earth shall be sourced from identified locations and with prior permission of landowner and with clear understanding for its rehabilitation. The Indian Road Congress (IRC):10-1961 guideline should be used for selection of borrow pits and quantity that can be borrowed. Balance cut and fill will be followed to the extent possible to minimize borrowing. Adequate provision shall be made for cross

[1] SRRDA mostly undertake this activity through state forest department. The forest department plants tree either along the proposed roads if land is available otherwise on nearby degraded forest land.

drainage structures for maintaining natural drainage pattern in the subproject area and preventing soil erosion.

20. The provision of adequate cross drainage structures shall be made to ensure smooth passage of water and maintaining natural drainage pattern of the area. The discharge capacity of the CD structure shall be designed accordingly. Road levels shall be designed considering HFL. Low costs measures like use of bamboo or eucalyptus tree will be adopted for embankment protection and control of soil erosion. Other slope stabilisation measure like vegetative protection will be installed when necessary as deemed by the PIC. None of the sample roads is crossing any natural stream except Damdih road, which run close to Haf River. This road may be prone for flooding.

E. Environmental Management Plan and Institutional Arrangements

21. Appropriate mitigation measures are identified for all rural road construction and operation activities. The identified impacts associated with rural roads and mitigative measures are largely common to most of the roads. The EMP provides action common to all roads at pre construction, construction and operation stage. Since IEE is carried out, prior to preparation of DPR, the EMP will be updated specific to road as per DPR requirements by PIU and included with DPR, which shall be available to contractor at the time of bidding.

22. The environmental monitoring program is prepared with aim to monitor the environmental performance of environmental management plan. For rural roads, Environmental Monitoring plan will be more observation oriented and it provides observation areas with frequency of monitoring at pre construction aspects construction stage and operation stage.

23. NRRDA/SRRDA has defined institutional setup including with specified responsibility for environmental management. Existing capacity of the State Rural Roads Development Agencies (SRRDAs) and Project Implementation Units (PIUs) for implementing environmental safeguard issues need substantial strengthening. The capacity enhancement is proposed through focused workshops and training session. Few workshops have already been conducted at participating states through ADB appointed Environmental specialist.

24. Grievance Redress Mechanism is also defined for receiving public concerns at state, PIU, and central level.

F. Public Consultation and Information Disclosure

25. The project has immense acceptability among the local people. They perceived that in addition to providing all weather connectivity, the sub-project road would bring positive socioeconomic changes in the area. The project has tried its best to address all the issues raised during consultations under the constraints of suitability from engineering point of view.

G. Conclusion

26. The findings of Environment Assessment of sample roads indicate that impacts are mostly similar and subprojects are unlikely to cause any significant environmental impacts. While some of the impacts are negative, there are many bearing benefits to the area. Most of the impacts are likely to occur during construction stage, are temporary in nature, and can be mitigated with minor to negligible residual impacts. The implementation of prescribed mitigation measures will minimize/avoid the adverse impacts. Moreover, the impacts shall be monitored

continually by implementing and updating the Environmental Management plan and Environmental Monitoring Plan. Executing agency shall ensure that updated road specific EMP forms part of DPR and is available to contractor at the time of bidding. The contractor will specify the quantity and budget for various activities like rehabilitation of borrow earth pits, first aid and sanitation facilities at construction camp and temporary office/material storage place as per EMP requirements. The same shall be revised if there is any change in the project design. Any such change shall be reported to ADB as well.

27. Any major changes or any major additional work other than the proposed project activities will require updation of ECOPs and IEE. The updated ECOPs and IEE will have to be submitted to NRRDA and ADB for concurrence before civil works commence.

I. INTRODUCTION

A. Project Background

1. Pradhan Mantri Gram Sadak Yojana (PMGSY) aims to provide all-weather road connectivity to currently unserved habitations in India's rural areas, where 70% of the population live. The Government of India (GOI) launched the "Pradhan Mantri Gram Sadak Yojna" (PMGSY)2 in year 2000 The objective of PMGSY is to provide all-weather road connectivity to all rural habitations with a population of more than 500 persons in plains and and 250 persons in hill states. The National Rural Road Development Authority (NRRDA) is implementing the Project under Ministry of Rural Development (MORD) at central level and through State Rural Road Development Authority/Agencies (SRRDA) at state level3.

2. The Rural Connectivity Investment Program (RCIP) is a continuation of the Rural Road Sector II Program (RRS IIP) and is a multi-tranche financing facility (MFF) that will construct or upgrade to the all-weather standard about 9,000 km of rural roads connecting around 4,800 habitations in the states of Assam, Chhattisgarh, Orissa, Madhya Pradesh, and West Bengal (collectively called RCIP states). RCIP will also improve the institutional arrangements and business processes through capacity building of the SRRDAs. The project will enhance capacities related to design, operation, safeguard, financial, road safety, and asset management matters. Investments in rural roads will improve connectivity and cut transport costs by providing improved connectivity between habitations, markets, and urban towns.

3. RCIP Tranche 1 financed part of the cost of: (i) construction of 3,461 km of rural roads in the five project states, (ii) consultancy services, and (iii) capacity building of implementing agencies by establishing rural connectivity training and research centers (RCTRCs) and rural roads network management units (RRNMUs). The Loan for Tranche 1 (Loan 2881-IND) totalling $252 million was signed in April 2013 and became effective on 5 June 2013. RCIP Tranche 2 (Loan 3065-IND) totaling $275 million was approved on 25 November 2013. Until May 2014 Tranche 1 has awarded 515 out of 532 or about 97% of the total contracts while for RCIP Tranche II has 498 out of 716 or about 70%.

4. The Government is submitting the third Periodic Finance Request (PFR) to cover 1,055.94 of rural roads in the state of Chhattisgarh. The Chhattisgarh Rural Road Development Agency (CGRRDA) is the implementing agency (IA) for the ADB funded subprojects in the state. Tranche III as per classification of ADB has been categorised as 'Category B' project and therefore requires an Initial Environmental Examination (IEE).

5. This IEE report was prepared by M/s Operations Research Group (P) Ltd., the Technical Support Consultants (TSC) appointed by National Rural Road Development Agency (NRRDA) under the ADB loan assistance.

B. Project Roads Identification and Location

[2] Prime Minister's Rural Road Program

[3] Madhya Pradesh Rural Road Development Authority

6. PMGSY has prepared specific guidelines for the selection of roads to be eligible under this programme. The key requirements is that any road will be eligible for construction or up-gradation only if it is part of the Core Network4 and satisfy the following environmental criterion:

- The selected road shall not disturb any cultural heritage designated by the Government or by international agencies, such as UNESCO, and shall avoid any monuments of cultural or historical importance.

- The selected shall not pass through any designated wildlife sanctuaries, national parks, notified ecological sensitive areas or area of internationally significance (e.g., protected wetland designated by the Wetland Convention);

- The sub projects shall only involve activities that follow Government of India laws and regulations and meets funding agency safeguard policies.

7. The CGRRDA has selected about 1055.88 km of rural roads for inclusion under RCIP Batch 3 in Chhattisgarh. The 1055.88 km of roads comprises 320 different stretches spread over 15 districts of the State. These districts are located in the central, southern and eastern parts of the state. In this batch of subprojects, the longest road is 23.23 km (Lakwakona - Sonkyari road in Manora block of Jashpur district), while T02 - Kurrubhatta To Tendumudi road in Kharsiya block of the Raigarh district is the shortest (0.60 Km). The average length of roads works out to 3.24 km. The list of 1055.88 km roads with location and length is given in Appendix 1.and the location map of the districts is shown in Map 1.

C. Rural Road Construction Proposal

8. The proposed rural road construction works typically considers a 10-12 m right of way (RoW), which includes side slopes for embankment, side drains on either side of the alignment. However, as per the recent NRRDA guidelines a RoW of 6 m has been considered for roads having an average traffic flow of 100 vehicles per day The roads consists both black top (B.T.) and cement concrete (C.C.) as per the ROW availability.

9. The proposed road upgrading and construction activitie are confined in the existing alignment of the unpaved tracks. Majority of these are foot/pathways traditionally used by the villagers and transformed into the present form of unpaved tracks/roads through minor construction works taken up by the communities, local bodies and state Government over the decades.

D. ADB Safeguard Policies and Category of the Project

10. The Asian Development Bank has defined its safeguard requirements under its Safeguard Policy Statement 2009 (SPS 2009) requiring environmental assessment, mitigation, and commitment towards environmental protection. The prime objectives of these safeguard

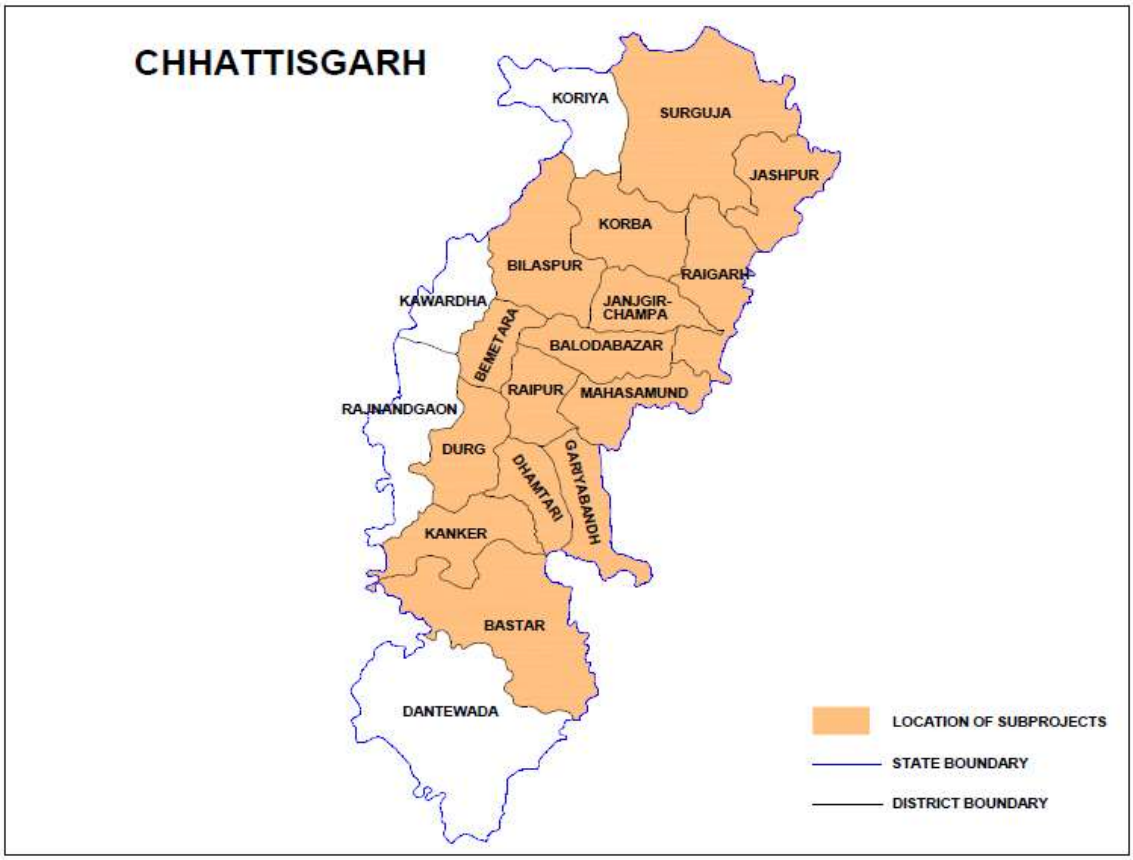
[4] Core Network is that minimal network of roads (routes) that is essential to provide access to essential social and economic services to all eligible habitations in the selected areas through at least single all-weather road connectivity. A core network comprises of through routes and link routes. Through routes are the ones, which collect traffic from several link roads or a long chain of habitations and lead it to marketing centres either directly or through the higher category roads i.e., the district roads or the state or national highways. Link routes are the roads connecting a single habitation or a group of habitations to through routes or district roads leading to market centres. Link routes generally have dead ends terminating on a habitation, while through routes arise from the confluence of two or more link routes and emerge on to a major road or to a market centre

policies are to: (i) avoid adverse impacts of projects on the environment and affected people, where possible; and (ii) minimize, mitigate, or compensate adverse project impacts on the environment and affected people when avoidance is not possible. The ADB SPS 2009 classify a project into category A, B or C depending on potential environmental impacts.

11. All environmentally sensitive components along each subproject road are assessed to define the magnitude and extent of likely impacts. Selection criteria require none of the roads pass through or near any protected areas, archeologically important monument, and reserved forests. Few tree cutting is allowed provided they are not protected or endangered species. The road primarily passes through agricultural and residential areas. Most of the roads follow existing alignment and land acquisition is minimal. The RCIP Tranche III for the state of Madhya Pradesh is classified as environmental category B based on ADB SPS 2009.

12. No environmental categorisation is made under the Government of India (GoI) environmental legislations since rural road upgrading and construction are not covered by the Indian Environmental (Protection) Act and Rules, 1986 as amended.

Figure 1: Location fo Districts with Batch 3 Roads



E. Objectives and Approach for Environmental Assessment

13. The prime objectives of the environmental assessment is to identify likely environmental impacts during design, construction, and operation stages of each rural road and formulate cost effective mitigation and monitoring measures and institutional mechanism for efective implementation of recommended measures.

14. Since there is large number of subproject roads involved under RCIP and magnitude of each road is small, preparation of individual IEE's for each road is inappropriate. ADB has prepared an Environmental Code of Practices (ECOP) checklist under Rural Road Sector (RRS) ProjectII II that was modified for RCIP. The ECOP is a distillation of the lessons learned in managing environmental impacts from past rural road projects. Each subproject was subjected to rapid environmental screening guided by the ECOP checklist. Sample ECOP checklist with annexures on tree, utility and community structures, strip maps and photographs for each selected sample road are provided in Appendix 2.

15. The findings from the ECOP Checklist from the sample projects provide the basis to prepare state-level IEE reports and EMP. The EMP is generic and forms part of the bidding documents to guide the project implementation consultant (PIC) and project implemention unit (PIU) prepare road specific EMPs provided in the detailed project reports (DPRs).

F. IEE Methodology and Content

16. The state specific IEE was structured based on ADB SPS, 2009 and ADB's Environmental Assessment Guidelines (2003). The IEE reports including EMPs, and monitoring plans, cover the most environmentally sensitive components in state as well as specific to subproject roads.

- **Corridor of Impact**: The direct area of influence or the corridor of impact (COI) has been considered as 10 m on either side of the proposed sample roads alignment Based on the proposed cross-section.
- **Field Visits, Primary and Secondary Data Collection**: A total of 10% of the nominated roads were selected to comprise the sample population where the environmental examination is to be conducted. Each sample road was visited by PIC along with concerned PIU officials for environmental assessment. Individual road specific strip map was prepared during the field visit to capture the information related to tree inventory, utility and community structures located along the proposed road alignment, surface water bodies, and ecological sensitivities. Secondary environmental information pertaining to the environmental issues, protected area, forests areas were collected from various government and non-governmental / research institutions for assessment of the baseline environment of the project locations, district and state as a whole.
- **Data Analysis, Impact identification and Mitigation Measures**: Information collected were analysed and impacts identified. Mitigation measures were proposed common to larger roads and specific to the roads. EMP is prepared considering mitigation measures and institutional framework of SRRDA.

17. The IEE report includes following seven chapters including this introduction Chapter.

- Chapter 1- Introduction
- Chapter 2- Description of Project
- Chapter 3- Description of Environment
- Chapter 4- Anticipated Impacts and Mitigation Measures
- Chapter 5- Institutional Requirement and Environmental Monitoring Plan
- Chapter 6- Public Consultation and Information Disclosure
- Chapter 7- Conclusion and Recommendation

G. Legal Framework and Legislative Requirements:

18. India has well defined institutional and legislative framework. The legislation covers all components of environment viz air, water, soil, terrestrial and aquatic flora and fauna, natural resources, and sensitive habitats. India is also signatory to various international conventions and protocols.

19. As per Environment (Protection) Act, 1986; the Environmental Impact Assessment Notification, 2006; amended in 2009 defines the environmental impact assessment for development projects. All new or expansion of national and state highways requires environmental impact assessment and environmental clearance from central or state level Environmental Appraisal Authority. However, rural road projects proposed under RCIP do not require environmental assessment or clearance based on the Notification and instead the mainstream environmental concerns specific procedures that were formulated under Rural Connectivity Investment Program (RCIP) will be implemented.

20. New road construction or road improvement work attract many legislation including the diversion of forest land, tree cutting, opening of new quarry, establishment of temporary workshops, construction camps, hot mix plants, and use of vehicles for construction. The legislation applicable for RCIP roads are listed below:

Table 1: Applicable Environmental[5] Laws and Regulations to RCIP Road

Sl. No.	Legislation	Applicability
1.	Forests (Conservation) Act 1980 (Amended 1988), and Forest (Conservation) Rules, 1981, (Amended 2003)	As per above Act/Rules *Forest Clearance* from Department of Forests/Ministry of Environment and Forests Govt. of India is required for diversion of forest land (if any) for non-forest purpose. Prior permission is required from forests department to carry out any work within the forest areas and felling of roadside trees. Cutting of trees need to be compensated by through afforestation as per permission condition.
2.	The Water (Prevention and Control of Pollution) Act 1972 (Amended 1988), and the Water (Prevention and Control of Pollution) Rules, 1974	Placement of hot-mix plants, quarrying and crushers, batch mixing plants, discharge of sewage from construction camps requires *No Objection Certificate (Consent to Establish and Consent to Operate)* from State Pollution Control Board prior to start of construction or setting up specific facility. *Authorisation* will also be required for disposal of Hazardous Waste like waste oil etc. from State Pollution Control Board
3.	The Air (Prevention and Control of Pollution) Act, 1981, (Amended 1987), and the Air (Prevention and Control of Pollution) Rules, 1982	
4.	The Noise Pollution (Regulation and Control) Rules, 2000 (Amended 2002)	
5.	The Hazardous Waste (Management, Handling and Transboundary Movement) Rules 2008 (Amended 2009), and the	

[55] PMGSY Roads are not covered by the EIA Notification. As all eligible roads under the RCIP are prohibited from entering wilidlife protected areas and sanctuaries, no permit under the Wildlife Act is needed.

Sl. No.	Legislation	Applicability
	Batteries (Management and Handling) Rule, 2001	
6.	Guidelines for Ground Water Extraction Prescribed by Central Ground Water Authority under the power granted under Environment (Protection) Act 1986	*Permission* from Central Ground Water Authority (CGWA) is required for extracting ground water for construction purposes, from declared as Semi-critical, Critical and Overexploited areas from ground water potential prospective. For NOC, An application in the prescribed Performa is to be submitted either to the Office of the Regional Director, (CGWB) of the concerned state, or to Member Secretary, CGWA, New Delhi
7	The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and Workmen Compensation Act	Fixing hours for normal working day, weekly paid rest, overtime pay, basic welfare and amenities, temporary living accommodation on-site, PPEs, penalties for vilolation, and liability of employers in workmen injuries arising from employment.

21. The PMGSY Scheme and Guidelines (2004) No. 12025/8/2001-RC, Ministry of Rural Development (MORD) also defines environmental requirements in road selection and regulatory compliance.

II. DESCRIPTION OF THE PROJECT

A. General

22. The PMGSY program has mandate to provide all-weather roads to all the rural habitations within the country. RCIP is planned to meet above objective. Under RCIP Tranche 3 in in Chhattisgarh 1055.88 Km roads have been identified for implementation. The broad specification for road alignment selection, payment design, construction methodology, geometric design etc. are same and is as per the "Specification for Rural Roads" published by IRC on behalf of the Ministry of Rural Development, Government of India. The design details presented in this chapter are as per above specifications. Minor changes will apply depending on road specific issues and design consideration.

23. Since topography of Chhattisgarh state is largely flat, the design details applicable to flat terrain are presented in following section.

B. Sample Roads Selected in Chhattisgarh State

24. The Chhattisgarh state has selected 320 roads with a total length of 1055.88 Km spread over ten districts as summarised at Table 2 below and detailed at Appendix 1.

Table 2: Summary of District Wise Rural Roads

Sl. No.	Name of District	No. of Roads	Length of Roads (Km)			
			Total	Max	Min	Average
1	Bilaspur	53	164.85	20.30	0.72	3.11
2	Durg	27	64.10	6.40	0.70	2.37
3	Jangir-Champa	2	6.15	3.50	2.65	3.08
4	Dhamtari	1	2.60	2.60	2.60	2.60
5	Jashpur	29	150.77	23.23	1.30	5.20
6	Mahasamund	28	110.12	8.95	1.20	3.93
7	Raigarh	50	170.59	16.40	0.60	3.41
8	Raipur	78	216.01	20.90	0.75	2.77
9	Surguja	3	8.30	3.00	2.50	2.77
10	Bastar	9	38.70	8.80	0.80	4.30
11	Kanker	8	19.05	6.00	0.90	2.38
12	Korba	32	104.70	9.00	1.05	3.27
Total		320	1055.94	23.23	0.60	3.27

C. Rural Road Construction Proposals

25. The proposed rural road construction work will provide 3.75 to 7.5 m roadway width[6] with 3.75 m carriageway in accordance with the Indian Road Congress (IRC) -SP 20: 2002 in plain terrain. The proposal considers a 3.75 m cement concrete pavement with lined storm water drains for stretches passing through built-up areas, waterlogged, water overtopping, and flood prone areas. The pavement design considers a base layer of variable thickness design with granular sub-base, 150 mm thick water bound macadam (WBM grade I and and II) and finally topped with 20 mm thick bituminous pavement. Adequate cross drainage structures like pipe or slab culverts/bridge structures are considered for drainage channels across the roads.

[6] The road width may be reduced to 6m in case of BT and 3.75 m in case of CC as per PMGSY recent guideline.

Few minor bridges are also proposed for construction. Figure 2.1 shows the typical cross section of the rural roads.

26. The rural road construction works will be in conformance with the Rural Roads Manual and Technical Specifications (IRC: SP20: 2002) for Rural Roads published by IRC on behalf of Ministry of Rural Development, Government of India. The broad design considerations are given at later part of this chapter.

1. Present Condition

27. The sample project roads mainly pass through plain or riverine terrain and agricultural area. These roads have several cross drainage structures, electric posts and telephone post along the existing alignment. There are some community physical structures like temples, mosques, and primary and secondary schools beside the roads alignment, but will not be affected due to the proposed upgrading. Some utilities besides the roads may need shifting.

2. Alignment and Profile

28. The existing road is generally an earthen track with some stretches of brickbat soling and the project road is considered as new connectivity road. The construction works are to be confined to the existing alignment. The existing horizontal and vertical alignment / profile will be generally maintained except for minor smoothening or corrections to sustain consistent design speed without causing any land acquisition requirements and thereby the possible social and/or environmental concerns.

3. Design Considerations

29. Geometrical Design and ROW Requirements: The geometric design standards for this project will conform to PMGSY-ADB guidelines and the guidelines as stated in IRC-SP 20:2002 and the final recommendations of NRRDA expert committee (refer D.O. no. - 17305/1/2007-Tech/12 dated 30/09/2010). Recommended design standards vis-à-vis the standards followed for this road are described below. The requirement of ROW as per PMGSY guidelines considered for the design is given at Table 3 below:

Table 3: ROW Requirement

Road classification	Plain and Rolling Terrain (ROW in m)			
	Open Area		Built-up Area	
	Width	Range	Width	Range
Rural roads (ODR and VR)	15	15-25	6.0	6.0

ODR: Other District Road; VR: Village Road

30. Since terrain is plain, the design speed considered is as per recommended design speed of 50 Km/h for ruling (40 Km/h as minimum speed). The radius of horizontal curve is considered as 90 m ruling minimum (60m absolute minimum). The vertical alignment is designed as per ruling gradient of 3.3% applicable for plain terrain.

31. Pavement and Embankment Design: Considering the sub-grade strength, projected traffic and the design life, the pavement design for low volume PMGSY roads are proposed to be carried out as per guidelines of IRC: SP: 72 – 2007 or IRC SP:77 “Design of Gravel Road” and IRC SP:62-2004 “Cement Concrete Roads”. In built up area for hygienic and safety reasons, C.C pavement is proposed with a hard shoulder and appropriate line drain. A design

life of 10 years is considered for the purpose of pavement design of flexible and granular pavements. The embankment height considered as 1m (average) from ground to crust except at the approaches of cross drainage structures. The embankment height will vary in flood prone area as per the HFL.

32. **Available Right-of-Way:** As per the information available with Chhattisgarh Rural Road Development Agency (CGRRDA), ROW is largely available for all the sample roads. However, in most of the roads, the required ROW of 10-15 m is encroached and in some of the road, it is put to agricultural use by the adjacent landowners. The private landowners along the proposed right of way (ROW) however, are voluntarily parting the encroached land and in some cases parted even their own private land without any compensation, anticipating the developmental benefits from the road construction works.

33. **Road side drain:** As the insufficient drainage of surface water leads to rapid damage of road, road side drain (Figure 2.1) are provided on the locations of habitation areas with concrete pavement. The rainwater will flow along the longitudinal slope and intermittent gaps in concrete curbs.

34. **Carriageway:** The carriageway is proposed as 3.75 m as per IRC-SP20: 2002 but may be restricted to 3.0 m where traffic intensity is less than 100 motorised vehicles per day and where the traffic is not likely to increase due to situation, like dead end, low habitation and difficult terrain condition. The ROW requirement in built-up/constricted area may be even reduced to 4 m.

35. **Shoulder:** Earthen shoulder shall be constructed in layers and compacted to 100% of Proctor's Density. It is proposed to have 1.875 m wide shoulder (0.875 m hard shoulder and 1 m earthen shoulder) on either side of carriage way.

36. **Surfacing:** Slow setting bitumen emulsion will be applied as primer on water bound layer. Rapid setting bituminous emulsion will be used for Tack coat. Premixed carpet 20 mm thick and mixed with equivalent viscosity grade bitumen shall be laid as surfacing course. 6 mm thick, Type B seal coat is considered for sealing of the premixed carpet.

37. **Structural Works:** Following grades of concrete are proposed for structural works as per specified MORD and IRC specifications:

- Concrete in superstructure of Slab Culvert – M-25 (RCC)
- Concrete in Abutment cap, Dirt wall of slab culverts – M-25 (PCC)
- Brickwork in Abutment, Return Wall, Headwall – Cement mortar (1:4)
- Concrete below Abutment, Return Wall, Headwall – M-10 (PCC)
- Concrete in pavement (on carriageway) – M-30 (PCC)
- Concrete in pavement (on shoulder and drain) – M-25 (PCC

4. Traffic

38. The present traffic data on each of these rural roads typically varies between 10-15 vehicles per day on most of the rural stretches. The traffic largely comprises motor cycles/two wheelers, tractors, light commercial vehicles, animal drawn carts and bicycles.

5. Economic Assessment

39. The economic analysis carried out for the project has indicated that the rural road construction works will act as a catalyst for the rural economic growth and poverty alleviation of the community in the region.

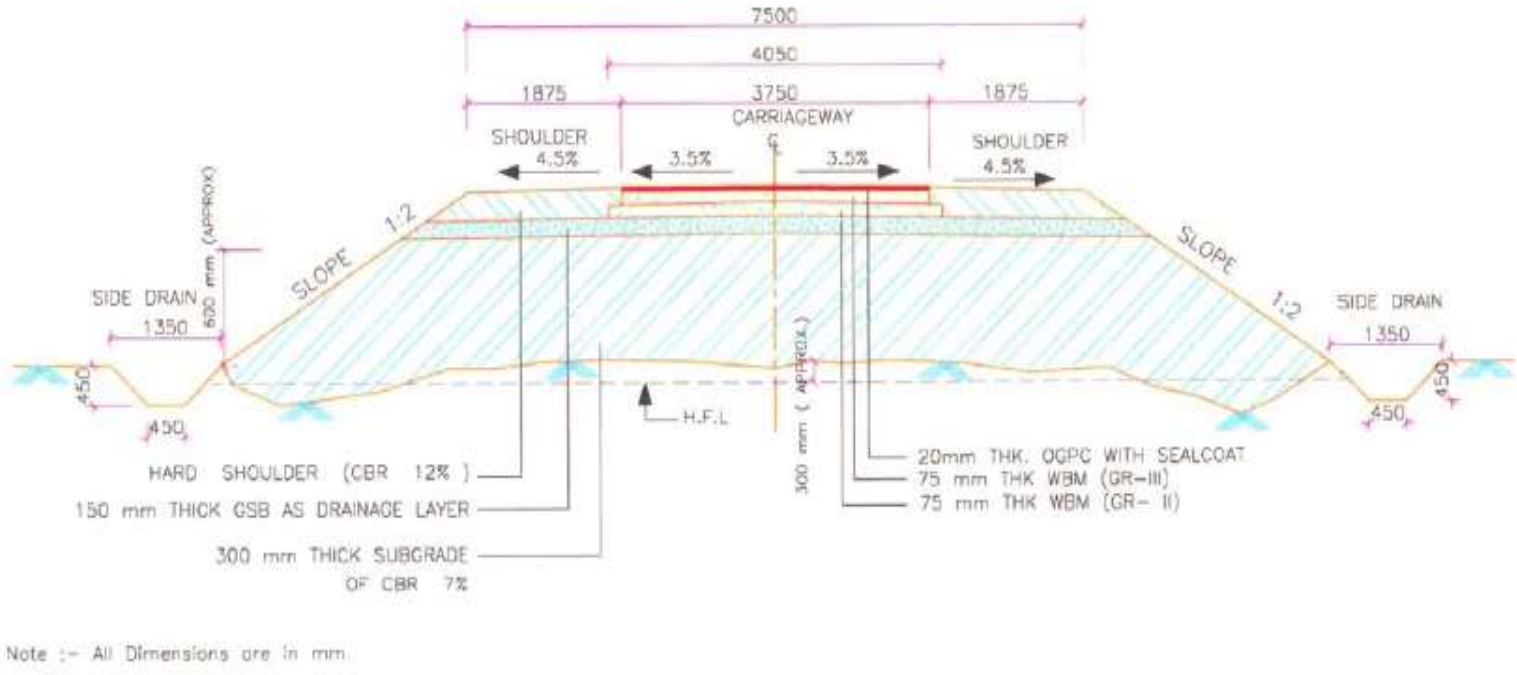


Figure 2: Typical Cross-section of Rural Roads

III. DESCRIPTION OF THE ENVIRONMENT

A. Background

40. Baseline environmental conditions about all facets of environment viz. physical, biological and socio-economic were established using primary and secondary sources. Efforts to collect the latest information both at regional as well as local level especially along the project corridor were made tro allow better prediction of likely changes in the environment due to the project and will serve as performance indicators for various components.

41. The project roads are located almost all over the state covering 18 out of the 27 districts. The baseline information at the state level and road-specific environmental salient features are provided in this chapter.

42. Located between the northern latitude of 17°52' and 24° and east longitude 78°58' and 84°28', the state of Chhattisgarh was carved out of the state of Madhya Pradesh on 1st November 2000 to give a fillip to developmental activities and fulfil the long cherished aspirations of the local populace. Spread over an area of 135,194 sq km it consists of 27 districts (including 9 new districts formed in 2011) and 146 blocks. Earlier known as the rice bowl of Madhya Pradesh, it is a major rice-producing region of India. The state boundary touches six states of the country, namely Madhya Pradesh, Maharashtra, Andhra Pradesh, Orissa, Jharkhand, and Uttar Pradesh. The Batch 3 roads in the state fall in Raipur, Durg, Bilaspur, Jaspur, Janjgir-Champa, Kawardha, Raigarh, Korba, Koriya and Mahasamund districts of the state. A summary key environmental features of these districts are given in table 4.

Table 4: Summary Key Environmental Features of the Sample Roads Districts

District	Description of Environmental Parameters
Raipur/ Baloda Bazar/Gariyaband	Undivided Raipur district including the newly created Baloda bazaar district covered an area of 13083 sq. km and lies between 19°46' N and 21°50' N and 81°25'E to 83°16' E with population of 3016930 as per 2011 census. The district is surrounded by Bilaspur and Janjgir-Champa in north, Dhamtari in south, Mahasamund in east and Durg in west. The district occupies the south eastern part of the upper Mahanadi valley and the bordering hills in the south and the east. The district has a tropical climatic condition. Summers are extremely hot and at times the mercury may rise to 42°C while winters are mild and lows can fall to 13.2 °C. The district receives a normal rainfall of about 1300 mm. Udanti Sanctuary in Gariaband Tehsil is about 170 km from Raipur. Physiographically, it is divided into three units: Chhattisgarh plain, eastern and southeastern undulating, hilly tract, and southern hilly range. Major land use is agriculture. The entire district falls under Mahanadi Basin- main tributaries being Seonath, Jok, and Tel. Major soil types in the district are Black Cotton, and Red-Yellow Loamy. Principal crops grown in the district are wheat, gram, and cotton. The major geological formations in the district are high-grade gneisses and unclassified metamorphic of Achaean Age.
Durg	Undivided Durg district including the newly created Bemetera district covered an area of 8708 sq. Km, lies between- 20°23'N and 22°02' N & 80°46' and 81°58 E with a population of 28,10,436 as per 2011 census. The district occupies the south-western part of the Upper

District	Description of Environmental Parameters
	Sheonath-Mahanadi valley and the bordering hills in the south and southwest. It is located at an elevation of 317 m above MSL. The district has subtropical climate characterized by hot summer and monsoon rainfall followed by dry and cold winter season. The annual temperature varies from 42.2 °C (summer) to 11°C (winter). The average rainfall of the district is 1270 mm. Physiographically, it is divided into two divisions: the Chhattisgarh plain and the Southern plateau. The Chhattisgarh plain occupies the largest area in the district. Major land use is agriculture. Major part of the district is drained by Seonath, Hamp, Kharr and Tendula river. Major soil types are Laterite, Red-Yellow Loamy, The principal crops grown are Paddy, jowar, bajra. Geologically, 87 % of the total geographical area of the district is covered by sedimentary formations of Chhattisgarh Super group comprising gypsiferous sale, Chandi limestone, Gunderdehi shale, Charmuria limestone, Chandarpur sandstone and Archaean granite gneisses.
Bilaspur	The district covers an area of 8,570 sq. km and lies within latitude 21° 43'N and 23 ° 7' N and longitude 81° 29'E to 82° 29'E with a population of 19,98,358 as per 2011 census. The district is bounded by Shahdol and Dindori of Madhya Pradesh on north and northwest side; Korba and Janjgir-Champa on the east; Raipur and Durg on the south; and Kawardha on the southwest. It is located at an elevation of 424 m above MSL The climate of the district is sub-tropical, semi arid, continental and monsoon type characterised by hot summers, cool winters and small rainy season. The summer temperature reaches a maximum of 45°C whereas it drops to about 10 °C in winter season. The average rainfall of the district is about 580 mm. Physiographically it is a part of Chhattisgarh Plain locally called the Bilaspur Plain. Major land use is agriculture. The soil is Red-Yellow Loamy. Major crop grown is paddy. The district is mainly underlain by sedimentary formations of Chhattisgarh super group and crystalline rocks of Achaean age except along river banks, where recent alluvium deposits are found in isolated patches.
Mahsamund	Mahasamund district is spread out in an area of 3902.39 Sq. Km in the Central-East of Chhattisgarh State with a population of 860257 as per 2011 census. The district lies between 20°47'N to 21°31'30''N latitude and 82°00'E to 83°15'45'' E longitude, surrounded by districts of Raigarh and Raipur of Chhattisgarh State and Nawapara and Bargarh of Orissa. Mahanadi and its tributaries like Kodar. Granite rocks can be found in the Bagbahra, Basna and Pithora region. Rocks are predominantly Limestone of the Chhattisgarh group contemporary to the Cuddapah group of the Upper Pre-Cambrian age, consisting of limestone layers, shale, sandstone, or quartzite. Neo-granite, dolerite, and quartz in intrusive forms are also found in the district. Hence there is a great scope of intense mining activity. From granite rocks of the Achaean period to stratified rocks of Cuddupah group of Upper Cambrian age are and alluvial soil and sand of recent age are found in abundance in the district. Also found in this region are Neo-granite, Dolerite and Quartz in intrusive forms. Major crops grown are Paddy,

District	Description of Environmental Parameters
	Wheat and Kodu.
Raigarh	Raigarh city the capital of Raigarh district is located at 21.9°N 83.4°E. The district has a population of 1,265,529 as per 2011 Census. It has an average elevation of 215 metres (705 feet). The Kelo river flows through the district which is one of its main water sources. The minimum - maximum temperature range is 29.5 - 49 °C in summer and 8 - 25 ° C in winter.
Korba	Korba district is situated in the northern half of the Chhattisgarh state and surrounded by the districts Korea, Surguja, Bilaspur, Janjgir etc. The district spreads between 220 01' N to 230 01' N and 820 08' E To 830 09' E with a population of 1011823 as per 2011 Census. It is located at an elevation of 304.8 m above MSL, Korba District falls under the hot temperate climate zone and hence the district experiences very hot and dry. Summer season starts from April to mid June. Rainy season due to the southwest monsoon is from mid-June to the end of September. The average rainfall in the district is 1506.7 mm. and normal rainfall is 1,287.6 mm. The district's total area is 714,544 hectare out of which 283,497 hectares is forest land.
Janjgir-Champa	Janjgir-Champa district is situated in the east central part of the Chhattisgarh state. The district is Raigarh in the east, Bilaspur in west, Korba and Bilaspur districts in the north and Raipur and Raigarh districts in the south. The district spreads between 21.60 N to 22.40 N and 82.30 E to 83.20 E with a population of 1317431 as per 2011 Census. It is located at an elevation of 294.4 m above MSL. Janjgir-Champa District falls under the hot temperate climate zone and hence the district experiences very hot and dry. Summer season starts from April to mid-June. Rainy season due to the Southwest Monsoon is from mid June to end of September. The average rainfall in the district is 1,157.1 mm. and normal rainfall is 1478.0 mm. The average maximum temperature is 49.00 C and average minimum temperature is 80C. The district's total area is 4, 46,674 hectare.
Jaspur	Jaspur district is located in the northern corner of Chhattisgarh state adjoining the border of Bihar, Jharkhand, and Orissa in the eastern side. Its total area is 6,205 Sq.Km and it lies between $22^0$17'N and $23^0$15' N latitude and $83^0$30'E and $84^0$24' E longitude. Average rainfall of the district is 1048.4 mm. Forest areas constitute around 0.5% of the total area of the district.Main crops grown are Paddy, Maize, Kodo-Kutki, Wheat, and pulses.
Bastar	Bastar district is one of the most backward districts of the state located in the south adjoining Odisha and Andhra Pradesh. The total area is 4029.98 sq. km. More than 70% of the district's population is tribal. Rice is grown predominantly during kharif season as rain fed crop having 2.38 million hectare area but the productivity of this crop is low 08.53 qtl/ha. The irrigated area comprises only 1.67%. Agricultural practices are traditional. Forests play an important role in the lives of the people, providing food security and livelihood through the collection of minor forest produce, and employment (as casual labour)
Surguja	Surguja district is located in the northern part of Chhattisgarh State. Borders of Uttar Pradesh, Jharkhand, Orissa and Madhya Pradesh

District	Description of Environmental Parameters
	States are adjoining to the district. This district has extension between south-eastern part of Vindhyachal-Baghelkhand region of peninsular India. It lies between 23037'25" to 2406'17" N latitude and 81034'40" To 8404'40" E longitude.The has as area of about 16359Sq Km. About 50% area of the district is covered by forests
Kanker	Kanker is situated within the 20^0.6'-20^0.24' E longitude and 80^0.48' - 81^0.48' E latitudes. Total area of the district is 5285.01 square kilometers. Small hilly pockets are seen throughout the area.Mainly five rivers flow through the district namely- doodh river, Mahanadi, Hatkul river, Sindur river, and Turu river. The climate of the district is of monsoon type. The May month is the hottest month and the December month is the coolest month. Average rain of the district is 1492 mm. 90% rain fall during the June to October.
Dhamtari	Dhamtari district is situated in the fertile plains of Chhattisgarh Region. The district is situated between 20042' N Latitude and 81033' E Longtitude. The total area of the district is 2029 Sq.Km. and the average altitude is 305 M above the mean sea level. The district is surrounded by district Raipur in north & district Kanker as well as Bastar in South, part of Odisha state in East & District Durg and Kanker in West. Mahanadi is the principal river of this district

B. Physical Environment

1. Meteorology and Climate

43. The climate of Chhattisgarh is mainly tropical, humid and sub-humid. The climate is hot because of its position on the tropic of cancer. May is the hottest month and December-January is the coldest. The maximum temperature during summers ranges from 33ºC to 46ºC while minimum temperature from 30ºC to 19ºC. The temperature during the winter season ranges between of 27ºC to 9ºC. The state receives an annual average rainfall of 1524 mm. The vagaries of monsoon and uneven distribution of rainfall causes at times severe drought conditions. The winter rainfall is meagre.

2. Air Quality

44. Most of the project area lies in vast open agricultural land and is largely free from air pollution sources other than traffic and few brick-kilns existing in the area. These were located in open area and operate only for few months. As such, the ambient air quality for major pollutants like SO2, SPM and NOX is expected to be within the limits. However, in absence of any existing data on ambient air quality levels of the project area, secondary sources were referred.

Table 5: Ambient Air Quality during 2008

Area Classification	SO_2 (µg/m^3)	NO_2 (µg/m^3)	RSPM (µg/m^3)
Industrial	17	42	212
Residential	16	28	126
National Ambient Air Quality Standards for Industrial and Residential Areas	80	80	100

Source: National Ambient Air Quality Status, 2008, CPCB, and Table 3.3

45. The above Table 5 reveals that the concentration of all the pollutants are higher in industrial areas especially nitrogen dioxide and respirable suspended particulate matter. The levels of sulphur dioxide and nitrogen dioxide are however, well within the limits (NAAQS). The higher particulate matter levels are attributed to the vehicular movement on unpaved roads and the loose dust in the agricultural fields that lead to formation of dust clouds over short periods. The same can be inferred from Table 3.3 that provides a comparison of the air quality at different locations.

3. Noise

46. Along the proposed road construction proposals, there is neither significant industrial activity nor significant vehicular traffic contributing to ambient noise levels. The occasional vehicular movement on the unpaved roads contributes to increased noise levels over short duration and limited to daytime. The existing roads do not appear to have vehicular traffic at nighttime. Therefore, the ambient noise levels are expected to stay within the National Ambient Noise Standards.

4. Topography and Geomorphology

47. Based on regional topography Chhattisgarh region isdivided into three regions, the Northern Hills, the Central Plains and the Bastar Plateau. The central Chhattisgarh basin is characterised by two major landform types, the gently sloping Chhattisgarh Plain and the undulating Rimland. The elevation of the plain ranges from about 250 m on the eastern margin to about 330 m in the west. The gentle gradient of the Chhattisgarh Plain is largely due to its geological structure with flat to gently dipping Cuddapah sedimentary formations. About 18 per cent of the state comes under the flat or level topography, which is largely found in the Chhattisgarh Basin in the central belt of the state7. These plains mainly adjoin the river valleys of Godavari, Mahanadi and Sabri River.

48. Ground elevation of the project districts vary from 250 to 450 m above mean sea level, but the topography of the project region is mostly flat.

[7] Water Policy for Drought Proofing Chhattisgarh, S. Gupta, Institute for Human Development, 2002

Table 6: Ambient Air Quality Status of Chhattisgarh in Previous Years

City	Location	Type of Area	SO2			NO2			RSPM			SPM		
			2004	2007	2008	2004	2007	2008	2004	2007	2008	2004	2007	2008
Korba	Pragati Nagar	R	13	13	26	19	21	32	132	94	157	139	193	264
	HIG 21, 22, MP Nagar (Extn)	R	13	13	6	21	21	16	176	103	79	209	212	163
	ITI Rampur	R	14	13	21	21	21	26	207	103	90	210	215	179
Bhilai	Laghu Udyog Nigam I.A.	I	24	25	14	29	31	22	148	164	113	264	259	236
	Vishak Hostel	R	21	21	13	26	26	21	128	97	107	234	182	226
	Regional Office Bunglow Office Bldg.	R	BDL	5	13	19	16	21	107	79	102	193	160	213
Raipur	M/s Wool Worth (I) Ltd	I	11	14	17	38	35	42	292	177	212	416	304	385
	New HIG - 9, Hirapur	R	10	15	20	37	36	44	275	134	181	402	241	381
	Yatayat Thana	R	-	14	19	-	35	44	-	115	182	-	205	337
National Ambient Air Quality Standards	Industrial Area (I) & Residential Area (R) (24 hourly average)	80	80			80			100			Not Prescribed		

Source: National Ambient Air Quality Monitoring Series, CPCB

R – Residential and other areas,
I – Industrial area,
L- Low, M- Moderate, H – High and C – Critical levels of pollution based on exceedence factor (calculated for n > 50 days)

BDL = Below Detection Limit (Concentration less than 4 $\mu g/m^3$ for SO_2)
BDL = Below Detection Limit (Concentration less than 9 $\mu g/m^3$ for NO_2)

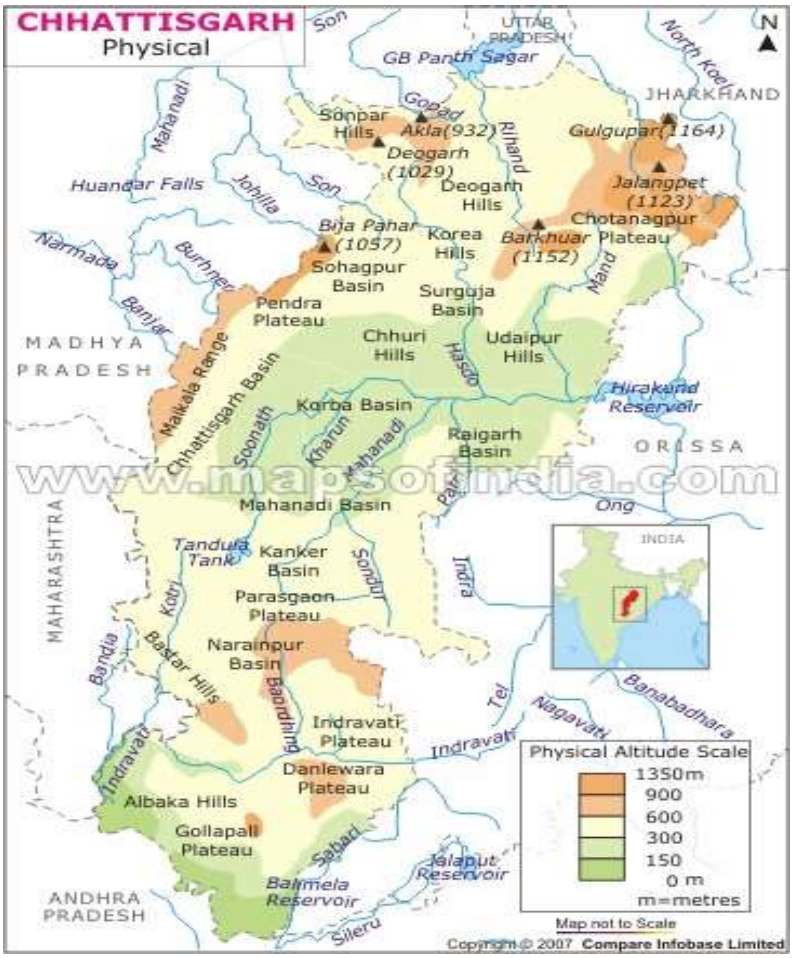


Figure 3: Physical Map Chhattisgarh Showing Elevations

5. Geology/Soil

49. Physiographically, the state of Chhattisgarh can be divided into 3 distinct zones:

- **Bastar plateau**: This region covering the districts of Baster, Dantewada and Kanker is mostly covered with forests. The hills forming the plateaus achieve heights between 700 and 800 m.
- **Chhattisgarh Plain**: It represents mature pediplain and is characterised by a gently undulating and flat terrain. High mounds or hillocks altitude of 700 m above MSL distinguish the fringe area. The average relief is of about 400 m.
- **Northern Hill region**: It covers part of Sarguja, Koriya, Korba, Bilaspur, Jashpur and Raigarh districts. It is a part of Maikhal and Hazaribagh ranges of central India.

50. The soils of the Chhattisgarh Plain are considered its principal natural resource, and are the mainstay of the predominantly agricultural population of the region. The following types of soils are found in the region: Kanhar (clayey), Matasi (sandy loamy), Dorsa (clay-loam), and Bhata (laterite).

51. These soils are deficient in important mineral nutrients like calcium and magnesium, nitrogen, phosphorous, lime and potash, which are concentrated in the lower parts of the soil layer. However, the tropical red and yellow soils or the red sandy soils of the region possess texture suitable for growing rice and millet crops.

6. Earthquake & Seismicity

52. Chhattisgarh has very low rates of seismic activity. In recent years, tremors from earthquakes in neighbouring states have been felt, most notably in 1969. The Bureau of Indian Standards (BIS) updated he seismic hazard map of India in 2000[8] . The main change was merging of Zones I & II. As per this updation, the entire Chhattisgarh state falls in Zone II as shown in Figure 4. It reveals that the project region falls in Zones II low to moderate risk zone.

53. According to Global Seismic Hazard Assessment Program (GSHAP) data, the state of Chhattisgarh falls in a region of low seismic hazard with the exception being moderate hazard in areas along the Maharashtra and Andhra Pradesh state borders. Historically, parts of this state have experienced seismic activity in the M4.0 range. The hazard-zoning map is shown in Figure 5.

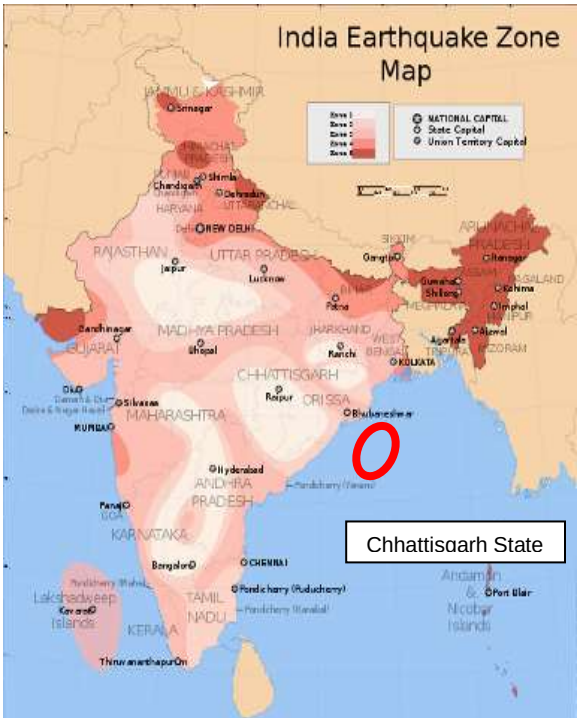


Figure 4 Seismic Zone Map
Source: IS 1893 (Part 1) 2002

7. Land use

54. The area under various land uses in the state is presented in Table 3.4. It shows that the state records a forest area of 59,772 sq km (44.2% of the total State area). Reserved Forest, Protected Forest and Unclassified Forest constitute 43.1%, 40.2% and 16.7% of the total forest area respectively (55,863 sq km and 41.3% of the total geographic area). With 35.4% of net sown area, it is one of the most intensely cultivated regions in the country, with paddy being the main crop. The Table shows that the major portion of the land use is under agriculture (48.7%) followed by forest cover (28%)

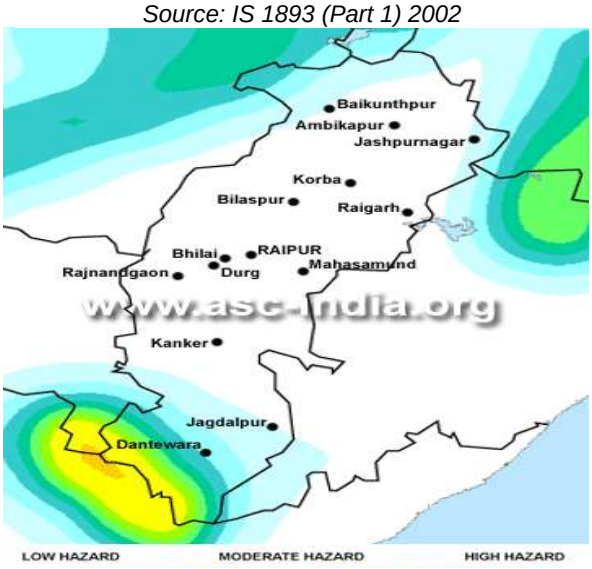


Fig 3.3 : Hazard Zone Map
Source: Amateur Seismic Centre, Pune

[8] IS 1893 (Part 1): 2002 Indian Standard Criteria for Earthquake Resistant Design of Structures Part 1 General Provisions and Buildings (Fifth Revision).

Table 7: Land Use Pattern in the State

Land Use	Area in '000 ha	Percentage
Total Geographical area	13,519	
Reporting area for land Utilization	13,468	99.6
Forests	5,977	44.2
Not Available for cultivation	1,039	7.7
Permanent pastures and other grassing land	848	6.3
Land under miscellaneous tree crops & groves	1	0.0
Culturable wasteland	344	2.5
Fallow lands other current fallows	232	1.7
Current fallows	248	1.8
Net area sown (as per agriculture census 1995-96 expect total cropped area)	4,779	35.4

Source: State of Forest Report, 2005, Forest Survey of India, Dehradun

55. The land use pattern within the sample roads can be broadly described as flat lanty with agriculture as dominant with residential and forest and associated land uses. Of the 32 sample roads evaluated, all surrounded by agricultural and residential lands and 12 roads pass through patches of forest land.

8. Hydrology and Water Quality

56. The main rivers that flow in the state are Mahanadi and its tributaries like Seonath, Hasdeo, Mand, Arpa etc, which drains part of Raipur, Durg, Rajnandgaon, Bilaspur, Raigarh and Surguja districts. Most of the rivers are perennial in nature. Generally the drainage patterns are of dendritic, parallel, angular and radial types. Son, the tributary of Ganga drains part of Sarguja and Koriya districts.

Figure 5: River Basin Map of Chhattisgarh

57. Hydro-geologically, the area is underlain by diverse rock types of different geological ages from Azoic to Quaternary. These geological formations have their particular hydrological characteristics, which control groundwater occurrence, movement and availability. The Archaean crystallines comprising granites, gneisses form the major litho units of the area. They form discontinuous, unconfined and semi-confined aquifers. Weathered mantle and fractures form the main repository of ground water in these aquifers. The unconsolidated formation of Quaternary age comprising alluvium, clay, silt, laterite etc. form thin and extensive unconfined aquifers in several isolated patches and near major river courses with thickness up to 30m bgl along Mahanadi, Arpa, Hasdeo, Seonath, Kharun, Mand, Kelo etc.

58. The sample roads are normally cross small drainage channels, which eventually join the major channels/rivulets. All of these channels generally remain dry for most part of the year and drain the storm water for few weeks only during or after the monsoon.

59. Several hand operated tube wells/wells are seen alongside of the existing tracks in many of the proposed road construction proposals. These tube wells appear to be serving as the main source of drinking water for rural communities in the region.

60. **Surface water Quality:** In Chhattisgarh, surface water is mostly of good quality, but pollution is increasing in major towns due to increasing urbanization. The estimated surface water available for use is around 41,720 Million Cubic Meter (MCM). None of the water sources are safe for drinking or bathing without conventional water treatment. Rivers such as Shivnath, Hasdeo, Indrawati, and Kharoon are polluted at different stretches due to industrial, domestic, and agricultural wastes. Among these rivers, Hasdeo River is the most polluted. No perennial river crosses the sample project roads.

61. **Groundwater Quality and Availability:** In the past, drinking water was obtained from wells, natural springs, streams, rivers, tanks and lakes. In the plains, where drinking water has been generally insufficient, wells, tanks and small rivers have been the main sources. In hilly and undulating regions, springs, rivulets and wells provide drinking water. Most households in rural areas now rely on hand pumps for their supply of drinking water. Despite their increasing density, there are still places where hand pumps are not available or functioning. In these locations drinking water is sourced from tube wells or even rivers. Piped and tap water is still not common.

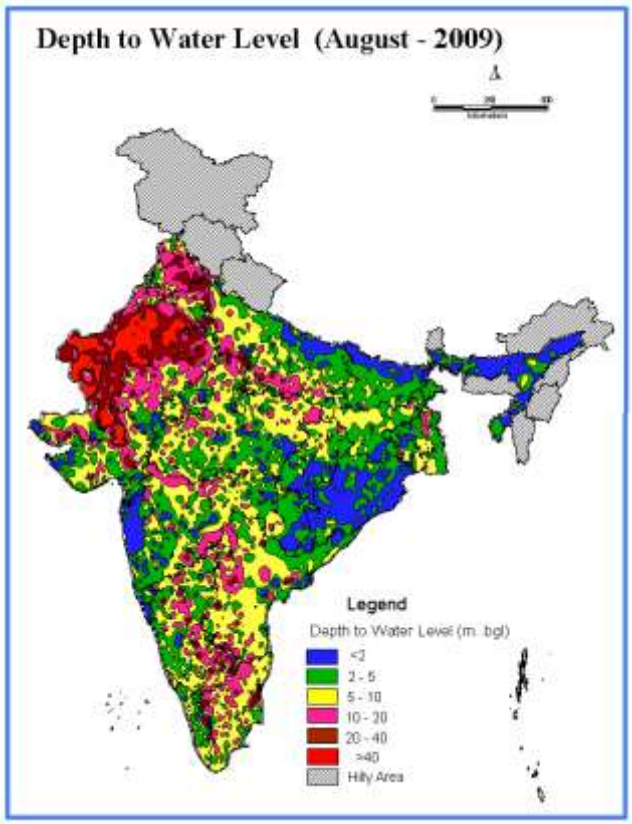


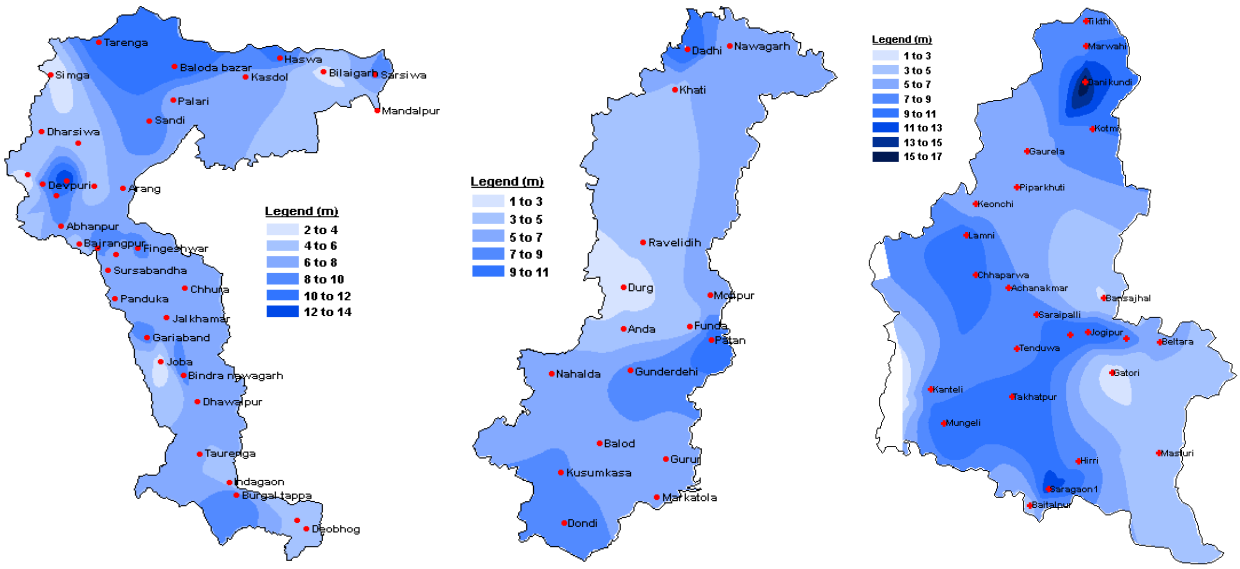
Figure 6: Average Depth of Water Table

62. Largely, the groundwater of the state is potable and meets the quality requirement for irrigation. Groundwater is generally moderately alkaline to near neutral in nature. Water pH general ranges from 6.5 to 8.5. The electrical conductivity was well below 1000μS/cm, which is indicative of fresh water circulation in the shallow zone. In few places such as northern part of Durg, parts of Bilaspur and Raigarh the ground water is high in sulphate content. Occasional high TDS values have been recorded in groundwater in parts of Raigarh and Bilaspur districts. The highest value of electrical conductivity (12000μ S/cm) was recorded in the Bodri Exploration well in Belha block of Bilaspur District[9].

63. As per the central ground water board (CGWB) report, the groundwater quality of all the ten project districts in both shallow and

[9] Mishra A K, Mohapatra P K (2002), Ground water scenario in Chhattisgarh, National Seminar on Science, Technology and Water, Ravishankar Shukla University, Raipur. pp.1-13

deeper aquifers is good and suitable for drinking, irrigation and industrial purposes. Belha block in Bilaspur and Saja in Durg are notified as semi-critical with respect to groundwater availability by CGWA. The Decadal (1995-2005) water table conditions during Pre-monsoon is shown in Figure 6.



Raipur Durg Bilaspur

Figure 7: Decadal Water Table Conditions in some Sample Project Districts

C. Ecological Resources

64. Chhattisgarh is rich in biodiversity. The State's forests are of two major types: Tropical Moist Deciduous and the Tropical Dry Deciduous. Composition wise, there are four important formations: Teak forests, Sal forests, miscellaneous forests and Bamboo forests. The chief NTFPs (non-timber forest produce) of the State are tendu leaves (Diospyros melanoxylon), sal seeds (Shorea robusta), harra (Terminalia chebula), gum, and chironji (Buchanania lanzan).

65. The floral biodiversity is complex comprising of different species including Aonla, Neem , Imli , Harra , Bel , Baheda , Baibidang , Baichandi, Adusa, Kalihari, Safed Mulsi, Kali musli, Aloe vera, Lemon grass, Bixa orellana, Ashwagandha, Isabghol, Sarpa gandha, Malkangni, Kali haldi, Nirmali, Kuchla, Tikhur, Keokand, Kiwanch, Sarphokha Bhuai amla, Giloy, Nagar Motha, Kalmegh, Satabar, Bidarikand, Ananth Mul, Brahmi, Bach, Jangli haldi, Jangli piaj, Rasna, Chitrak, Shankpuspi, Ratti, Tejraj, Bhojraj, Gokhaur, Bavachi, Bhragnraj, Salparni, and Senna. In Chhattisgarh 1,685 specimens of different plant species have been collected. Until now 1,685 species belonging to 785 genera and 147 families have been identified and preserved in the State herbarium. Ten dominant families of the state are Fabaceae, Poaceae, Cyperaceae, Asteraceae, Euphorbiaceae, Acanthanaceae, Convulvulaceae, Malvaceae, Rubiacaeae, Scorphulariaceae.The dominant species seen along the project roads are – babool (Acacia spp.), peepal (Ficus religiosa), Bargad (Ficus benghalensis), neem (Azadirachta indica), mahua (Madhuca longifolia), shisam (Dalbergia sissoo), Imli (Tamarindus indica), Gulmohar (Delonix regia) etc.

66. The project area lies in tropical climate zone; it has a medium range of flora and fauna. However, none of the sample roads will require the removal of any any rare, endangered or threatened floral species.

67. As mentioned 11 sample roads traverse patches of forestland. However, the habitat type is largely modified due to the presence of agricultural fields and opening up of the forest with the project roads. Although, none of the will require forestland conversion requiring forest clearance, tree cutting permit may be required. In most of cases, tree cutting has been minimized by suitably modifying the alignment. Along the sample roads the following faunal species are known to occur:

- **Amphibians:** Among amphibians toad *(Bufo sp.)* and frog *(Rana tigrina)* are reported.
- **Reptiles:** Among reptiles Indian garden lizards (*Calotes versicolor*), house lizards (*Hemidactylus sp.)* are generally reported while cobra *(Naja naja*) and viper (*Vipera sp.)* are rarely reported.
- **Mammals:** Among mammals Indian palm squirrel (*Fumambulus pennanti*), cat, dog (*Cuon sp.*), cow, Buffalo, rat (*Rattus rattus*) etc. are reported.
- **Aves:** Among aves common birds like crow (*Corves splendens*), sparrow (*Passer domesticus*), parrot (*Psittacula krameri*), baya *(Ploceus philippinus*), peafowl *(Pavo cristatus*), pigeon (*Columba livia*), and *Egretta sp*. etc. are reported.
- **Arthropods:** Among arthropods common insects viz Butterflies, Dragonflies, Wasps; Grasshopper, Cockroach, House fly, Beetles, Mosquitoes etc are reported

9. Forests

68. The state of Chhattisgarh being placed in Deccan bio-geographical area , houses an important part of that rich and unique biological diversity . What is amore conspicuous is that the state is significantly rich in endemism with respect to many plants having medicinal importance. The forests of the state fall under two major forest types, i.e., Tropical Moist Deciduous forest and the Tropical Dry Deciduous forest. The state of Chhattisgarh is endowed with about 22 varied forest sub-types existing in the state. The forest map of Chhattisgarh indicates that central and west districts like Raipur , Durg are having low forest areas while south and western parts have a mix of dense and open forest areas.

69. No forestland diversion is involved in any of the project districts under this project.

10. Wild Life and Protected Areas

70. The state falls under the Decan Bio-geographical Zone. It has 10.88 percent of its forests under Protected Area (PA) network. There are 3 National Parks, 3 Project Tiger Reserves, and 8 Sanctuaries as given in Table 3.6. The Indravati National Park is the only Tiger Reserve in the state located in Dantewada District. The wild fauna in the state consists of Tiger, Sambhar, Blue bull (Nilgai), Chinkara, Chital, Hanuman, Langoor, Rhesus monkey, Porcupine, Hare, Wild dogs, Jungle cat, Jackals, Hyena, Fox, Wild cat, Cheetal. Barking deer, Jackal, Sloth bear, Crocodile, Otter and Civet. The important avifauna consists of wagtails, Munias, Blue king fisher, Jangli murgi, Red Spur fall, Phakta, Ducks, Baj, Harial, Neelkanth Kabootar, Koel, Bhura Teetar, Kala Teetar, Tree pie, Drongo, Shikara, Giddha, Bagula, Dubchick, Wild pig, Peacock, Barlets, Bulbulis, and Minivets oriolets.

Table 8: List of Protected Areas in Chhattisgarh

S.No.	National Park	District	Area in Sq.Km.
1	Indravati	Dantewada	1258.000
2	Kanger Ghati	Bastar	200.000
3	Guru Ghasidas	Sarguja/Koriya	2898.705
Sanctuaries			
1	Achanakmar	Bilaspur	551.55
2	Badalkhol	Jashpur	104.55
3	Bhairamgarh	Dantewada	139.00
4	Barnawapara	Raipur	244.66
5	Gomarda	Raigarh	411.20
6	Pameda	Dantewada	262.00
7	Semarsot	Sarguja	608.52
8	Sitanadi	Dhamtari	553.36
9	Tamor Pingala	Sarguja	608.52
10	Udanti	Raipur	247.59
11	Bhoramdev	Kawardha	163.80

71. Among the project districts part of Guru Ghasidas National Park and Kanger ghat fall in Sarguja and Bastar districts respectively, while, Achanakmar, Badalkhol, Bhairamgarh and Pameda, Barnawapara, Semarsot, Sitanadi, Udanti and Gomarda sanctuaries fall in Bilaspur, Jaspur, Dantewada, Raipur and Raigarh districts respectively. However, none of the sample and project roads pass through any of these protected areas (Figure 8).

72. Endangered and threatened animals of India have been listed in the Schedule I and Schedule II of the Wildlife (Protection) Act, 1972 (amended in 2001). No threatened, rare, endangered or endemic species were found in COI of the sample roads.

11. Aquatic Biology and Fisheries:

73. No wetland or important water bodies exists in and around the selected project roads area. None of the sample project roads area is having any fish culture ponds.

D. Socio-Economic Environment

1. Demography

74. Chhattisgarh, earlier a part of Madhya Pradesh, became a separate state on 1st November 2000. It is a state with several unique features, such as abundant natural resources, rich biodiversity, and rich cultural diversity. The population of about 21 million is largely rural (79%). Tribals constitute about 33% of the population, and scheduled castes form about 12%. The welfare and development of tribals is an important focus area for the state government. The gender ratio of the state is higher than the national average as shown in Table 9.

Table 9: Demographic Profile

Indicators	Year	Unit	Chhattisgarh	All India
Area	2011	'000 Sq. Km.	550.58	3287.26
Population	2011	Million	25.54 (2.0)	1210.20
Rural population	2011	Percent	76.76	68.84
Urban population	2011	Percent	23.24	31.16

Indicators	Year	Unit	Chhattisgarh	All India
Population density	2011	Persons/Km^2	189	382
Gender Ratio	2011	Per '000 males	964	914

Note: Figures in bracket indicate percentage Source: Census, 2001

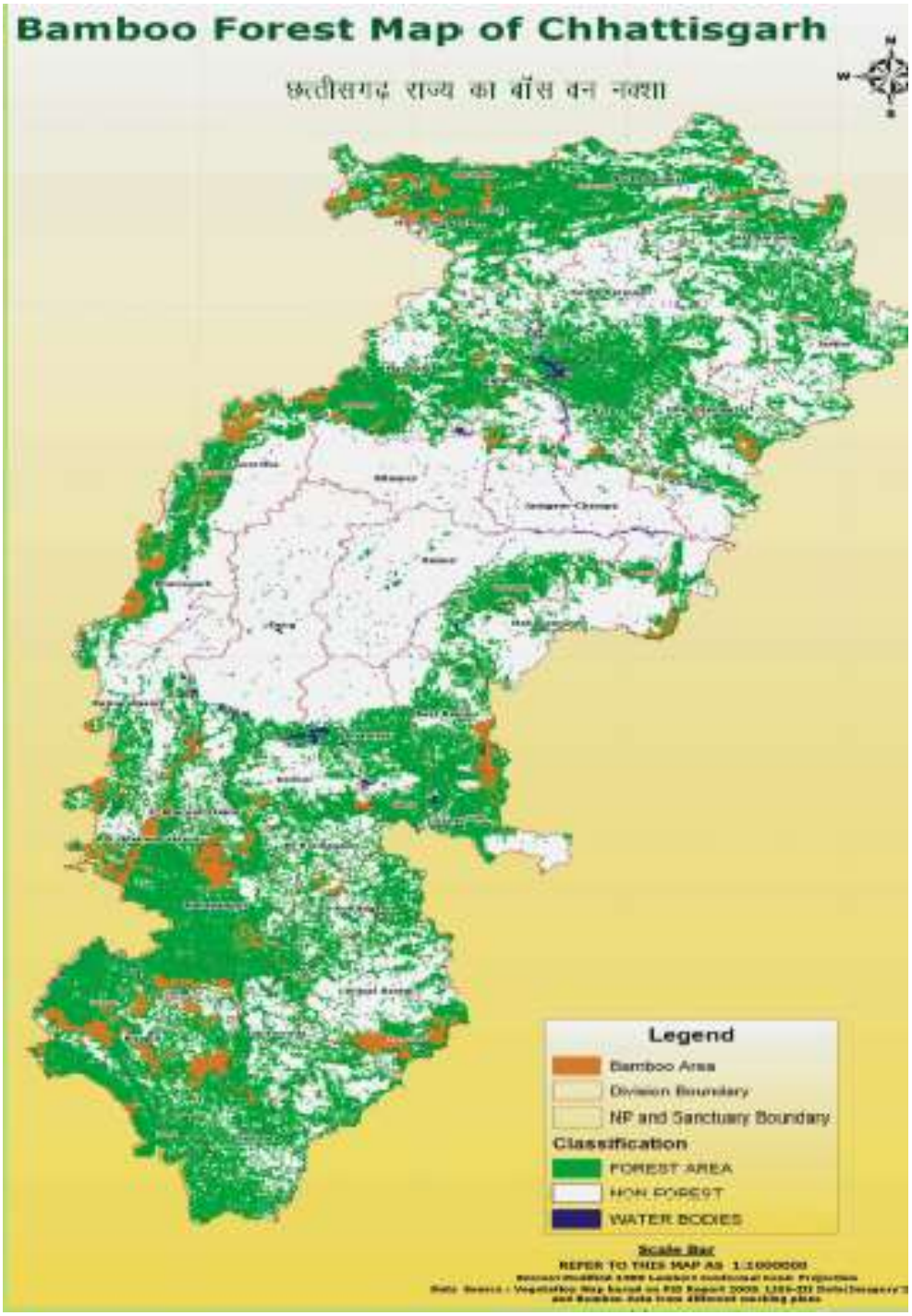


Figure 8: Forest Map of Chhattisgarh State

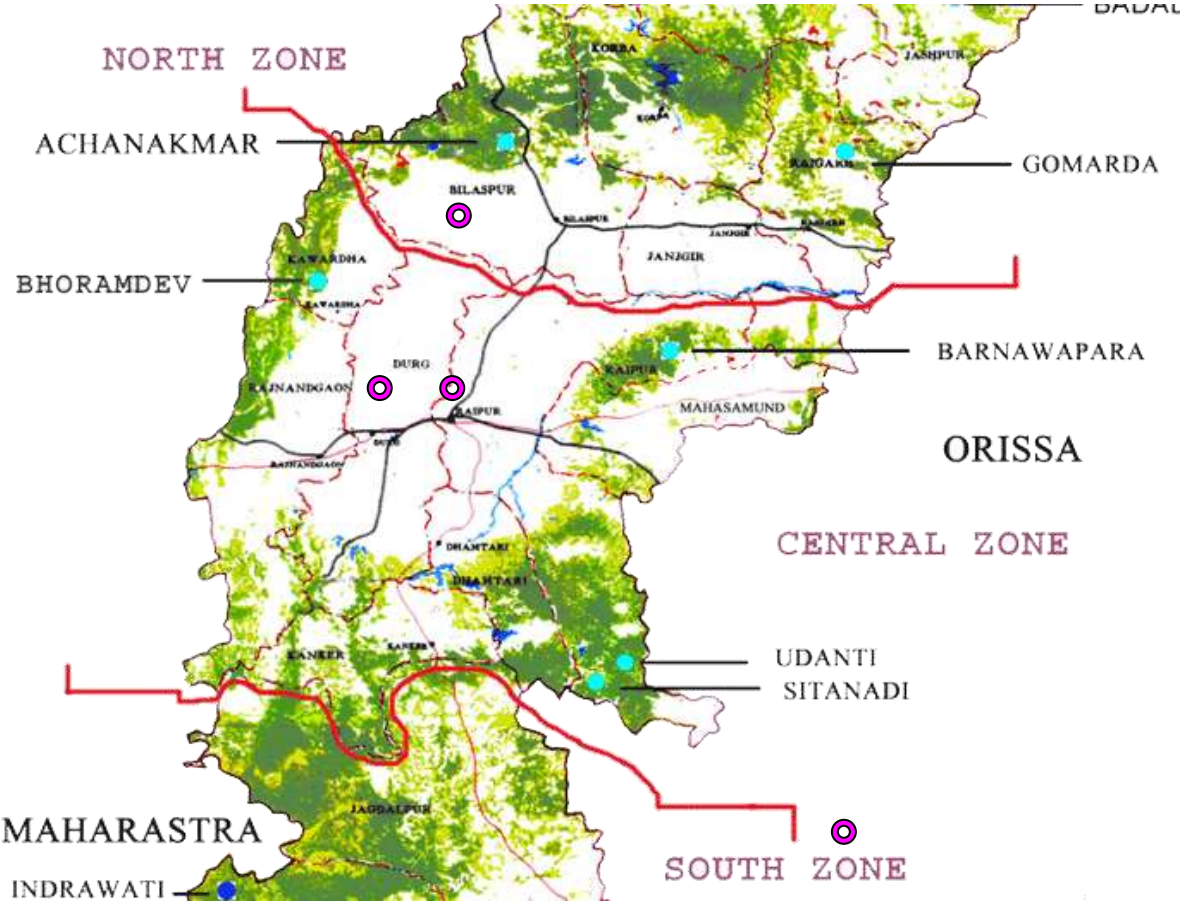


Figure 9: Protected Areas/Wildlife Sanctuaries of Chhattisgarh State

2. Healthcare

75. The state suffers from a lack of healthcare facilities and a lack of trained medical personnel. There was only one medical college serving a population of more than twenty millions at the time of formation of the State. The infant mortality rate and death rate of Chhattisgarh are among the highest in the country. The life expectancy at birth is also much lower than the all-India average (Table 3.8). Villagers of the project district depend on ayurvedic pharmacy, district hospitals, health posts and primary health care centres of the district.

3. Literacy and Education

76. The state has made considerable progress in the literacy (Table 3.8). However, the literacy level is particularly low among the scheduled castes and scheduled tribes population, especially among tribal women. The number of primary schools per 0.1 million people is above the average all-India level. However, the primary schools lack facilities and trained teaching staff. Tribals, in particular, lack access to educational facilities. Several enrolment campaigns and welfare programs run in the state to improve enrolment and reduce the dropout rates. The number of recognized professional education institutions is low in Chhattisgarh compared to the all-India situation.

Table 10: Human Development Indicators of Chhattisgarh

Indicators		Year	Unit	Chhattisgarh	All India
Infant Mortality Rate		2002	Per'000 live birth	73	63
Life Expectancy at Birth	Male	2003	Years	59.2	63.87
	Female	2003	Years	58.0	66.91
Death Rate		2002	Per '000 pop.	10.3	8.1
Literacy Rate	Male	2011	Per cent	81.45	82.14
	Female	2011	Per cent	60.59	65.46
	Person	2011	Per cent	71.04	74.04
Gross Enrolment Ratio (Classes I-IV)	Boys	2002-03	Per cent	107.3	97.53
	Girls	2002-03	Per cent	101.6	93.07
	Total	2002-03	Per cent	104.4	95.39
Primary School		2002-03	Per Lakh Pop.	115.2	63.42
Professional Edu. Inst.*		2002-03	Per Million Pop.	0.2	2.54

** Professional educational institutions include engineering, technology, architecture, medical and teacher training colleges.*

4. Affluence

77. The percentage of population below the poverty line is high at 44%. On an average, the level of affluence of a household in Chhattisgarh is lower than that of a household in the rest of the country (Table 3.9). There are proportionately less number of households in houses with concrete roof, drinking water in premises and open drainage system for waste water in comparison with the all-India level. In both rural and urban areas of Chhattisgarh, the proportion of households having access to safe drinking water is also less compared to the all-India scenario.

Table 11: Indicators of Affluence

Indicators		Year	Unit	Chhattisgarh	All India
HH in houses with concrete roof		2001	Per cent	10.9	19.8
HH with drinking water in premises		2001	Per cent	19.0	39.0
HH with open drainage for waste water		2001	Per cent	16.7	33.9
HH having access to safe drinking water	Rural	2001	Per cent	66.2	73.2
	Urban			88.8	90.0
	Total			70.5	77.9

5. Economy

78. The State's economy is highly dependent on the primary sector with agriculture as the main source of livelihood of the population. The per capita income (measured by per capita State Domestic Product) of Chhattisgarh is much below the national average as seen from Table 3.10. The share of the primary sector in the State Domestic Product (SDP) of the State is 37.3% whereas at the all India level this share, on an average, is 26.3%. At the all India level, the share of the service sector is 49.3% of GDP (Gross Domestic Product) whereas in Chhattisgarh the service sector has a share of 43.7% of SDP.

79. The expansion of the industrial sector is quite tardy in the State. It is confined to few local areas, mainly in Durg, Raipur, Korba and Raigarh districts. Most districts of the State hardly have any industrial units except rice milling and wood cutting. The agricultural

productivity is very low (Table 12). Low agricultural productivity is the result of several factors, including mono-cropping practices, low use of fertilizer, lack of water resource management and irrigation facilities, and low levels of mechanization. There is significant scope for improving agricultural productivity by addressing these problems.

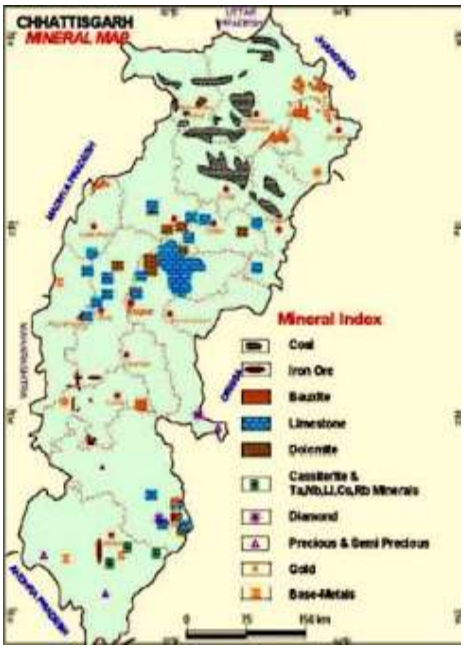
80. All parameters for the banking services namely, number of bank offices per 100 thousand population, percentage of households availing of the banking services, credit-deposit ratio indicate that banking activities are limited in Chhattisgarh in comparison with the all India scenario.

Table 12: Indicators of Economy of Chhattisgarh

Indicators		Year	Unit	Chhattisgarh	All India
SDP/GDP per capita		2001-02	Rs.	11952	17822.8
Composition of SDP / GDP	Primary	2002	Per cent	37.30	26.28
	Secondary	2002	Per cent	18.98	24.41
	Service	2002	Per cent	43.72	49.31
Average yield of principal crops	Rice	2008-09	Kg. per hect.	1485	2125
	Wheat	2008-09	Kg. per hect.	1086	2839
	Maize	2008-09	Kg. per hect.	1399	2024
Cropping Intensity		2003	Per cent	117	135
Consumption of fertilizers		2003-04	Kg. per hect.	46.5	89.8
Prop. of area under irrigation		2001	Per cent	20.66	44.2
Bank offices		2004	Per Lakh Pop.	2.80	4.54
HH availing banking services		2001	Per cent	24.10	35.50
Credit-Deposit Ratio		2003	Per cent	39.1	59.4

6. Agriculture

81. About 35% of the state's area is under agriculture and majority of the state's population (about 80%) is dependent on agriculture. The principal food crops of the state are rice, wheat and maize. Agriculture contributed about 34% to the Net State Domestic Product (NSDP) in 2002-2003.



82. Agriculture production and livestock farming is the main source of livelihood in sample project areas. The economy of the area is predominantly agriculture based. It has high potential for agriculture production such as crops, tropical fruits e.g. b mango, papaya, lemon, orange, etc., and green vegetables. Most of the common crops grown in the areas are as rice, wheat, maize, barley, as well as other important vegetables

7. Mineral Resources

83. Chhattisgarh is well known for its abundant deposits of natural resources. The state's resources include minerals-mainly iron-ore, coal, bauxite, and dolomite, limestone, diamonds and other precious stones, gold and tin. The state accounts for 19% of the country's iron ore deposits. The iron ore of Bailadila mines in

Dantewada district is exported to Japan because of its high ferrous content. 17% of the nation's coal reserves lie in the state. The state also accounts for 49% of the country's diamond deposits. The State is the largest producer of quartzite, and the second largest producer of iron ore, coal and dolomite in the country. Abundant deposits of limestone are found in the districts of Raipur, Bilaspur, Durg and Bastar regions.

84. The mining and quarrying sector contributed 12% to the state's Gross Domestic Product in 2001-02. Major companies operating in Chhattisgarh include Essar Steel, NMDC, Jindal Steel and Power, SAIL, BALCO, and South Eastern coalfields, De Beers, and Rio-Tinto. Several large Cement Companies such as ACC and the AV Birla Group also operate in the state.

8. Industries

85. The major industries of the state are electronics, telecommunications, petrochemicals, power, food processing and automobiles. The state has also taken a lead in the production of cement. The state is also famous for its traditional handicrafts and handlooms manufactured at Chanderi and Maheshwar. The major industrial unit in the state are- cement, Pig Iron, Steel Ingots, News Prints and Sugar mills.

9. Physical Infrastructure

86. **Road**: The road length and the railway route length per Sq. Km. of Chhattisgarh are less than the national average as shown in Table 13. An Infrastructure Development action plan is in place. Upgradation and expansion of the road network is being taken up.

Table 13: Physical Infrastructure

Indicators	Year	Unit	Chhattisgarh	All India
Road length	2008	Per '00 sq.km.	550.18	927.15
Railway route length	2001	Per'000 sq. km.	8.73	19.17
Village electrification	2004	Per cent	92.9	83.8
HH with electricity for lighting	2001	Per cent	53.10	55.8
No. of post offices	2011	Per Lakh Pop.	11.86	15.08 (2001)
Tele-density	2003	Per '00 Pop.	1.7	6.6

87. **Power**: The percentage of villages electrified is about 93% in the entire state. However, the percentage of households with electricity for lighting is only 53.1% the all India level. The state was until recently, power surplus state. It is also being linked to the Eastern grid. Korba in Chhattisgarh is the power capital of India. NTPC's Super Thermal Power Plant in Korba works at a very high Plant Load Factor (PLF). There are huge coal reserves in the vicinity, offering cheap power generation opportunities.

10. Religious and Cultural festivals:

88. The state of Chhattisgarh has great cultural value. Festivals and cultural activities are being celebrated throughout the year in the state. Specific events are being organized by tribal communities i.e. Gonds and Banjaras, throughout the year. There are few temples located along the project roads. In some cases those need to be shifted.

E. Salient Environmental Features of Sample Roads

89. The salient environmental features of sample roads are summarized in Table 14 below:

Table 14: Salient Environmental Features of Sample Roads

Sl No.	District	Block	Road Name (length)	Salient Environmental Features
1	Bilaspur	Bilha	T010 - Aithulkapa (1.86 Km)	• Topography is flat • Inhabited area Aithulkapa at Ch-1400m to Ch-1860m • Project road passes mainly through Pasteur/ grazing land • Ponds located between Ch-100m to Ch-200m, Ch-200m to Ch-300m LHS and , Ch-400m to Ch-500mLHS • Some water crossing points are found between Ch-400m to Ch-500m, Ch-700m to Ch-800m, Ch-1200m to Ch-1300m • No tree will be cut for the road project
2	Bilaspur	Kota	Kurdur To Bagdhar Via Sargod (20.30 KM)	• Hilly area between Ch-3600m toCh-9200m and Ch-1500m to Ch-19000m along the project road • Forest area found between Ch-00m toCh-14000m and Ch-15000m to Ch-19400m along the project road. • Inhabited areas namely village Amagohan para, Tumadabra, Maluwari, Para, Sargod and Bagdhara between Ch-400m to Ch-600m, Ch-2000m to Ch-2400m, Ch03200m to Ch-14000m, Ch-11800m to Ch-12000m, Ch-14600 to Ch-15000m and Ch-19800m to Ch-20300m. • Project road passes mainly through agricultural area • Pond located at Ch-8000m to Ch-1000m LHS • 4 trees will be cut for the road project
3	Bilaspur	Kota	Katra Rd To Bargawa Lusada Kedadand (3.25 Km)	• Topography is flat • Forest area found between Ch-00m toCh-1440m LHS along the project road. • Inhabited areas namely village Tatidhar between Ch-300m to Ch-400m, Ch-1200m to Ch-1400m. • Project road passes mainly through agricultural area • No tree will be cut for the road project

Sl No.	District	Block	Road Name (length)	Salient Environmental Features
4	Bilaspur	Mungeli	Bicharpur To Uslapur Singhanpur (8.630 Km)	• Topography is flat • Inhabited area lies between Ch-00m to Ch-400m, Ch-3000m to Ch-3200m,Ch-5000m to Ch-5200m, Ch-8500m to Ch-6200m and Ch-7600m to Ch-8600m. • Project road passes mainly through 6 agricultural land • Pond between Ch-2600m to Ch-2800m RHS, Ch-5000m to Ch-5200m LHS and Ch-7900m to Ch-7600 RHS • There is some water crossing points at the project road at Ch-4400m to Ch-4600m. • 1 tree will be cut for the road project
5	Durg	Dhamdha	Main Road To Parsada (6.4 Km)	• Topography is flat • Inhabited area starts between Ch-2000m to Ch-2600m, Ch-4000m to Ch-4800 and Ch-6200m to Ch-6400m. • Project road passes mainly through 6agricultural area • Small ponds between Ch-200m to Ch-400m LHS, Ch-1400m to Ch-1800m RHS, Ch-2400m to Ch-2600m LHS, Ch-2600m to Ch-3000m RHS, Ch-5800m to Ch-6200m RHS • No flood prone area along the road • No tree loss due to the road project
6	Durg	Bemetara	Main Road - Atriya (1.45 Km)	• Topography is flat • No forest land along the road • The project road is passing through village namely Atriya at between Ch-900m to Ch-1400m. • Project road passes mainly through agricultural land • Few water crossing has been observed between at CH-700m to Ch-800m • There is no problem of water stagnation and other drainage issues on or near the road • No tree loss due to the road project
7	Durg	Nawagarh	Kodiya - Bhaisamuda Road (2.15 KM)	• Topography is flat • No forest land along the road • Project road is passing through village namely Kodiya between Ch-200m and

Sl No.	District	Block	Road Name (length)	Salient Environmental Features
				Ch-1400m and Bhaisamuda between Ch-00m to Ch-2150m. • Project road passes through agricultural land • Pond between Ch-200m to Ch-500 (2) RHS, Ch-1400m to Ch-1500 and Ch-2000m to Ch-2150m • Few water crossing has been observed between at Ch-800m to Ch-900m and Ch-2000m to Ch-2100m • 21 trees will be cut for the road project
8	Janjgir-Champa	Malkharada	T01 To Bokrel (3.50 Km)	• Topography is flat • No forest land along the road • Project road passes through agricultural land • Project road is passing through village namely Bokrel between Ch-3100m to Ch-3200m • Pond between Ch-2900m to Ch-3000m RHS • Few water crossing has been observed between at Ch-00m to Ch-100m, Ch-2200mt o Ch-2300m, Ch-2900m to Ch-3000m • There is no flood prone area along the project road. • 37 trees will be cut due to the road project.
9	Dhamtari	Nagri	Sahnikhar to Latiyara (2.60 Km)	• Topography is flat • No forest land along the road • Inhabited area lies between Ch-700m to Ch-1000m LHS and Ch-2400m to Ch-2600m both side with connecting village Latyari and Sahnikhar respectively • Project road passes through agricultural land • Pond between Ch-2300 to Ch-2400m • Few water bodies are crossing • No tree loss due to the road project
10	Jashpur	Bagicha	Turrikona To Tr 02 MDR (5.00 Km)	• Topography is flat • Forest area at between Ch-1600m to Ch-2400 to Ch-2500m • Project road is passing through village Para between Ch-200m to Ch-600 m and Turrikona Ch-4400 m to Ch-5000

Sl No.	District	Block	Road Name (length)	Salient Environmental Features
				• Project road passes through agricultural land • Few water crossing • No tree loss due to the road project
11	Jashpur	Pathalgaon	Hardijhariya To Tr07 (1.63 KM)	• Topography is flat • No forest land along the road • Project road is passing through village Harsijhariya toil between Ch-1200m to Ch-1300m • Project road passes through agricultural land • 12 trees will be cut due to the road project • No flood prone area along the road
12	Jashpur	Kunkuri	Lodhaamba - L-38 Harradand (6.20 Km)	• Topography is flat • No forest land along the road • Project road passes through village Navatoli (Ch-00m to Ch-200m), karmatoli (Ch-1000m to Ch-1400m), sirivelly (Ch-2800mt o Ch-3200m) and lodhaamba (Ch-4400m to Ch-4800m) • Project road passes through agricultural land • Pond between Ch-800m to Ch-1000m • Few water crossing • No tree loss due to the road project
13	Korba	Kartala	T04 To Kasipani (2.10 Km)	• Topography is hilly • Forest area located between Ch-00m to Ch-300m and Ch-1100m to Ch-1700m • Project road passes through village Kashipani Ch-900 to Ch-1100m • Project road passes through agricultural land • There is no pond along the project road. • Few water crossing • No tree loss due to the road project
14	Korba	Korba	T01 To Dadarpara (4.25 Km)	• Hilly Topography • Forest area starts between Ch-200m to Ch-2500m both side and Ch-2700 to Ch-4000m both side • Inhabited area lies between Ch-00m to Ch-200m, Ch-2600m to Ch-2700m, Ch-4000m to Ch-4250m with connecting village Binjhari • Pond between CH-800m to Ch-900m

Sl No.	District	Block	Road Name (length)	Salient Environmental Features
				• Few water crossing • 8 trees loss due to the road project
15	Korba	Podiuproda	T04 To Jambahar (4.15 Km)	• Hilly Topography • Forest area starts between Ch-1300m to Ch-4000m both side. • Inhabited area lies between Ch-300m to Ch-500m and Ch-4000m to Ch-4150m with connecting village Kotwari and Jambahar • Project road not passess through agricultural area • Few water crossing • No flood prone area located • 2 trees will be cut due to the road project
16	Mahasamund	Saraipali	T 03 To Sahajpani (8.95 Km)	• Topography is flat • forest area between Ch-2500m to Ch-5200m, Ch-6000m to Ch-6800m and Ch-6800m to Ch-7100m LHS • The project road is passing through village namely Mandirdipa, Kasturbahal and, Sahajpani between Ch-900m to Ch-1100m, Ch-5000m to Ch-5200m and Ch-7800m to Ch-8500m respectively • Project road passes through agricultural land • Pond between Ch-3200m to Ch-3400 RHS and Ch-4700m to Ch-4900m along the Project road • Few Water crossing • 139 trees will be cut due to the road project.
17	Mahasamund	Mahasamund	NH 6 To Khadsa (1.9 Km)	• Topography is flat • Forest area between Ch-00m toCh-600m RHS along the project road • Project road is passing through village namely Kharsa between Ch-1600m to Ch-1900m. • Project road passes through agricultural land • Pond between Ch-600m to Ch-700m • Few water crossing • 22 trees will be cut due to the road project.

Sl No.	District	Block	Road Name (length)	Salient Environmental Features
18	Mahasamund	Mahasamund	NH 6 To Dumarpali (2.65 Km)	• Topography is flat • Forest area between Ch-00m to Ch-500m • Project road is passing through village namely Dumarpali between Ch-1800m to Ch-2650m • Project road passes through agricultural land • Few water crossing between Ch-00m to Ch-100m and Ch-1600m to Ch-1700m • 61 trees will be cut due to the road project
19	Raigarh	Dharamjaigarh	T06 To Jamabeera (3.00 Km)	• Topography is flat • Forest area between Ch-00m to Ch-13000m both side. • Inhabited area lies between Ch-2100m to Ch-2700m with connecting village Jamabeera • Agriculture land found between Ch-1700m to ch-2000m both side along the project road • Few water crossing • 3 trees will be cut due to the road project.
20	Raigarh	Lailunga	Kesala To Khairbahar (Vr78) – 2.4 KM	• Topography is flat • No forest area along the road • Road passes through agricultural area • Pond located at Ch 1+560 RHS and 1+900 LHS • No tree loss due to the project
21	Raigarh	Sarangarh	T-06 To Ghatora (4.50 Km)	• Topography is flat • Forest area located between Ch-300m to Ch-6000m LHS, Ch-1500m to Ch-1800m both side, Ch-2200m to Ch-2400m LHS, Ch-2200m to Ch-4100m RHS. • Project road passes through agricultural land • Inhabited area lies between Ch-1800m to Ch-2200m and Ch-4100m to Ch-4500m with connecting village Ghatora • Few water crossing • No tree loss due to the project.

Sl No.	District	Block	Road Name (length)	Salient Environmental Features
22	Raigarh	Raigarh	Sambalpuri Kolaibahal Road To Sapnai (1.95 Km)	• Topography is flat • No forest area along the road • Road passes through agricultural area • Pond located at Ch 1+200 RHS • No water logging • No tree loss due to the project
23	Raipur	Balodabazar	SH 33km To Lawanband (0.90 Km)	• Topography is flat • No forest area along the project road. • Project road is passing through village Lawanband between Ch-400m to Ch-900m • Project road passes through agricultural land • No pond along the project road • Few water crossing between Ch-200m to Ch-300m • 3 trees will be cut due to the project.
24	Raipur	Gariaband	Gariaband To Khatti (5.30 Km)	• Topography is flat • No forest area along the project road. • Project road is passing through village Khatti between Ch4-400m to Ch-5+300m • Project road passes through mostly agricultural area • No pond or other water body along the project road • 1 tree will be cut due to the project.
25	Raipur	Kasdol	Chhachhi To Amakhoha (5.75 Km)	• Topography is flat • No forest area along the project road • project road is passing through village Chhachhi, Pisid and Amakhoha between Ch-00m to Ch-400m, Ch-400m to Ch-2200m, and Ch-4800m to Ch-5400m • Project road passes through agricultural land • Pond located between Ch-200m to Ch-400m LHS, Ch-2200m to Ch-2400m LHS, Ch-4600m to Ch-4800m both side and Ch-4800m to Ch-5000m RHS • Few water crossing • 53 trees will be cut due to the road project
26	Raipur	Pallari	Gidkera To Saiha Bazar (3.50 Km)	• Topography is flat • No forest located along the project road

Sl No.	District	Block	Road Name (length)	Salient Environmental Features
				• Project road is passing through village namely Gitkera and Saiha between Ch-00m to Ch-300m and Ch-3200m to Ch-3500m • Project road passes through agricultural land • Grazing ground between Ch-2600m to Ch-2900m RHS • Pond located between Ch-2900m to Ch-3000m LHS, Ch-3200m to Ch-3300m RHS and Ch-3300m to Ch-3400m RHS • There are few water crossing observed • 22 trees will be affected due to the project.
27	Raipur	Pallari	Pandariya Dotopar Amera Bhalookona 13 Km To Achholi (5.90 Km)	• Topography is flat • No forest area along the project road. • Project road is passing through village Achholi between Ch5-400m to Ch-5+900m • Project road passes through mostly agricultural area • No pond or other water body along the project road • 2 trees will be cut due to the project.
28	Raipur	Chhura	Kantakhusari To Rajpur Via Dharampur (4.50 Km)	• Topography of the project road is hilly at LHS • Forest area located at Ch-600m to Ch-1700m and Ch-2000m to Ch-2800m both side • Inhabited area lies between Ch-00 to Ch-200 m and Ch-3900 m to Ch-4500 with connecting village Jampura and Rajpura • Project road passes through agricultural land • No pond located • Few water bosies are crossing and cross drainage structures are provided at these locations. • 4 trees loss due to the road project
29	Raipur	Tilda	Tulsi M To Sarfonga (2.63 Km)	• Topography is flat • Inhabited area lies between Ch-2200m to Ch-2630m with connecting village Sarfonga way • Project road passes through

Sl No.	District	Block	Road Name (length)	Salient Environmental Features
				agricultural land • Barren land Ch-2100m to Ch-2500m along the project road • Pond between Ch-2400m to Ch-2500m LHS • Few water bodies are crossing and cross drainage structures are provided • 1 tree will be cut due to the road project
30	Surguja	Lundra	NH 78 Katni Gumla Road To Silsila Uparpara (2.80 Km)	• Topography of the project road is hilly at RHS • Forest area located at Ch-600m to Ch-1200m both side • Inhabited area lies between Ch2-400 to Ch-2-800 m • Project road passes through agricultural land • No pond or other water body located along the road • No tre loss due to the road project
31	Bastar	Bastar	T01-Farsaguda To Patelpara Chhurawand (7.50 Km)	• Topography of the project are is flat • Forest area starts between Ch-2800m to Ch-4400m RHS and Ch-4400m to Ch-6800m both side • Inhabited area lies between Ch-00m to Ch-200m, Ch-1000m to Ch-2400m and Ch-6800m to Ch-7500m with connecting village Salehmeta, Bazar para and Ghuraband • Project road passes mostly through agricultural area • Pond lies between Ch-400m-600m LHS and Ch-6000m Ch-6200m LHS • 2 nos. tree loss due to the road project
32	Kanker	Koelibeda	Vishrampur To Alor (0.90 Km)	• Topography is flat • No forest area along the project road. • Inhanited area is village Alor at Ch. 0+700 to 0+900m • Project road passes through agricultural area • No pond or other water body along the project road • No tree will be cut due to the project.

IV. ANTICIPATED ENVIRONMENTAL IMPACTS AND ITS MITIGATION MEASURES

90. Road improvements work brings substantial economic and social benefits to rural communities and ultimately to the nation as a whole. Experience from past rural road upgrading projects however indicated risk for adverse impacts mostly related during the construction phase and the loss of avenue trees. Impacts are limited as the eligibility screening criteria defined in the environmental assessment and review framework avoids significant adverse impacts and proposed road improvements are confined along existing alignments. The impacts are expected largely during construction phase, which can be mitigated through engineering measures and adoption of best construction practices. This section outlines the identified impacts during design, construction and operation phases along with proposed mitigation measures for eliminating or minimizing the adverse impacts.

91. All project roads are subjected to environmental screening using the ECOP checklist. A sample size of 10% was selected by the CGRRDA with support from the Project Implementation Consultant (PIC) from which this state level IEE was based. Separate environmental checklist were prepared for bridges with length greater than 50m. A standard EMP that forms part of the ECOP Checklist guided the preparation of the EMP provided in this report. As the MFF also calls for construction of training and research centers, separate assessments and EMPs will be prepared and may be integrated in the state-level IEEs as the designs and construction schedule are finalized.

92. The associated environmental impacts are assessed considering present environmental setting of the project area, nature, and extent of the proposed activities. Impacts are analysed on both generic and specific nature and are classified as insignificant, minor, moderate, and major. Since the issues associated with most of the roads are similar, the impacts and mitigation measures given below are applicable to most of the subprojects. Any issue specific to a road is separately mentioned.

A. Common Impacts during Design and Construction Phase

1. Climate change projection

93. **Temperature**. By the 2050s, there is a general increase in temperature in Chhattisgarh with the average annual minimum temperature expected to increase from 1.76oC to 3.10oC from the reference 1961-1990 based on General Circulation Model (GCM) ensemble average. The annual average maximum temperature is expected to increase from 0.75oC to 3.00 oC while the annual maximum temperature from 0.449-3.21oC. Monthly maximum temperature difference occurs on August which could reach 3.8oC. Consistent with the trend, the annual minimum temperature is expected to increase by 1.452oC to 4.48oC.

94. **Precipitation**. The various GCM models are not in agreement on the trend of change in precipitation in Chhattisgarh by the 2050s. Predicted annual change in rainfall ranges from a decrease of 418.48 mm to an increase of 401.01 mm with a corresponding statistical confidence in change ranging from “marginally significant” (90% p-value on Stundent’s t-test) to significant (95% p-value).

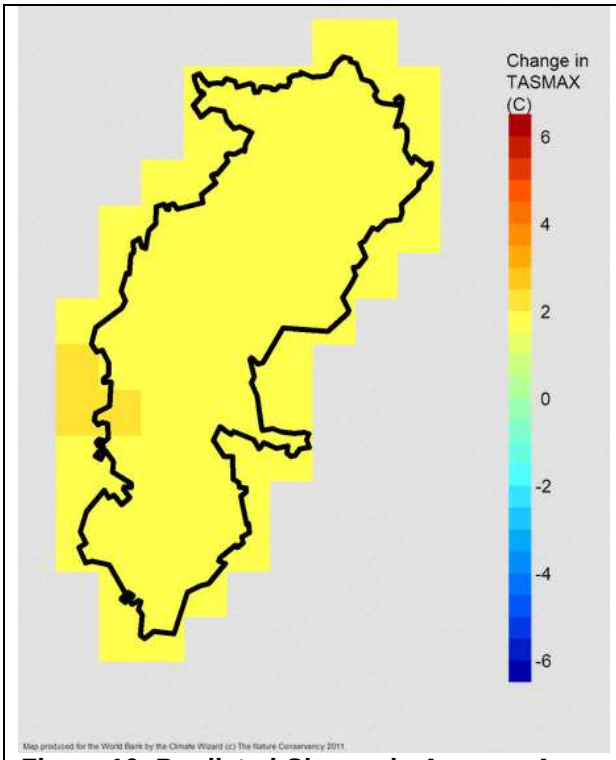
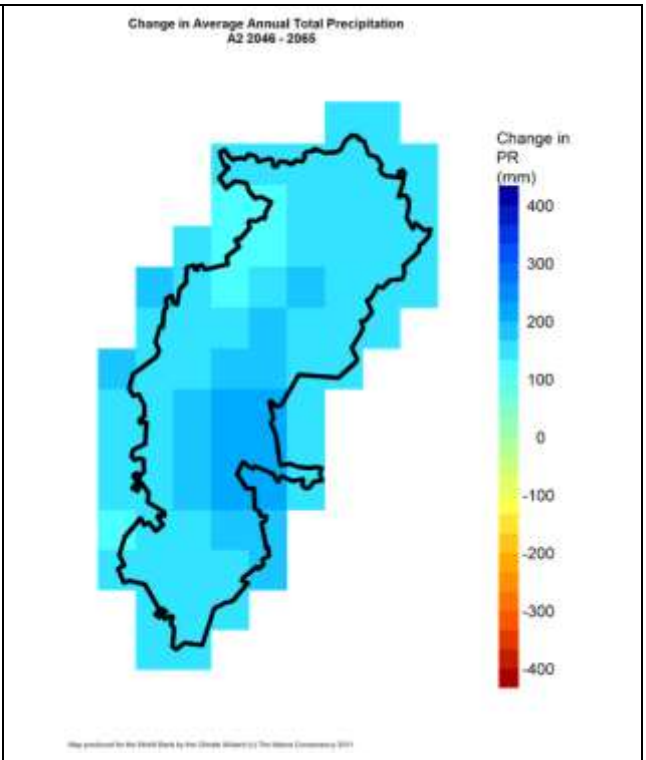


Figure 10: Predicted Change in Average Annual Maximum Temperature, oC, A2 2046-2065



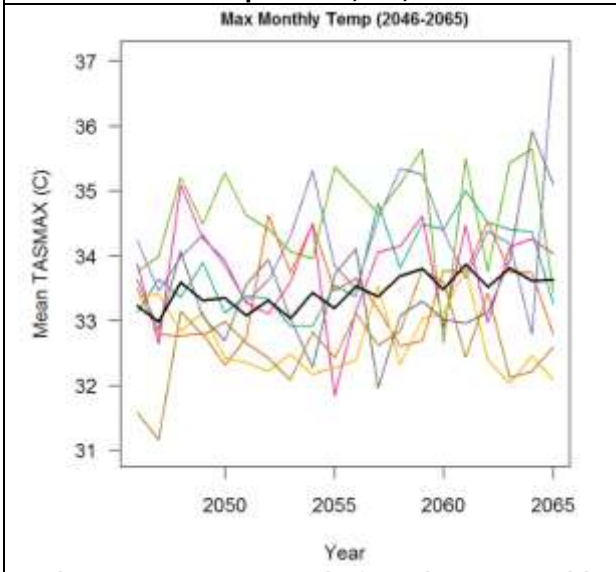


Figure 11:Future Trend of Maximum Monthly Temperature, A2, 2046-2065

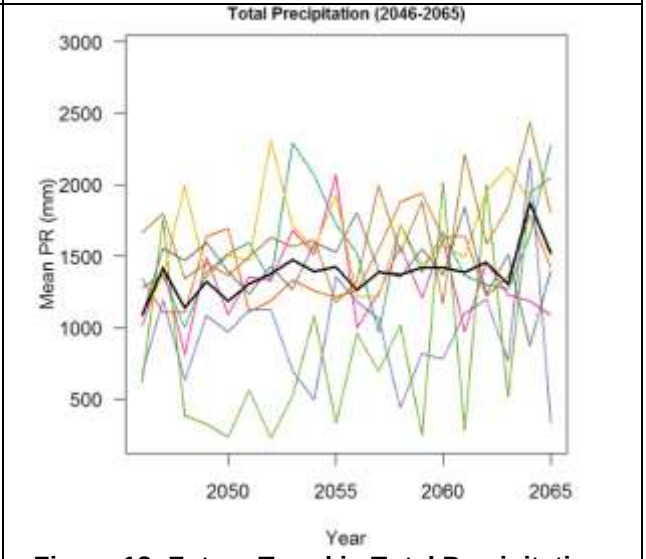


Figure 12: Future Trend in Total Precipitation, A2, 2046-2065

95. Geographically, the highest temperatures will be experience in the central districts of Raipur and Durg. Although the GCMs are not in agreement on the change in precipitation at the State level, marginally significant results predicts an increase in rainfall in Dhamtari and Raipur districts by as much as 150-200mm/year.

2. Natural Hazards and Climate Risks

96. There are limited existing natural hazards that can be affected by the projected changes in temperature and precipitation. The entire state in general is almost free from earthquake and landslide. Tropical depressions have passed over the state particularly the districts of Mahasamund, Bilaspur, Korba, and Raigar causing little damage. The riverine flooding particularly when tropical depression passes the area has resulted to wide displacement but limited mortality. However, there is risk of vegetation fire particularly in Raipur and Bilaspur districts.

97. **Mitigation Measures.** The succeeding Table presents the civil works component that address identified climate change risks. Although no attempt was made to segregate additional cost implications due to climate change from standard engineering design practices as stipulated in the IRC, the cost of addressing flooding and erosion for the RCIP Tranche 3 in the State is Rs 55.850 million of which RS18.750M is for constructing cross and side drains, Rs279.370M is for bridges and culverts, Rs247.840M is for increasing road embankment height, and 12.540 is for slope stabilization.

98. Compensatory tree plantations[10] (1:3) will be made to compensate the loss of trees cut for construction of subproject roads. Efforts shall be made to plant additional trees for increasing the carbon sink. The tree may be planted with help of village Panchayat.[11] All non-sample rural roads to be included in RCIP will also be screened for climate change vulnerability and necessary mitigation measures shall be adopted for minimization of identified vulnerability if any.

[10] SRRDA mostly undertake this activity through state forest department. The forest department plants tree either along the proposed roads if land is available otherwise on nearby degraded forest land.

[11] Village Panchayats are planting trees at along rural roads with funding under Mahatma Gandhi National Rural Employment Act scheme. The PIUs may facilitate with them for planting trees along the road. Some of the PIUs in different states are already helping Village Panchayats for the same.

S.No.	Road Name	District	Block	Length (Km)	Project Cost in the DPR	Length (m) located in flood prone Area	Cost of measures to address the risks (Rs.)			
							Cost of cross and Side Drains	Cost of bridges/ culverts	Increasing embank-ment height	Slope stabilization (pitching, turfing etc.)
1	2	3	4	5	6	7	8	9	10	11
24	T 01 Tendukona To Dokarpali	Mahasamund	Bagbahara	3.050	134.43	0.00	2.97	6.16	0.00	0.00
25	T02 Mungaser To Firgi	Mahasamund	Bagbahara	6.350	198.91	MDR				
26	Bizrabhata Tr 01 Tukda To Dhama Ghutkuri	Mahasamund	Basna	1.200	51.39	0.00	0.00	9.86	0.00	0.00
27	Kudekel To Potapara	Mahasamund	Basna	2.200	78.87	0.00	3.71	6.94	0.00	0.00
28	Tr 04 To Birsinghpali S	Mahasamund	Basna	1.350	52.70	0.00	2.60	3.21	0.00	0.00
29	Tr 03 To Rupapali	Mahasamund	Basna	4.550	168.23	0.00	7.80	3.34	0.00	0.00
30	Tr 04 To Karnapali	Mahasamund	Basna	4.950	205.11	0.00	1.11	42.40	0.00	0.00
31	Tr 03 Bandabari To Bamhanidih	Mahasamund	Basna	3.800	162.56	0.00	4.83	22.13	0.00	0.00
32	Tr 03 Bade Sajapali To Bhuthabahara	Mahasamund	Basna	4.300	170.80	0.00	2.60	33.62	0.00	0.00
33	Tr 03 Bade Sajapali To Harda	Mahasamund	Basna	4.100	178.04	0.00	7.43	6.33	0.00	0.00
34	NH 6 To Badetemari	Mahasamund	Basna	2.520	95.87	0.00	0.00	11.00	0.00	0.00
35	NH 6 To Khadsa	Mahasamund	Mahasamund	1.900	72.79	0.00	0.00	11.00	0.00	0.00
36	NH6 Kuhari To Pasid ODR	Mahasamund	Mahasamund	1.500	59.58	0.00	1.48	9.54	0.00	0.00
37	Amora T05 To Kachhardih	Mahasamund	Mahasamund	1.950	75.52	0.00	3.71	6.58	0.00	0.00
38	NH 6 To Dumarpali	Mahasamund	Mahasamund	2.650	113.58	0.00	11.15	3.48	0.00	0.00
39	Lr 066 To Nawagaon Kala	Mahasamund	Pithora	1.550	52.24	0.00	0.00	6.40	0.00	0.00
40	T 12 To Saragtora	Mahasamund	Pithora	3.400	137.60	0.00	5.94	13.15	0.00	0.00
41	MDR Bagbahara Road Tendukona To Udarlami	Mahasamund	Pithora	5.850	248.79	0.00	7.43	39.28	0.00	0.00
42	Bamhani To Kesaripur	Mahasamund	Pithora	2.350	95.66	0.00	2.23	10.02	0.00	0.00
43	Tr 10 Bhurkoni To Kolda	Mahasamund	Pithora	8.100	315.05	0.00	20.81	10.53	0.00	0.00
44	Tr 10 To Faroda	Mahasamund	Pithora	7.650	293.41	0.00	2.97	29.69	0.00	0.00
45	T 11 To Bartunda	Mahasamund	Pithora	1.550	63.48	0.00	5.20	6.72	0.00	0.00
46	NH 6 To Gauriya	Mahasamund	Pithora	4.800	232.55	0.00	8.92	36.47	0.00	0.00
47	Katangtarai To Chhoteloram	Mahasamund	Pithora	4.750	199.45	0.00	9.66	13.36	0.00	0.00
48	NH6 To Loharindongari	Mahasamund	Pithora	1.500	53.02	0.00	0.00	10.48	0.00	0.00
49	NH 6 To Bandimal	Mahasamund	Saraipali	8.300	358.72	0.00	3.90	78.69	0.00	0.00
50	T 03 To Sahajpani	Mahasamund	Saraipali	8.950	389.93	0.00	2.23	61.99	0.00	0.00

S.No.	Road Name	District	Block	Length (Km)	Project Cost in the DPR	Length (m) located in flood prone Area	Cost of measures to address the risks (Rs.)			
							Cost of cross and Side Drains	Cost of bridges/ culverts	Increasing embank-ment height	Slope stabilization (pitching, turfing etc.)
51	Baloda To Gerra	Mahasamund	Saraipali	5.000	172.41	0.00	0.00	11.69	0.00	0.00
52	Kewti Pakhanjur To Marrampani	Kanker	Durgukondal	2.200	52.81	0.00	0.00	0.00	0.00	0.00
53	Bande To Haridaspur	Kanker	Koelibeda	2.800	109.88	0.00	0.00	0.00	0.00	0.00
54	2 Km of Govindpur Markanar To Vijaynagar	Kanker	Koelibeda	2.350	96.20	50.00	0.00	23.10	0.00	0.00
55	Janakpur To Krishnanagar	Kanker	Koelibeda	1.500	66.37	0.00	0.00	0.00	0.00	0.00
56	Vishrampur To Alor	Kanker	Koelibeda	0.900	40.70	0.00	0.00	0.00	0.00	0.00
57	49 Km of Bhanpratappur Bande Road Badgaon To Badepara	Kanker	Koelibeda	1.400	48.60	0.00	0.00	0.00	0.00	0.00
58	Sankanrnagar To Padenga	Kanker	Koelibeda	1.900	85.04	0.00	0.00	0.00	0.00	0.00
59	Roopnagar To Jagannathpur	Kanker	Koelibeda	6.000	275.93	0.00	0.00	0.00	0.00	0.00
60	Badepara Talnar To Khaspara Chitalur	Bastar	Bakawand	7.200	243.47	0.00	14.27	14.29	0.00	0.00
61	Bakawand To Bhirinda	Bastar	Bakawand	3.800	166.87	0.00	0.00	33.06	0.00	0.00
62	L036-Gaytaparairpa To Pujariparairpa	Bastar	Bastanar	2.550	184.40	0.00	4.12	65.06	0.00	0.00
63	Farsaguda Chhurawand Road- Khaspara Khadka Vhaya Jamgaon	Bastar	Bastar	8.800	372.00	0.00	4.81	66.63	0.00	0.00
64	Farsaguda To Patelpara Chhurawand	Bastar	Bastar	7.500	352.75	300.00	11.39	41.63	0.00	0.00
65	NH 16 Pakhnar Road 9 Km To Koikimari	Bastar	Darbha	0.950	67.42	0.00	5.42	11.28	0.00	0.00
66	Manjhiguda To Khaspara	Bastar	Darbha	0.800	59.57	0.00	16.53	4.14	0.00	0.00
67	Darbha Chandameta Road To Thotapara	Bastar	Darbha	1.200	76.10	0.00	5.43	20.28	0.00	0.00
68	J K Road Rd 26 Km To Budagibhata	Bastar	Darbha	5.900	250.64	0.00	23.32	36.23	0.00	0.00
69	T05 To Bijani	Janjgir-Champa	Dabhara	2.650	97.31	2.00	2.81	2.10	0.00	1.21
70	T01 To Bokrel	Janjgir-Champa	Malkharada	3.500	160.91	3.50	0.30	0.00	0.00	2.42
71	Bahinga - Karhi Road	Bemetra	Bemetara	2.900	139.54	0.00	0.00	0.00	0.00	0.00

S.No.	Road Name	District	Block	Length (Km)	Project Cost in the DPR	Length (m) located in flood prone Area	Cost of measures to address the risks (Rs.)			
							Cost of cross and Side Drains	Cost of bridges/ culverts	Increasing embank-ment height	Slope stabilization (pitching, turfing etc.)
72	Main Road NH12a - Joung	Bemetra	Bemetara	2.650	124.51	0.00	0.00	0.00	0.00	0.00
73	Mohrenga - Pausari	Bemetra	Bemetara	2.500	115.27	0.00	0.00	0.00	0.00	0.00
74	Main Road - Atriya	Bemetra	Bemetara	1.450	80.00	0.00	0.00	0.00	0.00	0.00
75	Bachedi - Khumiguda	Bemetra	Berla	3.000	144.56	0.00	0.00	0.00	0.00	0.00
76	Main Road - Hathpan Road	Bemetra	Berla	2.200	96.88	0.00	0.00	0.00	0.00	0.00
77	Murkuta - Jhanki Road	Bemetra	Nawagarh	3.500	195.22	75.00	6.05	56.82	18.51	0.00
78	Boerkachra Amlidih - Thengabhat	Bemetra	Nawagarh	4.330	232.66	100.00	6.24	46.75	24.78	17.74
79	Main Road Mohtara - Andhiyarkhor Road	Bemetra	Nawagarh	1.350	77.39	0.00	0.00	0.00	0.00	0.00
80	Kodiya - Bhaisamuda Road	Bemetra	Nawagarh	2.150	98.17	0.00	0.00	0.00	0.00	0.00
81	Main Road - Matiya	Bemetra	Saja	2.100	89.22	0.00	0.00	0.00	0.00	0.00
82	Thelka - Bhanora Lalpur	Bemetra	Saja	2.450	124.78	0.00	0.00	0.00	0.00	0.00
83	Main Road - Kehka	Bemetra	Saja	1.550	67.55	0.00	0.00	0.00	0.00	0.00
84	Kanhera - Rampura Road	Bemetra	Saja	3.530	160.05	0.00	0.00	0.00	0.00	0.00
85	Main Road - Dehri Road	Bemetra	Saja	2.250	118.75	0.00	0.00	0.00	0.00	0.00
86	Mohgaon - Budhwara	Bemetra	Saja	0.750	34.76	0.00	0.00	0.00	0.00	0.00
Total				212.680	9136.970	530.500	219.370	925.430	43.290	21.370

99. The projected increase in traffic is expected to increase the amount of greenhouse gas (GHG) emitted to the environment. Using the Transport Emissions Evaluation Models for Projects (TEEMP), an excel-based freeware developed by the Clean Air Asia, together with ITDP, ADB, Cambridge Systematics and UNEP-GEF, the emission intensities are provided in the succeeding Table 15.

100. The estimated greenhouse gas emissions includes road construction[12] for 3 scenarios: business-as-usual which considers the project traffic[13] traveling over existing road conditions which hampers travel speed, emissions without induced traffic which assumed at 0.2 traffic elasticity to occur on Year 3, and emissions with induced traffic.

Table 15: CO2 Estimated Emission Intensity, RCIP Tranche 3;Chhattisgarh

Details	CO2		
	Business-As-Usual	Project (without Induced Traffic)	Project (with Induced Traffic)
tons/km	7.77	21.60	22.03
tons/year	771.31	2,145.21	2,188.43
tons/km/year	0.71	1.96	2.00
g/pkm	26.06	72.47	69.98

101. Estimated CO2 emission from the implementation of RCIP Tranche III –Chhattisgarh is about 2,000 tons annually which is almost 3 times higher than the business-as-usual. The CO2 emissions savings from lower fuel consumption due to road roughness and increase on capacity was off-set by the construction related emissions in upgrading the 1,055 kms rural roads.

3. Finalization of Alignment

102. **Impact**: The proposed rural road will be constructed to provide 7.5 m roadway in accordance with PMGSY guidelines and technical specifications (IRC-SP 20: 2002) for plain terrain. Sample rural road are aligned to existing road mostly having earthen track with some stretches of brickbat soling. Most of the existing sample road passes through plain terrain primarily agriculture and residential areas. None of the sample roads passes close to any protected monument or through protected areas. Impacts due to road alignment and design is expected to be minor and limited to shifting of some common utilities, community structures (temple, school) and cutting of trees falling within road way.

103. **Mitigation Measures**: The road alignment is finalised considering availability of RoW. The RoW is reduced in built-up area or constricted areas to minimize land acquisition. The road alignment is modified to minimize tree cutting, shifting of utilities or community structure. The road is designed to follow natural topography to avoid excessive cut and fill. All non-sample roads to be included in RCIP will follow above measures. In addition these subprojects will comply with the following alignment finalisation criteria :

a. The road will be part of district core network and will comply with PMGSY guidelines
b. Subproject shall not disturb any cultural heritage designated by the government or by the international agencies, such as UNESCO, and shall avoid any monuments of cultural or historical importance.

[12] 11,000 tons of CO_2/km road built
[13] As projected in the feasibility study

c. Subproject will not pass through any designated wild life sanctuaries, national park, notified eco-sensitive areas or area of international significance such as protective wet land designated under Wetland Convention, and reserve forest area.
d. Subproject to comply with local and National legislative requirements (such as forest clearance for diversion of forest land) and ADB's Safeguard Policy Statement 2009.

4. Land Acquisition

2. **Impact**: No land acquisition is involved due to various measures considered for finalisation of road alignment. Villagers have volunteered to donate their land if at certain stages land is required for geometrical correction or alignment adjustment for avoiding tree cutting or shifting of community structure. There could be some impact on the encroachers; however, most of them have also volunteered to shift from the proposed alignment. Due diligence on these aspects have been conducted separately and reported in the social compliance reports.
104. **Mitigation Measures**: All efforts shall be made to minimize the land acquisition while finalising the alignment. In an unavoidable situation, adopt suitable engineering measures to reduce the ROW requirement or donation of land from landowners. In the encroached areas, efforts shall be made to restricted road construction to the available space.

5. Protected Areas (National parks, wild life sanctuaries, Eco sensitive zones, protected /historical monuments) and Forest Areas.

105. **Impact**: Chhattisgarh state has many wild life sanctuaries but none of the sample road is located within 10 km radius of the sample project roads. The nearest national parks and sanctuaries (Guru Ghasidas National Park in Koriya, Achanakmar in Bilaspur, Badalkhol in Jaspur, Barnawapara and Udanti in Raipur, Gomarda in Raigarh and Bhoramdev in Kawardha district) are located at a distance of minimum 10km away from the project roads. Nine out of the 30 sample roads pass through forest area and the PIUs have already obtained clearance from the Forest department (Sample attached in **Appendix 4**) for the purpose of the road construction. An estimated 393 trees will be cleared to accommodate the proposed road upgrading. Chhattisgarh is also known to have several archaeological monuments and historical monuments spread all over the state. However, none of them is located within 5 km of sample roads.

106. **Mitigation Measures**: As there are no Protected/Ecologically sensitive areas in the sub project areas, no such measures are proposed. In case of a diversion of forest land, prior forest clearance shall be obtained under Forest (Conservation) Act 1980 (amended 1988).

6. Land Clearing Operations

107. **Impact:** The site clearing operations may have impact on common utilities, community properties, land use and vegetation profile of the area if adequate considerations not given to road alignment finalization, utility and community structure shifting plan, tree felling, and demolition waste disposal.

108. **Mitigation Measures**: The following steps shall be taken to minimize the associated impact with land clearing operations.

- The land clearing operation should be undertaken as per the defined road alignment and community structure, utility and road furniture shifting plan.
- The road land width shall be clearly demarcated on the ground.

- The utility and community structure shifting shall be as per plan and with consultations and concurrence of the community.
- Tree felling shall be limited to those, which could not be saved even by design measures. The tree shall be cut with a permission of Forest department. The vegetable cover shall be removed and disposed in consultation with community.
- All public utilities shall be shifted with a concurrence of respective agencies/authority and to the adjacent location approved by them. The top soils shall be collected and preserved for reuse as a base for turfing of embankment slopes or development of barren areas along roadside. The top soil shall be preserved at identified location with the provision of watering /grass development on the heap surface to prevent air pollution.

7. Cut and Fill and Embankment construction

109. **Impact:** Inadequate alignment planning may increase the cut and fill requirement as well as need for more borrow earth for embankment formation leading to some impact on land use. Inadequate provision for drainage and embankment slop protection may lead to soil erosion. Due consideration is given to above aspect for alignment finalization of sample road. With the adoption of appropriate mitigation measures, the impact due to above activity on land use and other environmental component is expected to be minimal.

110. **Mitigation Measures**: The alignment design shall consider options to minimize excessive cuts and fills. The cut and fill quantities shall be used for embankment to minimize barrow earth requirement. The design shall be as per relevant IRC provisions for cut and fill, slope protection and drainage. Adequate provision shall be made for cross drainage structures for maintaining natural drainage pattern in the subproject area and preventing soil erosion. The top soil of the cut and fill area shall be used for embankment slope protection.

8. Establishment of Construction Camp, Temporary office and Storage Area

111. **Impact**: The congregation of labor population and technical staff in the subproject area during the construction phase is likely to put considerable stress on the limited resources of village areas. Some of the associated impacts are related to health, safety of the laborers at the construction campsites, availability of safe drinking water, and sanitation.

112. The establishment of construction camp temporary office and storage area will reduce land productivity if these are established on agricultural land. Loading and unloading of construction material, transportation of material, handling of fuel and waste disposal from these areas may have direct and indirect impact on soil, water and air quality.

113. **Mitigation Measures**: The following steps shall be taken to minimize/reduce these impacts:

- Construction campsites shall be located away from any local human settlements (minimum 500m away) and preferably located on lands, which are not productive barren/waste lands presently. Similarly temporary office and storage areas shall be located away from human settlement areas (minimum 500 m).
- The construction camps, office and storage areas shall have adequate water supply, sanitation and all requisite infrastructure facilities. This would minimize dependence of construction personnel on outside resources, presently being used by local populace and minimize undesirable social friction thereof.

- The construction camps shall be located at a minimum 5 km from forest land/areas to deter the construction labor in trespassing. Similarly, temporary office and storage areas shall be located at a minimum 1 km from forest land/areas.
- The construction camps, office and storage areas shall have septic tank/soak pit of adequate capacity so that it can function properly for the entire duration of its use.
- All construction camps shall have rationing facilities particularly for kerosene/LPG so that dependence on firewood for cooking is avoided completely to the extent possible.
- The construction camps, office and storage areas shall have health care facilities for adults, pregnant women and children.
- All construction personnel shall be subjected to routine vaccinations and other preventive/healthcare measures.
- Contractor shall arrange all personal protective equipment (PPEs) like helmet, boots, and earplugs for workers, first-aid and fire fighting equipment at construction sites. An emergency plan shall be prepared to fight with any emergency like fire.
- Garbage bins must be provided in the camp and regularly emptied and disposed off in a hygienic manner. Domestic solid waste shall be disposed of in a control manner. The recyclable waste shall be sold off and non saleable and biodegradable waste shall be disposed through secured land filling.
- All fuel oil/lubricant unloading and storage shall be made on the paved areas away from storm water drainage.

114. After completion of construction work, the camp /temporary office/storage areas sites shall be restored to its original condition.

9. Traffic Movement

115. **Impact:** Construction work along the existing road could cause disturbances to traffic movements. It will also pose risk of accident to motorist at night if these blockages and disruption are not clearly demarcated.

116. **Mitigation Measures**: The contractor will prepare appropriate traffic diversion scheme, which shall be implemented in different stretches of the road as per the progress of the construction work. This plan shall be approved by PIU and implemented before start of any construction work to avoid any inconvenience to the present road users. The diversion plan should ensure smooth flow of traffic, minimize accidents to road users during construction works. Adequate signboards shall be placed much ahead of diversion site to caution the road users. The road signs should be bold and visible and retro reflective in nature for day and night visibility.

10. Associated Impacts due to Construction Activities

a. Loss of productive soil, erosion and land-use

117. **Impact**: No land use will change due to the project, since required ROW is available throughout the alignment. Land use though will change temporarily of construction camp, temporary office storage areas for the period of construction. This will also result in loss of soil productivity. Soil erosion may take place along steep and un-compacted embankment slope,

and wherever vegetation is cleared. Soil erosion may have cumulative effect viz. siltation, embankment damage, and drainage clogging etc. The siltation, due to soil erosion may occur only in the ponds located close to the roads. There are 6 roads in Raipur district, 2 roads in Durg district and 1 road in Bilaspur district where ponds are located close to the existing road. Loss of soil due to run off from earth stockpiles may also lead to siltation. Land use may also change due to borrowing the earth.

118. **Mitigation Measures**: It shall be ensured that the land taken on lease for access road, construction camp and temporary office of the storage facilities, is restored back to its original land use before handing it over back to land owner. The top soil from the productive land (borrow areas, road widening areas etc.) shall be preserved and reused for plantation purposes. It shall also be used as top cover of embankment slope for growing vegetation to protect soil erosion. The topography of all the sample roads through out the stretch is plain except in case of few roads where it is undulating for very small stretches. Therefore, cut and fill shall be planned as per IRC provisions and rural road manual. All steep cuts shall be flattened and benched. Shrubs shall be planted in loose soil area. IRC: 56 -1974 recommended practice for treatment of embankment slopes for erosion control shall be taken into consideration. Soil erosion shall be visually checked on slopes and embankment areas. If soil erosion observed, suitable measures shall be taken to control it.

b. Borrow Areas and Quarries

119. **Impact**: Borrow areas if left un-rehabilitated may pose risk to people, particularly children and animals of accidentally falling into it. This may also become potential breeding ground for mosquitoes and vector born disease. Illegal quarrying may lead to unstable soil condition; destroy the landscape of the terrain, air and noise pollution.

120. **Mitigation Measures**: Borrowing earth from agricultural land shall be minimized to the extent possible. Further, no earth shall be borrowed from already low-lying areas. The borrow earth shall be sourced from identified locations and with prior permission of landowner and with clear understanding for its rehabilitation. The Indian Road Congress (IRC):10-1961 guideline should be used for selection of borrow pits and quantity that can be borrowed. The borrow area shall be located/ rehabilitated as per the guidelines given at **Appendix IV.1**. Fly ash shall also be used in road embankment as per IRC guidelines wherever thermal power plant is located within 100 km of the road alignment. The stone aggregate shall be sourced from existing licensed quarries only. The quarry should have requisite consent to operate from State Pollution Control Board. No new quarry shall be opened for the proposed project

c. Hydrology and Drainage

121. **Impact**: The activities involved with proposed road development may alter the hydrology and drainage pattern of the area in absence of adequate provision for cross drainage structure, construction wastes disposal and drainage in habitat areas.

122. None of the sample roads is crossing any natural stream except Damdih road, which run close to Haf River. This road may be prone for flooding. Certain project roads are crossing local and seasonal drains. Village ponds are also located close to few roads.

123. **Mitigation Measures**: The provision of adequate cross drainage structures shall be made to ensure smooth passage of water and maintaining natural drainage pattern of the area. The discharge capacity of the CD structure shall be designed accordingly. The construction

work shall be planned in dry season so that water quality of the water channel is not affected due to siltation. Elaborate drainage system shall be provided to drain the storm water from the roadway and embankment and to ensure minimum disturbance to natural drainage of surface and subsurface water of the area. Provision of additional cross drainage structures shall be made in the areas where nearby land is sloping towards road alignment in both the both sides.

124. Provision of CC road construction in habitat area with drainage of both side of the road shall be made as per the design specifications and with adequate slope to prevent any water logging.

d. Compaction and Contamination of Soil

125. **Impact**: Soil in the adjoining productive lands beyond the ROW, haulage roads, and construction camp area may be compacted due to movement of construction vehicles, machineries, equipments and construction camps/storage facilities. It may get contaminated due to inappropriate disposal of liquid waste, (lubricating oil and fuel spills, waste oil and lubricant and vehicle/equipment washing effluent) and solid waste (fuel filters, oily rags) likely to be generated from repair and maintenance of transport vehicles, construction equipment and machinery.

126. **Mitigation Measures**: To prevent soil compaction in the adjoining productive lands beyond the ROW, the movement of construction vehicles, machinery and equipment shall be restricted to the designated haulage route. The productive land shall be reclaimed after construction activity. Septic tank or mobile toilets fitted with anaerobic treatment facility shall be provided at construction camp/temporary office/storage areas. Domestic solid waste at construction camp shall be segregated into biodegradable and non-biodegradable waste. The non-biodegradable and recyclable waste shall be sold off. Fuel and lubricants shall be stored at the predefined storage location. The storage area shall be paved with gentle slope to a corner and connected with a chamber to collect any spills of the oils. All efforts shall be made to minimise the waste generation. Unavoidable waste shall be stored at the designated place prior to disposal. To avoid soil contamination at the wash-down and re-fuelling areas, “oil interceptors” shall be provided. Oil and grease spill and oil soaked materials are to be collected and stored in labelled containers (Labelled: WASTE OIL; and hazardous sign be displayed) and sold off to SPCB/ MoEF authorized re-refiners.

e. Construction Debris and Wastes

127. **Impact**: Uncontrolled disposal of debris and waste may create unhygienic and unsafe condition around the disposal areas.

128. **Mitigation Measures**: All excavated materials from roadway, shoulders, verges, drains, cross drainage shall be used for embankments formation if feasible, filling pits, and landscaping. Unusable debris material should be suitably disposed off at pre-designated disposal locations, with approval of the concerned authority. The bituminous wastes shall be disposed in secure landfill sites only in environmentally accepted manner. MOSRTH guidelines shall be followed for debris, wastes removal and disposal at unproductive/wastelands which shall be selected with the consent of villagers and Panchayat. The dumping site should be of adequate capacity and to be located away from residential areas (at least 1000m away). It should also be located away from water bodies to prevent any contamination of these bodies.

f. Air Quality

129. **Impact**: The potential sources of air emission during the construction phase of the project are given below which can cause localised air pollution.

- Dust from earth works (during site preparation).
- Emissions from the operation of construction equipment and machines.
- Fugitive emissions from vehicles plying on the road, during the transport of construction materials.
- Emissions other than dust particularly from the hot mix plants and laying of bitumen. Hot mix plant will generate carbon monoxide (CO), un-burnt hydrocarbon (HC), sulphur dioxide (SO_2), particulate matters (PM), and nitrogen oxides (NOx) emissions.
- Localised increased traffic congestion in construction areas. Most of the emissions will be in the form of coarse particulate matter, which will settle down in close vicinity of construction site. This may affect the air quality of nearby areas, especially, due to emission discharge from low height of the stack.

130. **Mitigation Measures**: All these impacts will be temporary and hence, no significant impact is envisaged. The following measures will be taken to minimise these:

- Vehicles delivering loose and fine materials like sand and aggregates shall be covered.
- Dust suppression measures like water sprinkling, shall be applied in all dust prone locations such as unpaved haulage roads14, earthworks, stockpiles and asphalt mixing plant areas.
- Mixing plants and asphalt (hot mix) plants shall be located at least 0.5 km away and in downwind direction of the human settlements.
- Material storage areas shall also be located downwind of the habitation area.
- Hot mix plant shall be fitted with stack of adequate height (30 m) or as may be prescribed by state pollution control board (SPCB) to ensure enough dispersion of exit gases. Consent to establish and operate shall be obtained from State Pollution Control Board and comply with all consent conditions.
- Diesel Generating (DG) sets shall also be fitted with stack of adequate height. Low sulphur diesel shall be used in DG sets and other construction machineries. Construction vehicles and machineries shall be periodically maintained.
- The requisite PPE (helmet, mask, boot, hand gloves) shall be provided to the construction workers.

g. Noise Quality

131. **Impact:** Ambient noise level may increase temporarily in the close vicinity of various construction activities, maintenance workshops, vehicles movement and earthmoving equipment.

132. **Mitigation Measures**: The noise level will be intermittent and temporary and will attenuate fast with increase in distance from noise source. Further, vehicles and equipment should be fitted with silencers and maintained regularly. The workers shall be provided with personal protection devices such as earplugs and earmuffs. Workers' exposure to noise will be restricted to less than 8 hours a day. Workers duty shall be regulated accordingly.

[14] Water suppression of fugitive dust can reduce emissions from 12% to 98%

h. Groundwater and Surface Water Quality and Availability

133. **Impact:** Water will be required for compaction of road formation and domestic purposes in the workers camp. These requirements will be mainly sourced from groundwater due to availability and quality. Any uncontrolled abstraction of ground water can deplete the ground water table. Contamination of groundwater is not envisaged since all construction camps will have septic tanks. The drinking water supply to the habitat is primarily through hand pumps and bore wells. No significant impact is anticipated on surface water bodies except the risk of siltation due construction near rivers.

134. **Mitigation Measures**: Requisite permission shall be obtained for abstraction of groundwater from State Ground Water Board/Central Ground Water Authority[15] if applicable. The contractor shall arrange for water required during construction in such a way that the water availability and supply to nearby communities remains unaffected. Water intensive activities shall not be undertaken during summer period to the extent feasible. Provision shall be made to link side drains with the nearby ponds for facilitating water harvesting. Where ponds are not available, the water harvesting pits shall be constructed as per the requirement and rainfall intensity. Measures are already purposed in earlier section for prevention of siltation in water bodies. Water conservation across all activities will be observed.

i. Biological Environment

135. **Impact:** Since the sample roads are not passing through any protected areas or forest area, there is no diversion of forest land exept for 27 roads which are to be constructed on exixting path. The major adverse impacts will be due to tree cutting, Siltation and contamination of water bodies may affect the aquatic life. Since the aquatic life is minimal and no significant impact is anticipated on aquatic life.

136. **Mitigation Measures:** All efforts shall be taken to avoid tree cutting wherever possible. Requisite permission from forest department shall be obtained for cutting of roadside trees. Compensatory Afforestation shall be made on 1:3.ratio basis. Additional trees shall be planted wherever feasible. All care shall be taken to avoid siltation/contamination of water bodies. Movement of herbivores like cattle, goats, cows etc., have been observed in the surrounding agriculture fields. Disturbance to these animals will be avoided to the extent possible.

j. Impact on Common Property Resources

137. **Impact**: There are public utilities like Electric transformer, electric poles, and hand pumps all along the rural roads. The road construction may require shifting of these utilities. There are many community structures like school, playground village office and temples. One of the roads i.e NH6 - Malidih in Mahasamund district has a small temple located adjacent to the road that will be affected due to the project.

138. **Mitigation Measures**: All efforts are made to minimize shifting of common utilities and community structures. ROW has been reduced in constricted areas with appropriate engineering measures to minimize land acquisition and shifting of community structures. The

[15] As per Central Ground Water Authority (CGWA), there are 43 notified blocks in India where prior permission is required fro extraction of ground water. Currently there are no notified areas in Chhattisgarh state. CGWA is continually updating the list of notified areas.

community structures/utilities which can not be saved will be shifted to adjacent area with the concurrence and in consultation with community.

B. Common Impacts during Post Construction and Operation Phase

1. Air Quality

139. **Impact**: Decrease in air quality due to increase in traffic, idling at congestions.

140. **Mitigation Measures**: The bad road condition is the main cause of poor air pollution at present. The improved road conditions will result in the improved ambient air quality. Also, the subproject road is largely traversing through vast open agriculture areas, which will provide adequate dispersion to gaseous pollutants, generated from vehicles and will offset the increased pollutants.

2. Noise

141. **Impact**: During the operational phase, movement of traffic will be the prime source of noise. Traffic congestion and pedestrian interferences increase the use of horns. This may result in increased noise levels at habitat areas, nearby schools and religious places.

142. **Mitigation Measures**: Awareness signboard shall be provided for safe driving near the habitat areas. Speed limitation and honking restrictions may be enforced near sensitive locations.

3. Land, Soil, Tree Plantation

143. **Impact**: The better access can lead to conversion of agriculture land for residential and commercial purposes close to roads, which may result in loss of productive land and agricultural produce. Since the rural road are aimed at connecting the villages, and with the general trend of migration of rural population to urban areas, the phenomena of conversion of agriculture land to residential area is unlikely to change.

144. The land occupied for construction camp /temporary office/material storage area will remain unproductive if it is not restored after completion of construction activities.

145. Since the habitat in the project area is already modified and the only vegetation that will be planted are the trees for purposes of compensatory plantation, it will be essential to ensure the survivability of the compensatory tree planted

146. **Mitigation Measures** It shall be ensured that all construction camp/temporary office/material storage areas are restored to its original conditions. The borrow area rehabilitation will also be ensured as per the agreed plan with the landowner. Contractor and PIC will ensure the same and obtained clearance from PIU before handling over the site to SRRDA.

147. The PIC will undertake survivability assessment and report to PIU the status of compensatory tree plantation at a stage of completion of construction with recommendation for improving the survivability of the tree if required.

4. Groundwater

148. No impact is anticipated on groundwater due to the project during operation phase, hence, no specific mitigation is proposed.

5. Hydrology and Drainage

149. **Impact**: Water accumulation incidence may occur due to inadequate availability of cross drainage structure or clogging of cross drainage structures.

150. **Mitigation Measures**: Regular removal/cleaning of deposited silt shall be done from drainage channels and outlet points before the monsoon season. Rejuvenation of the drainage system by removing encroachments/ congestions shall be regularly conducted.

6. Socio-Economic Impact

151. Assessment of project impact on socio-economic conditions point to the conclusions that positive benefits are many fold compared to its adverse impact.

152. **Positive Impacts**: The better road access is likely to contribute the overall economic condition of village community. With the quick access to urban market areas, the farmers are likely to get better prices for their farm produce. Children will also be able to access the school and education facilities in the near by urban areas.

153. **Safety Measures** shall be adopted as per NRRDA guidelines. Some of them are highlighted below :

- Speed breakers (Rumble strips) as per IRC: 99-1988 shall be provided at sharp curves and bends where the curve design speed is less than 40 km per hour.
- Speed breakers shall also be provided at a threshold of habitation (as per NRRDA guidelines) at regular intervals (150-200 m) through habitation.
- The speed breakers are provided and directional sight boards installed at sites where reverse horizontal curves are closely spaced and speed reduction is required.
- Hazard markers to be installed at each end of all box culverts, river crossing causeways and similar CD structures
- Shoulder side slopes shall not be steeper than 2h:1V unless stone pitching of the slopes is provided.
- Cement concrete pavement and V-shaped drain is constructed to the full width of the available roadway within densely populated habitation.
- Directional sight board are installed on all sharp curves and bends
- At main road, intersection or crossing “STOP” sign and ‘T-intersection’ warning sign shall be installed on the village road.

C. Road Specific Impacts

154. The assessment of sample roads indicates that environmental issue associated with all the roads are similar. Hence mitigation measures applicable to all the road are also will be similar except variation in terms of magnitude which will depend on length of the road, the presence various environmental components. These components may be assessed in terms of no of pond, number of community structure (mostly temples, playground, school, gram Panchayat office) likely to be shifted, number and type of common utilities (hand pump, water tank, electric transformer, electrical poles).

155. Two sample roads L-27 Loghama – Khutgaon in Jaspur district and T-04 Pali – Karmagarah in Tamnar block of Raigarh district) also have hilly/undulating topography at some locations. The appropriate design measures shall be taken for correcting the profile of the road with minimum cut and fill requirements.

156. Forest areas are located along nine out of the 30 sample roads at different chainages, Appropriate measures relating to location of camp sites and working hours etc. should be maintained as provided in the environment management plan.

V. ENVIRONMENTAL MANAGEMENT PLAN, INSTITUTIONAL ARRANGEMENTS AND GRIEVANCE ADDRESS MECHANISM

A. Environmental Management Plan

157. The Environmental Management Plan (EMP) is prepared to facilitate effective implementation of mitigations measures with defined roles and responsibility for implementation and monitoring, regulatory compliance requirements, stages of implementation with location, period and costs. The mitigation measures are proposed to eliminate or minimise the identified impact associated with design, construction, and operation stages of the project, to acceptable level by adopting the most feasible options.

158. The EMP is prepared basd on the Environmental Code of Practice (ECOP) applicable to rural road defined by ADB at RRS I stage.

159. The identified impacts are mostly related to clearing operations of RoW, traffic diversions, setting and operation of construction camps, quarry and borrowing operations, transportation of materials, construction of cross drainage structures, air and noise pollution due to construction activities and operation of construction equipment, tree cutting and shifting of utilities and physical community structure.

160. Appropriate mitigation measures are identified for all rural road construction and operation activities. The identified impacts associated with rural roads and mitigative measures are largely common to most of the roads. The EMP is detailed at Appendix 4. It provides action common to all roads at pre-construction, construction and operation stage. Since IEE is carried out, prior to preparation of DPR, the EMP will be updated specific to road as per DPR requirements by PIU and included with DPR, which shall be available to contractor at the time of bidding. The areas to be updated as per DPR provisions are highlighted under location column of EMP.

161. Since, these are rural road, the vehicular density and speed will be low. Movement of vehicles would be confined primarily for transfer of agricultural produce to market places. As such, no major emergency is anticipated. In any accidental eventuality, local administration can be reached quickly for help though Gram Panchayat (village administration) communication systems.

B. Environmental Monitoring Plan

162. The environmental monitoring program aims to assess the the environmental performance of environmental management plan. The EMOP will:

- assess the effectiveness of mitigation measures,
- assess the change in environmental quality during construction and operation stages,
- assess compliance to regulatory requirements, and
- monitor the status of corrective action taken in case of deviation from the planned measures or regulatory requirements.

163. For rural roads, EMoP will rely more on visual observation during pre construction aspects[16], construction stage and operation stage. A monitoring plan with monitoring indicator and frequency of monitoring is given at Appendix 5.

C. Institutional Arrangements and Responsibilities

1. Institutional Arrangement

164. NRRDA constituted by MORD is the nodal agency for the implementation of PMGSY in India. SRRDA is the state level agency responsible for implementation of PMGSY program in the state. NRRDA has developed various guidelines and defined institutional arrangements for effective and timely implementation of PMGSY program, which also covers measures for environmental and social safeguards. In line with the defined institutional requirements, each SRRDA has set up district level project implementation units (PIUs). NRRDA also appoints Technical Support Consultant (TSC) to provide technical support for capacity building in SRRDA/PIUs, facilitating them for environmental and social safeguard compliance monitoring and due diligence. SRRDA appoints PIC (project implementation consultant) for supervision of construction work. PIC also helps PIU in monitoring the EMP.

165. NRRDA is also responsible to coordinate with SRRDA and ensure compliance to ADB safeguard requirements.

166. The institutional arrangement at national and state levels to implement PMGSY and RCIP is shown at Figure 13**.**

D. Institutional Environmental Responsibilities

167. The institutional environmental responsibilities for different level and function is elaborated below:

168. **MORD**[17] the executing agency has the responsibility for monitoring implementation of the EMP for all subprojects and undertaking necessary due diligence. MORD ensure this through its Nodal Agency NRRDA (National Rural Road Development Authority). MORD will also ensure that

a. ADB is given access to undertake environmental due diligence for all subprojects, if and when needed as per EARF requirements.
b. SRRDA meet all environmental assessment requirements in accordance with EARF
c. It undertakes random monitoring of the implementation of the EMP
d. Ensure compliance to legislative requirements such as forest clearance for diversion of forest land for non-forest purposes and Consent to Establish/Operate for hot mix plant, batching plant
e. Appoint Technical Support Consultant (TSC) to assist SRRDA for various environmental aspect and safeguard compliances

[16] Aspects related to alignment selection for inclusion of new roads

[17] MoRD implements it through its nodal agency NRRDA which undertakes this with the help of Environmental Expert of Technical Support Consultant

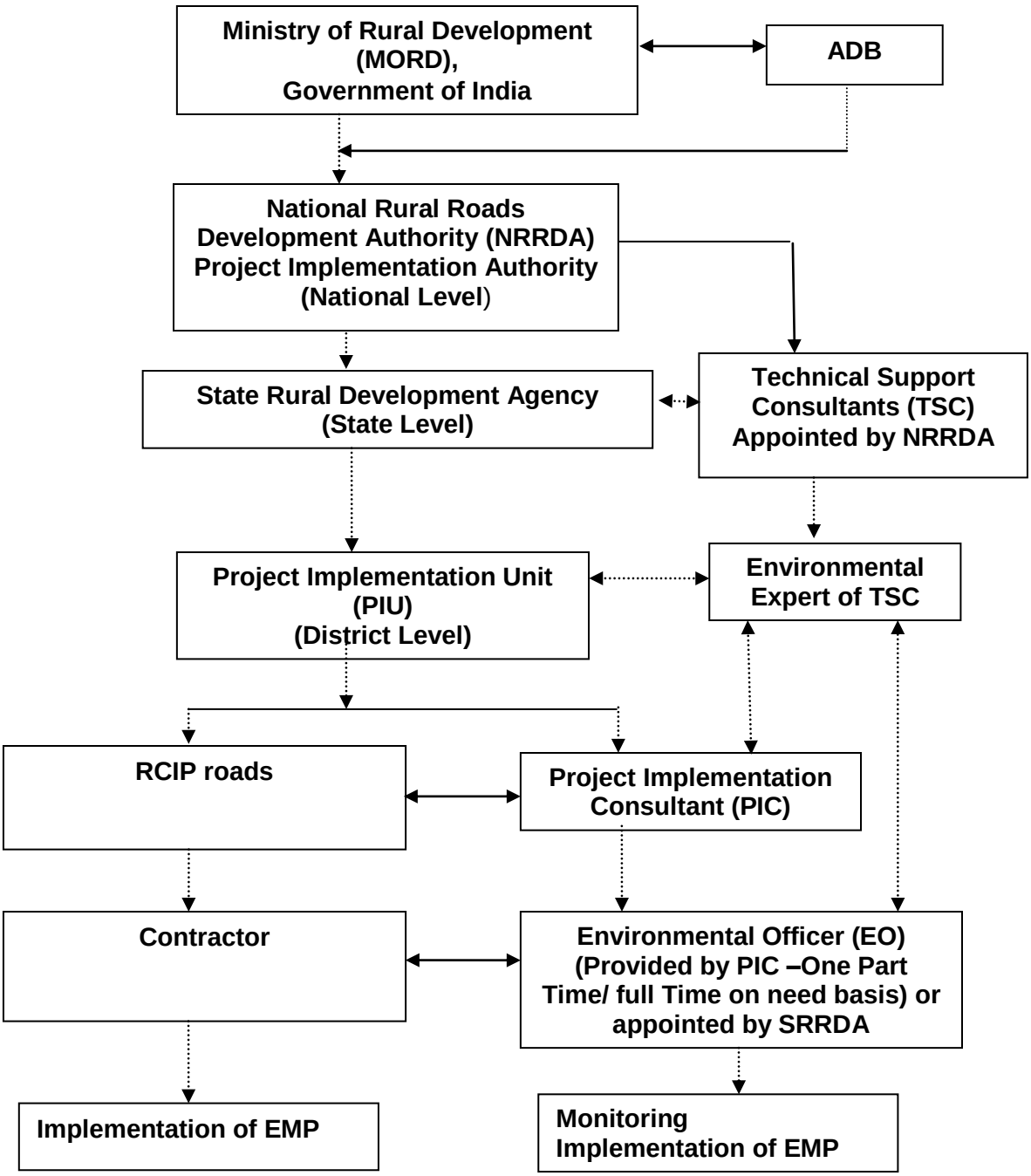


Figure 13: Institutional Arrangement for EMP Implementation

169. **SRRDA**[18]will ensure that :

a. ECOP checklist is prepared for each road
b. The completed ECOP checklist is included in the DPR with the help of PIC.
c. Ensure that all required statutory environmental clearances are obtained and comply with clearance conditions;
d. Ensure that the subproject specific EMPs and respective budget are included in the bidding documents;
e. Ensure that the ECOP checklists and EMP (including general and site specific issues) are made available to the contractors;
f. Undertake routine monitoring of the implementation of the EMP including spot checks on site and prepare monitoring reports at least once a year; and
g. With the support of technical support consultants prepare satisfactory environmental due diligence reports of the earlier tranche/periodic financing request before implementing the next tranche.
h. Appoint Project Implementation Consultant (PIC) for construction supervision and assist PIUs for EMP implementation and related safeguard compliances.

170. **PIU** will be responsible to :

a. Complete the ECOP checklists and prepare subproject specific EMPs (including monitoring plan) for each subproject
b. Obtain necessary statutory environmental clearance prior to commencement of civil works
c. Update the respective ECOP checklists and EMPs if there are any changes in alignment of the subprojects
d. To conduct monitoring of all subprojects and prepare pre-, during and post-construction monitoring checklists through the project implementation consultants,
e. Prepare and submit to SRRDA annual monitoring report as per ADB defined format

171. **The Technical Support Consultants (TSC)** appointed by NRRDA. The Environmental Expert of TSC :

a. Will provide technical assistance to SRRDA/PIU regarding environmental aspects, environmental permitting/clearances requirement,
b. Periodically review EMP implementation status including spot site inspections.
c. Conduct workshops/capacity building program at different level and functions.
d. Prepare environmental Due Diligence report for each trench before implementing next trench
e. Prepare state Level IEE reports and EMPs for non sample roads based on the ECOP checklist completed by the PIC

172. **Project Implementation Consultant (PIC)** is appointed by SRRDA. PIC will provide one Environmental Officer (EO). The EO will be responsible to ensure adherence and implementation of EMP at all stages of works by the contractor. The EO, if found warranting may also conduct field tests, independent of the contractor to determine the effectiveness of EMP under approval of PIC/PIU. The broad duties / responsibilities of the Environmental Officer will include:

a. Review of project design and specifications to ensure their adequacy and suitability with respect to the implementation of EMP.

[18] With assistance from PIC (Project Implementation Unit)

b. Collection and dissemination of relevant environmental documents including amendments to environmental protection acts issued by the various agencies, namely, ADB, Government of India / State and local bodies;
c. Interact with the counterpart of the Contractor(s), review work progress/plans and ensure implementation of the EMP;
d. Co-ordination with the NGOs, community groups and Government departments on environmental issues, provide clarifications/ and obtain clearances during project implementation if any, as required from the regulatory authorities and/or submitting periodic compliance reports as required by the State Authorities;
e. Monitoring sensitive environmental attributes during construction and operation stages19 to ensure that the suggested mitigation measures in the EMP are implemented;
f. Facilitate PIU for preparation of annual monitoring report as per ADB defined format
g. Documentation of the environmental management/monitoring activities for the regular project implementation progress report, which will serve as the basis for the annual environmental monitoring reports.
h. Conducting environmental training/awareness programs for the contractors, the project implementation personnel and the communities.

173. **Contractor** is appointed by SRRDA for construction of road and ensures implementation of EMP proposed. The broad duties of contractor are as follows**:**

a. Make adequate costs provision for EMP requirements while biding
b. Ensure effective implementation of mitigative measures as per road specific EMP
c. Comply with all applicable legislative requirements and obtain necessary consents for to Establish/Operate before start of hot mix plant and batching plants. Comply with al permit conditions
d. Create awareness amongst workers for environment, occupational health and safety aspects. Participate in training and awareness programme along with its executives conducted by PIC.
e. Provide PPE and adequate resources for Environment Occupational Health and Safety
f. Follow all the guidelines for borrowing earth and restoration of borrow areas, setting up construction camps
g. Sourcing of quarry material from approved quarries only
h. Provide all required input to PIC for environmental monitoring as per EMP.

E. Environmental Assessment and Review Framework (EARF) for RCIP

174. ADB has prepared an Environmental Assessment and Review Framework (EARF) which identifies the broad scope of the MFF, outlines the policy, environmental screening and assessment, and institutional requirements for preparing the environmental assessments to be followed for subsequent batches and tranches. This EARF also specifies criteria for eligibility for selection rural roads under RCIP. The sample roads are selected following these criteria. The EMP, monitoring requirement, institutional aspects, capacity building, grievance redress mechanism presented in this chapter are developed in line with above EARF. The eligibility

[19] Normally PIC is supposed to undertake five site visits and five monitoring reports as per contracts being issued by different SRRDA. It is proposed that PIC shall submit the following five monitoring reports: (1) First report at pre construction stage, (2) Second report after three months of start of construction or on completion of 25% construction (3) Thrid report after seven months of start of construction or on completion of 75% of construction, (4) Fourth report after one month of completion of construction and first year of operation stage (5) Fifth report in second month of seond year of operation stage.

criteria for selection of roads under RCIP, environmental assessment requirement for each trench and legal framework are given below:

1. Selection Criteria and Environmental Assessment Requirement

175. The following criteria will be followed for selection of non sample roads.

(i) No Category A (as per ADB's SPS) subproject will be included in the MFF.
(ii) Subprojects will be eligible for construction or upgrading in accordance with the PMGSY guidelines, and be included in the respective district core network.
(iii) The subprojects shall not disturb any cultural heritage designated by the Government or by international agencies, such as UNESCO, and shall avoid any monuments of cultural or historical importance.
(iv) The subproject will not pass through any designated wildlife sanctuaries, national parks, other sanctuaries, notified ecological sensitive areas or area of internationally significance (e.g., protected wetland designated by the Wetland Convention).
(v) The projects shall only involve activities that follow Government of India laws and regulations, ADB's Safeguard Policy Statement (2009)

176. The following environmental Assessment requirement will be followed roads included under RCIP

(i) ECOP checklists with annexes on trees, utility structures, community structures, strip plans and photographs will be completed for each and every road.
(ii) Based on the requirements of the PMGSY guidelines separate ECOP checklists will be prepared for bridges that are longer than 15 m.
(iii) Based on the completed ECOP checklists for roads and bridges, IEE reports will be prepared at a state level. These reports must contain a general EMP and a site specific EMP where there are site specific issues.
(iv) ADB's REA checklist for roads and highways will be completed based on the state level IEE reports prepared and submitted to ADB to confirm categorization

177. The vulnerable to climate change will also be screened following screening checklists, which was integrated in the ADB REA Checklists and corresponding mitigation measures will be prepared.

(i) Is the project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes
(ii) Could changes in precipitation patterns or evaporation rates over the lifespan of the project affect its sustainability and cost (i.e., increased landslides increase maintenance costs)?
(iii) Does the project use or depend on resources which could be affected by climate changes such as changes in temperature, precipitation, wind (increased soil moisture content in the sub-grade)?
(iv) Are there any demographic or socioeconomic aspects of the subproject and project area (e.g., population growth, settlement patterns) that increase the vulnerability of the project and surrounding area?
(v) Could the subproject potentially increase the vulnerability of the surrounding area (i.e., by increasing runoff, encouraging settlement in earthquake zones)

2. Legal Framework

178. As per Indian legislation, an environmental clearance is not required for rural roads. However, it may attract provisions of Forest Conservation Act, Wild Life (Protection) Act, and other legislation related with Air, Water and Noise pollution controls and prevention. The legislative applicability screening is presented in chapter 1 of this report and it will apply for non-sample road as well. Additionally, to ensure conformance to ADB's Safeguard Policy Statement, 2009 (SPS), the subprojects will be subject to the following requirements:

(i) Submission of a completed Rapid Environment Assessment (REA) checklist for Roads and Highways and a categorization form for each state level IEE that is prepared.
(ii) An Initial Environmental Examination20 (IEE) report including the preparation of an Environmental Management Plan (EMP) and a Monitoring Plan.
(iii) Regular monitoring of implementation of the EMP and submission of monitoring reports and due diligence reports to ADB as necessary

F. Capacity Building

179. Existing capacity of the State Rural Roads Development Agencies (SRRDAs) and Project Implementation Units (PIUs) for implementing environmental safeguard issues need substantial strengthening. Capacity building activities will mainly comprise training workshops for SRRDA and PIU environmental officers on (i) completion of environmental code of practice (ECOP) checklists; (ii) preparation of environmental management plan (EMP) and monitoring plans; (iii) monitoring of EMP implementation and completion of pre-, during and post-construction monitoring checklists; and (iv) preparation of monitoring reports. These few workshops have already been conducted at participating states though ADB appointed Environmental specialist. Additional training will be carried out periodically, by In-house trained and experienced officials.

G. Consultation and Information Disclosure

180. During the preparation of ECOP and Detailed Project Report (DPR), the PIU has to ensure consultation, and addressal of concerns of the affected people.

181. All environmental assessment documents are subject to ADB's Public Communication Policy (2005) and will be made available to the public, upon request. The SRRDAs are responsible for ensuring that all environmental checklist documentation, including the environmental due diligence and monitoring reports, are properly and systematically kept as part of the Investment Program specific records. MORD must disclose state specific sample road IEE reports on its website.

H. Grievance Redress Mechanism

182. PRI administered village level committee is the first contact point for any aggrieved person. This committee will try to settle the concern by them self or in consultation with contractor or PIU. The unresolved concerned are forwarded to PIU for further action. PIU resolves these concerns in consultation with PIC, SRRDA, and contractor as the situation demands. This is an established practice and is seen effective enough in RRS II. PIC will also collect concerns received by this committee in the intervening period and report the effectiveness of action taken.

[20] As per selection criteria, no Category A subproject will be included under RCIP.

183. Experience in earlier tranches of the progranIn shows that village level grievance redress committees comprising the sarpanch, panchayat secretary and other prominent citizens of the village were in place. However, as the site selection and project design process involved participation and full consultation with the community, there was hardly any grievance by the APs and no complaint was received by any of the village committees.

184. At national level NRRDA has made provision of registering complain /suggestion through its website. NRRDA forwards these complains to concerned SRRDA for necessary actions. SRRDA directly or through concerned PIU initiate the appropriate action and update the complainant as well as NRRDA. It is proposed that NRRDA website will be cross-linked to each SRRDA website as well or SRRDA will also make provision of complain registry at its website.

VI. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. General

185. Public consultations were undertaken consistent with the ADB requirements. All the five principles of information dissemination, information solicitation, integration, coordination and engagement into dialogue were incorporated in the consultation process. A framework of different environmental impacts likely from the project was strengthened and modified based on opinions of all those consulted, especially in the micro level by setting up dialogues with the village people from whom information on site facts and prevailing conditions were collected.

186. Stakeholders' consultations were held with the intent to understand their concerns, apprehensions, overall opinion and solicit recommendations to improve project design. Informal meetings, interviews were organized covering the entire project stretch. The informal consultation generally started with explaining the subprojects, followed by an explanation to potential impacts. Participant's views were gathered with regard to loss of agricultural land, shifting of utilities, shifting of common cultural properties, effect on air and noise quality of the area due to traffic, water availability, accident and risk.

187. The discussions were designed to receive maximum inputs from the participants regarding their acceptability and environmental concerns arising out of the subproject. They were given the brief outline of the project to which their opinion was sought. Suggestions were also sought for mitigating any potential adverse impact.

B. Compliance with Relevant Regulatory Requirements

3. In India, public consultation is mandatory in case of Category A and B1 category Projects[21] in select conditions. Being a category B project as per ADB Environmental Guidelines 2003, consultation was carried out during the early stage of IEE report preparation. The requirement of public consultation during the implementation of the project has been proposed as part of the mitigation plan. . This will involve regular communications between the PIU, PIC and the grievance redressal committee's and community leaders. Consultations carried out and grievances addressed will be recorded in the annual environmental monitoring report which will be submitted for disclosure on the ADB website.

C. Beneficiaries' Comments

188. The project has immense acceptability among the local people. They perceived that in addition to providing all weather connectivity, the subproject road would bring positive socioeconomic changes in the area. Local people mainly discussed on issues related to drainage and commencement of the construction work.

189. Some of the general issues raised during the different consultation sessions are summarised below :

- Construction Camp - The participants did not demonstare apprehension of any adverse impact due to the construction camp near to their villages. They

[21] As per schedule I of EIA notification number S.O. 1533, dated 14th September 2006. This notification also defines when a public consultation is mandatory. However, the project roads does not require environmental clearance under this notification.

responded positively towards providing support to these, if required, in terms of any food, water requirements.

- Water Logging and Drainage - Participants informed about few low-lying areas where water logging takes place during monsoon season. The villagers requested for provision of adequate cross drainage structures at these locations.
- Loss of Livelihood and Income Restoration Options - those who had encroached on the proposed alignment raised this issue. However, they willoffered the encroached space for the proposed project, if demanded.
- Road Safety - Safety issues were not raised during cosultations but proposed countermeasures as required from PMGSY guidelines were discussed
- Land Acquisition - People were in full support of the project and were ready to donate their land for the same, if required.
- Losses of Idols/Shrines - Participants supported the project and were willing to shift the idols, burial grounds and other religious structures observed at certain locations if required.
- Loss of Trees Due to Road Construction - Respondents were of the opinion that trees cutting should be avoided or else minimized. For trees to be cut compensatory plantation should be done. Some villagers expected additional plantation should be carried out. They recommended to plant only local tree species.
- Impacts on Health – Villagers do not perceived any impact due to this road project. However, issues pertaining to sexually transmitted diseases (STDs), HIV- AIDS may be an issue during construction stage however, this aspects are analysed by Social Impact Assessment team separately.
- Ambient Air & Noise Quality – The respondents viewed that these are the problems of urban areas and their villages are still untouched from this aspect. They even do not anticipate any of these problems after the completion of the project. However, they do not want increased in pollution during construction phase.
- Inconvenience during Construction - The participants viewed that they will manage it, as it will be temporary in nature.
- Employment during Construction - The locals expected that they should be given preference in employment during project implementation.
- Perceptions and Expectations - The public and the PAPs appreciated need and supported the project fully. Community at large appreciated overall benefits to them resulting from project development;

D. Addressal of Issues

190. The efforts made to address all the issues raised during consultations through design changes/adjustments and environmental best practices. Some of the provisions made under the project to address the issues and concerns of the community are given in the succeeding table.

Table 16: Addressal of Issues and Concerns under the Project

Issue/Concern	Addressal under the project
Water Logging and Drainage	Adequate cross drainage structures have been planned
Road Safety	Adequate safely signage is planned all along the rural road.
Land acquisition and Mode of compensation	The proposed RoW is 12m along the rural road. No land acquisition is planned in project road.

Issue/Concern	Addressal under the project
Loss of roadside idols/shrines	Idols and shrines will be relocated to the other nearby places with consultation and proper rituals
Loss of trees	Compensatory afforestation would be done at the ratio of three trees for each tree to be cut. Additional tree plantation shall be made wherever feasible
Increased pollution levels	Ambient air quality, water quality largely meets the prescribed standard. Al efforts shall be made to prevent pollution. No construction activity shall be taken at night in village area.
Utilities and basic infrastructure	All the effected utilities, electric poles, telephone lines, wells, tube wells etc. shall be relocated under the project cost. Primary water sources like hand pump and open well should be relocated first if affected.
Employment of locals during construction	Locals will be given preference for employment during the project implementation

VII. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

191. The findings of Environment Assessment of sample roads indicate that impacts are mostly similar and subprojects are unlikely to cause any significant environmental impacts. While some of the impacts are negative, there are many bearing benefits to the area. Most of the impacts are likely to occur during construction stage, are temporary in nature, and can be mitigated with minor to negligible residual impacts.

192. The project received immense support from local people as they perceive that this project will improve the overall connectivity and bring various economic opportunities to the people of the area

193. All sample roads included under RCIP were selected based on ecological and climate change consideration defined under EARF. Accordingly, none of the sample roads passes through protected areas or encroaches precious ecology (sensitive or protected areas) or any historical or archeologically protected areas.. As per selection guidelines, none of the selected sample road passes through reserved forests either. Few trees cutting though may be involved.

194. None of the rural road crosses any river, only local nallas are crossed where adequate engineering measures are proposed for the protection of road from the flood.

195. All the sample roads are aligned with existing village roads and unpaved movement paths. As such, land acquisition is nil or very minimal which is also acquired through donations from villagers.

196. Considering insignificant environmental sensitivity, the project is categorised as category B as per ADB Safeguard Policy Statement 2009.

197. No categorisation is made under environmental legislation of India, since these small roads do not require any environmental clearance in accordance to Indian Environmental (Protection) Act and Rules, 1986 amended till date. However, clearance from Forest Department will be required for cutting of trees.

198. The impacts identified are mostly related to alignment selection, land clearing, borrowing earth, cutting of trees, shifting of utilities and community structures, establishment of construction camp or material storage areas, transportation of material and operation of hot mix plant. All identified impacts are either eliminated or minimised through design consideration and suitable mitigative measures.

199. Environmental Management plan covering all stages of road construction (design, construction and operation) is prepared with defined responsibility for its implementation. Environmental Monitoring plan is also prepared to ensure effective implementation of EMPs.

200. NRRDA/SRRDA has defined institutional setup including with specified responsibility for environmental management. Existing capacity of the State Rural Roads Development Agencies (SRRDAs) and Project Implementation Units (PIUs) for implementing environmental safeguard issues need substantial strengthening. The capacity enhancement is proposed through focused workshops and training session. Few workshops have already been conducted at participating

states through ADB appointed Environmental specialist. Trained and experienced in-house officials should carry out more raining in future periodically.

201. The IEE also indicate that rural road construction works does not warrant further EIA study for subsequent rural road construction works in Chhattisgarh.

B. Key Recommendations

202. Any major changes or any major additional work other than the proposed project activities will require updation of ECOPs and IEE. The updated ECOPs and IEE will have to be submitted to NRRDA, and ADB for concurrence before civil works commence.

203. The implementation of prescribed mitigation measures will minimize/avoid the adverse impacts. Moreover, the impacts shall be monitored continually by implementing and updating the Environmental Management plan and Environmental Monitoring Plan.

204. These IEE is prepared based on ECOPs and feasibility stage. Subproject specific EMP shall be improved as per the final provisions made under DPRs. The updated EMP if there is any change, shall also be sent to ADB for information.

205. Executing agency shall ensure that updated road specific EMP forms part of DPR and is available to contractor at the time of bidding. . The contractor will specify the quantity and budget for various activities like rehabilitation of borrow earth pits, first aid and sanitation facilities at construction camp and temporary office/material storage place as per EMP requirements. The same shall be revised if there is any change in the project design. Any such change shall be reported to ADB as well

Appendix 1: Details of Roads in Chhattisgarh

Chhattisgarh – District wise List of Roads Proposed under Batch 3

S. No.	District	Block	Road Name	Length (Km)
1	Bilaspur	Gourella	Chuktipani Bazardand To Chutkipani Bahrijhorki	3.08
2	Bilaspur	Kota	Amagohan To Mohali Pandarpani	3.87
3	Bilaspur	Kota	Katra Rd To Bargawa Lusada Kedadand	1.44
4	Bilaspur	Marawahi	Semardarri Road Bhatatikara To Bagiha Tola	4.50
5	Bilaspur	Bilha	Bitkuli Pondi Hathini Road	3.18
6	Bilaspur	Bilha	Bilha - Dodki Kwanchhi	4.50
7	Bilaspur	Bilha	T010 - Aithulkapa	1.86
8	Bilaspur	Bilha	Murkuta - Nawagaon H	3.25
9	Bilaspur	Bilha	L091 - Khairkhundi	1.35
10	Bilaspur	Bilha	L022-Belpara Limha Patharapali	2.01
11	Bilaspur	Bilha	Beltara - Barbhatha-Bel	1.20
12	Bilaspur	Bilha	Mohatrai - Chumkunwa	2.41
13	Bilaspur	Bilha	Kadar - Kunwa	7.32
14	Bilaspur	Bilha	Kadar - Limatri	5.40
15	Bilaspur	Bilha	L091 - Sarvandevri	4.04
16	Bilaspur	Bilha	T04-Bahatarai Parsahi Rd	6.40
17	Bilaspur	Kota	Kota Ratanpur To Chherkabandha	2.82
18	Bilaspur	Kota	Kurwar To Navadih	3.03
19	Bilaspur	Kota	Amagohan To Khongsara Basti	2.01
20	Bilaspur	Kota	Kurdur To Bagdhar Via Sargod	20.30
21	Bilaspur	Kota	Rmkk Road To Kunvajati	1.56
22	Bilaspur	Kota	Banki Ghat To Kota Ratanpur Road	1.20
23	Bilaspur	Lormi	Amlidih To Koilari	3.50
24	Bilaspur	Lormi	Khektara To Nathelapara	2.37
25	Bilaspur	Lormi	Tekanpara To Kota Lormi Road	1.37
26	Bilaspur	Lormi	Lormi Mungeli MDR To Khapridih	0.75
27	Bilaspur	Lormi	Budhwara To Tulasaghat	1.20
28	Bilaspur	Lormi	Bhaskara To Khairakhurd	1.50
29	Bilaspur	Mungeli	Bicharpur To Uslapur Singhanpur	6.30
30	Bilaspur	Mungeli	Bhurka To SH 26	5.97
31	Bilaspur	Mungeli	Birgahani To Mdr Takhatpur To Pathariya	0.72
32	Bilaspur	Mungeli	Reunta To MDR Mungeli Nandghat Road	2.31
33	Bilaspur	Mungeli	Kodukapa To MDR Nadghat Road	1.30
34	Bilaspur	Mungeli	Aurabandha To MDR Nandghat Road	1.14
35	Bilaspur	Mungeli	Chichesara To Mungeli	3.90
36	Bilaspur	Mungeli	Tulsikapa To SH26	2.60
37	Bilaspur	Mungeli	SH 26 Road Chhuiha	2.42
38	Bilaspur	Mungeli	Bhumiyapara To SH26 Bijatarai	1.98
39	Bilaspur	Mungeli	Bijhori To SH 26	1.30
40	Bilaspur	Pathariya	T03 - Hathkera	2.25
41	Bilaspur	Pathariya	L036 - Umariya	7.32
42	Bilaspur	Pathariya	Main Road - Rambod Kokedi	2.01
43	Bilaspur	Pathariya	T04 - Sawatpur	5.55
44	Bilaspur	Takhatpur	Ganiyari To Pondi	3.36

S. No.	District	Block	Road Name	Length (Km)
45	Bilaspur	Takhatpur	Kotaghutku Road To Padaripar	1.20
46	Bilaspur	Takhatpur	Araiband Approach Road	4.00
47	Bilaspur	Takhatpur	Khapari To Modhe Road	1.00
48	Bilaspur	Takhatpur	Amane To Bija Kargird	2.31
49	Bilaspur	Takhatpur	Bhunda To Pathara	1.32
50	Bilaspur	Takhatpur	Navapara To Satti Para	1.32
51	Bilaspur	Takhatpur	Uslapur To Pondi Road	1.38
52	Bilaspur	Takhatpur	Pali To Butena	1.92
53	Bilaspur	Takhatpur	Savada Bra To Pura	2.55
53	**Total Bilaspur**			**164.85**
1	Durg	Bemetara	Bahinga - Karhi Road	2.90
2	Durg	Bemetara	Main Road NH12a - Joung	2.65
3	Durg	Bemetara	Mohrenga - Pausari	2.50
4	Durg	Bemetara	Main Road - Atriya	1.45
5	Durg	Berla	Bachedi - Khumiguda	3.00
6	Durg	Berla	Main Road - Hathpan Road	2.20
7	Durg	Dhamdha	Main Road To Parsada	6.40
8	Durg	Dhamdha	Dondki - Dewarkona Road	2.23
9	Durg	Dhamdha	Kanharpuri - Jataghara Road	2.90
10	Durg	Dhamdha	Main Road T13 - Kandai Road	1.50
11	Durg	Dhamdha	Main Road Girhola - Ghikudiya Road	2.15
12	Durg	Dondi	Bhandaritola - Lakhmatola Road	1.76
13	Durg	Durg	Nikum - Masabhat Road	3.50
14	Durg	Nawagarh	Murkuta - Jhanki Road	3.50
15	Durg	Nawagarh	Boerkachra Amlidih - Thengabhat	4.33
16	Durg	Nawagarh	Main Road Mohtara - Andhiyarkhor Road	1.35
17	Durg	Nawagarh	Kodiya - Bhaisamuda Road	2.15
18	Durg	Patan	Gadadih Marra Road - Bodal Road	0.80
19	Durg	Patan	Main Road - Chulgahan	1.00
20	Durg	Patan	Main Road - Guruwaindhih Road	0.70
21	Durg	Patan	Ausar - Jharmokhali Road	2.50
22	Durg	Saja	Main Road - Matiya	2.10
23	Durg	Saja	Thelka - Bhanora Lalpur	2.45
24	Durg	Saja	Main Road - Kehka	1.55
25	Durg	Saja	Kanhera - Rampura Road	3.53
26	Durg	Saja	Main Road - Dehri Road	2.25
27	Durg	Saja	Mohgaon - Budhwara	0.75
27	**Total Durg**			**64.10**
1	Jangir-Champa	Dabhara	T05 To Bijani	2.65
2	Jangir-Champa	Malkharada	T01 To Bokrel	3.50
2	**Total Jangir-Champa**			**6.15**
1	Dhamtari	Nagri	Sahnikhar to Latiyara	2.60
1	**Total Dhamtari**			**2.60**
1	Jashpur	Bagicha	L030 To Dobh (Vr)	6.00
2	Jashpur	Bagicha	Chhiropara To Tr 11	7.50
3	Jashpur	Bagicha	Mahadeo Jabala To Tr 12	11.00

S. No.	District	Block	Road Name	Length (Km)
4	Jashpur	Bagicha	Turrikona To Tr 02 MDR	5.00
5	Jashpur	Bagicha	Ghoghar To L54	1.30
6	Jashpur	Bagicha	Judwain To Tr10 MDR (01tr-09)	7.95
7	Jashpur	Duldula	Jamchuwa To T04 Makaribandha Duldula Road	5.70
8	Jashpur	Duldula	Judwain Ambatoli To L 45 Salamali	6.65
9	Jashpur	Duldula	Ranibandh - Makribandha	9.60
10	Jashpur	Duldula	Mayurchundi - L- 38	3.00
11	Jashpur	Jashpur	Jashpur To Dodkachoura (04l-50)	1.65
12	Jashpur	Kansabel	Titapakar To T07 Pandripani	5.80
13	Jashpur	Kansabel	Marhatoli To T06 Karmatoli (05l-43)	6.00
14	Jashpur	Kansabel	Semarkachhar To Tr-04 (Vr)	2.16
15	Jashpur	Kansabel	Koranga To Kunjara (Vr57)	3.10
16	Jashpur	Kansabel	Mdiajhariya To T02 Nh 78	2.50
17	Jashpur	Kansabel	Dumartoli To Sabadmunda Kansabel Road	4.20
18	Jashpur	Kunkuri	Lodhaamba - L-38 Harradand	6.20
19	Jashpur	Manora	Lakwakona - Sonkyari	23.23
20	Jashpur	Pathalgaon	Chandarpur To Tr03	6.00
21	Jashpur	Pathalgaon	Karrajore To Tr07	4.00
22	Jashpur	Pathalgaon	Tamta - Bathanpara	2.40
23	Jashpur	Pathalgaon	Hardijhariya To Tr07	1.63
24	Jashpur	Pathalgaon	L-87 - Tihalisarai	7.10
25	Jashpur	Pathalgaon	Tr-04 To Karadand	2.50
26	Jashpur	Pathalgaon	Tr-01 - Makkapur	1.75
27	Jashpur	Pathalgaon	Darrimahua To Tr01	2.60
28	Jashpur	Pathalgaon	Bangoda - Tr-05	1.65
29	Jashpur	Pathalgaon	Khamgada - L-74	2.60
29	**Total Jashpur**			**150.76**
1	Mahasamund	Bagbahara	T 01 Tendukona To Dokarpali	3.05
2	Mahasamund	Bagbahara	T02 Mungaser To Firgi	6.35
3	Mahasamund	Basna	Bizrabhata Tr 01 Tukda To Dhama Ghutkuri	1.20
4	Mahasamund	Basna	Kudekel To Potapara	2.20
5	Mahasamund	Basna	Tr 04 To Birsinghpali S	1.35
6	Mahasamund	Basna	Tr 03 To Rupapali	4.55
7	Mahasamund	Basna	Tr 04 To Karnapali	4.95
8	Mahasamund	Basna	Tr 03 Bandabari To Bamhanidih	3.80
9	Mahasamund	Basna	Tr 03 Bade Sajapali To Bhuthabahara	4.30
10	Mahasamund	Basna	Tr 03 Bade Sajapali To Harda	4.10
11	Mahasamund	Basna	NH 6 To Badetemari	2.52
12	Mahasamund	Mahasamund	NH 6 To Khadsa	1.90
13	Mahasamund	Mahasamund	NH6 Kuhari To Pasid ODR	1.50
14	Mahasamund	Mahasamund	Amora T05 To Kachhardih	1.95
15	Mahasamund	Mahasamund	NH 6 To Dumarpali	2.65
16	Mahasamund	Pithora	Lr 066 To Nawagaon Kala	1.55
17	Mahasamund	Pithora	T 12 To Saragtora	3.40
18	Mahasamund	Pithora	MDR Bagbahara Road Tendukona To Udarlami	5.85
19	Mahasamund	Pithora	Bamhani To Kesaripur	2.35

S. No.	District	Block	Road Name	Length (Km)
20	Mahasamund	Pithora	Tr 10 Bhurkoni To Kolda	8.10
21	Mahasamund	Pithora	Tr 10 To Faroda	7.65
22	Mahasamund	Pithora	T 11 To Bartunda	1.55
23	Mahasamund	Pithora	NH 6 To Gauriya	4.80
24	Mahasamund	Pithora	Katangtarai To Chhoteloram	4.75
25	Mahasamund	Pithora	NH6 To Loharindongari	1.50
26	Mahasamund	Saraipali	NH 6 To Bandimal	8.30
27	Mahasamund	Saraipali	T 03 To Sahajpani	8.95
28	Mahasamund	Saraipali	Baloda To Gerra	5.00
28	**Total Mahasamund**			**110.12**
1	Raigarh	Baramkela	T03 To Jhal	16.40
2	Raigarh	Baramkela	T-03 To Karapi	16.00
3	Raigarh	Baramkela	Bishnupali Sonabala To Dulopali	1.60
4	Raigarh	Baramkela	Dongaripali Jhal To Amapali	1.05
5	Raigarh	Baramkela	T05 To Marodarha	2.25
6	Raigarh	Baramkela	T06 Katangpali Sariya To Kandola	1.65
7	Raigarh	Baramkela	T-05 To Bade Amakoni (Vr3)	3.00
8	Raigarh	Baramkela	Sariya Sankara Road To Tora	9.50
9	Raigarh	Dharamjaigarh	L035 To Baghnipara	5.45
10	Raigarh	Dharamjaigarh	T06 To Jamabeera	3.00
11	Raigarh	Dharamjaigarh	Bandhanpur Sajapali T-04 - Chitamara	7.30
12	Raigarh	Dharamjaigarh	L050 (Potiya) - Bhagdahi	7.75
13	Raigarh	Dharamjaigarh	Dharamjaigarh Pathalgaon Raod T05 - Uraonpara	3.52
14	Raigarh	Dharamjaigarh	L035 - T02 To Darogapara	2.40
15	Raigarh	Dharamjaigarh	Sohanpur Road - Gidhakhota	4.55
16	Raigarh	Dharamjaigarh	Dharamjaigarh Kapu Road (T-03) - Branchpara	1.50
17	Raigarh	Dharamjaigarh	Bandhapali Dongabhawna Road To Gadainbahri	2.05
18	Raigarh	Dharamjaigarh	Katrapara To Jaroliama	4.73
19	Raigarh	Dharamjaigarh	T- 010 To Medarmar Colony	1.50
20	Raigarh	Dharamjaigarh	L 044 - Dhondhagaon	3.60
21	Raigarh	Dharamjaigarh	Bandhanpur- Chantipali Road - Salkheta	2.10
22	Raigarh	Kharsia	Kurrubhatta To Tendumudi	0.60
23	Raigarh	Lailunga	Ghatgaon To Patelpara	3.30
24	Raigarh	Lailunga	Kesala To Khairbahar (Vr78)	2.40
25	Raigarh	Lailunga	Lamdand - Kaharchua	1.60
26	Raigarh	Lailunga	Keshla Main Road To Saraimal	1.00
27	Raigarh	Pussore	Pussore Borodipa NH 200 Lohakhan	2.65
28	Raigarh	Pussore	Nawapara Lara To Mahlol	1.50
29	Raigarh	Pussore	Pussore Badebhandar Road Bunga To Nawapara-B	4.70
30	Raigarh	Pussore	Raigarh Kankatora To Renaglpali	2.00
31	Raigarh	Pussore	Kodatarai Surajgarh To Nawapali W	2.07
32	Raigarh	Pussore	Nawapara Lara To Basanpali	4.00
33	Raigarh	Sarangarh	Raigarh Sarangarh Road Tokhursi	2.55
34	Raigarh	Sarangarh	Sarangarh Shiverinarayan Road To Kalmi	1.00
35	Raigarh	Sarangarh	Hardi Dhuta Chharra Pindri To Khaira Bade	1.00
36	Raigarh	Sarangarh	T-06 To Ghatora	4.50

S. No.	District	Block	Road Name	Length (Km)
37	Raigarh	Sarangarh	L-049 To Dabgaon	2.50
38	Raigarh	Sarangarh	T-06 To Baigindih (Vr5)	4.50
39	Raigarh	Sarangarh	Sarangarh Shiverinarayan Road To Paraskhol	0.90
40	Raigarh	Sarangarh	T-09 To Silyari	2.00
41	Raigarh	Sarangarh	T-06 To Chawarpur (Vr6)	2.70
42	Raigarh	Tamnar	Hukara Dongamahua T-02 To Tihalirampur (Vr01)	2.00
43	Raigarh	Tamnar	Hukra Dongamahua To Lamdarha	2.20
44	Raigarh	Tamnar	Saraipali To Darama	1.75
45	Raigarh	Tamnar	Aamagha T- Kachkoba To Nayapara (Vr3)	1.75
46	Raigarh	Gharghoda	Gharghoda Dharamjaigarh To Bulekera	3.80
47	Raigarh	Raigarh	Raigarh Kolaibahal Road To Dumarpali E	4.02
48	Raigarh	Raigarh	Sambalpuri Kolaibahal Road To Sapnai	1.95
49	Raigarh	Raigarh	Dhanager Bhupdeopur Road To Hardi Jharia	3.00
50	Raigarh	Raigarh	Raigarh Kolaibahal Road To Bade Attarmuda	1.75
50	**Total Raigarh**			**170.59**
1	Raipur	Balodabazar	Dhobadih To Deori	4.10
2	Raipur	Balodabazar	SH 22km To Chhuiya	0.75
3	Raipur	Balodabazar	Balodabazar To Koliyari Saloni	1.55
4	Raipur	Balodabazar	Khamhariya To Bhairwadih	2.00
5	Raipur	Balodabazar	SH 33km To Lawanband	0.90
6	Raipur	Balodabazar	Balodabazar 28km To Bemetara	2.05
7	Raipur	Balodabazar	Risda To Puran	2.30
8	Raipur	Bhatapara	Rampur To MDR	0.80
9	Raipur	Bhatapara	Semariya To Datrengi	1.80
10	Raipur	Bhatapara	Koni Via Bagbudwa To Kodwa	1.10
11	Raipur	Bhatapara	Sendri To Khaparadih	2.00
12	Raipur	Bhatapara	Kesla To Lachchhanpur	2.25
13	Raipur	Bhatapara	Mopar To Arjuni	3.00
14	Raipur	Bhatapara	Akoli To Lewai	5.05
15	Raipur	Bhatapara	Bharatpur To Mopka	2.25
16	Raipur	Bhatapara	Pasid To Khapari	1.85
17	Raipur	Bhatapara	Nawagaon To Khamhariya	2.25
18	Raipur	Bilaigarh	Tundri To Maldiya	3.60
19	Raipur	Bilaigarh	Pipardula To Manpasar	2.10
20	Raipur	Bilaigarh	Beltikari To Pandripani	1.95
21	Raipur	Bilaigarh	Churla To Tendumudi	2.25
22	Raipur	Bilaigarh	Bisanpur To Nagardha	2.50
23	Raipur	Bilaigarh	Barbhata To Deoraha	2.40
24	Raipur	Gariaband	Gariaband To Khatti	5.30
25	Raipur	Kasdol	Mudhipar To Piparchhedi	3.15
26	Raipur	Kasdol	Nardha To Navrangpur	2.00
27	Raipur	Kasdol	Kasdol Kurkutti Road To Dhamalpura	0.80
28	Raipur	Kasdol	Kasdol Aurai To Damjhar	1.20
29	Raipur	Kasdol	Deopur To Thakurdiya	20.90
30	Raipur	Kasdol	Dhaurabhata To Bamhani	4.00
31	Raipur	Kasdol	Chhachhi To Amakhoha	5.75

S. No.	District	Block	Road Name	Length (Km)
32	Raipur	Pallari	Bhawanipur To Rewadih	4.18
33	Raipur	Pallari	Balodi To Odan	2.50
34	Raipur	Pallari	Datan To Gatapar Bbazar	4.10
35	Raipur	Pallari	SH09 Km 64 To Patharidih	2.13
36	Raipur	Pallari	T02 Balodi To Ahamadpur	3.73
37	Raipur	Pallari	Binouri To Gatapar	2.10
38	Raipur	Pallari	Junwani To Deogaon	0.90
39	Raipur	Pallari	Datan Sakari To Aurashi	1.10
40	Raipur	Pallari	Pandariya Dotopar Amera Bhalookona 13 Km To Achholi	5.90
41	Raipur	Pallari	Datan Sakari To Aurashi	1.00
42	Raipur	Pallari	Lakadiya	4.50
43	Raipur	Pallari	12t04 Km 17 To Malpuri	1.30
44	Raipur	Pallari	Gidkera To Saiha Bazar	3.50
45	Raipur	Pallari	Muswadih To Semharadih	3.00
46	Raipur	Pallari	Bhairwadih To Bijradih	1.04
47	Raipur	Rajim	Kosamkhunta To Khapari	2.70
48	Raipur	Rajim	Pokhara - Raksha	1.55
49	Raipur	Simga	Suhela Kathiya Road Km 2 To Ameri	1.65
50	Raipur	Simga	Diggi To Matiya	4.55
51	Raipur	Simga	Darchura To Manhora	3.07
52	Raipur	Simga	Kachlon To Kirwai	4.30
53	Raipur	Simga	Nh200 Km 54 To 14t02 Km 6	1.75
54	Raipur	Simga	Tildabandha To Newari	1.60
55	Raipur	Simga	Kathiya To Bhalesur	4.70
56	Raipur	Simga	Pounsari To Lanja	0.85
57	Raipur	Chhura	Mongra - Birnibahara	6.08
58	Raipur	Chhura	Kantakhusari To Rajpur Via Dharampur	4.50
59	Raipur	Chhura	Dadargaon To To Chhatarmadai O Via Kothigaon	2.60
60	Raipur	Chhura	Rakshi To Nawadih	2.40
61	Raipur	Chhura	Bamhani To Nawadih	2.50
62	Raipur	Deobhog	Kadalimuda - Dhungiyamuda	1.80
63	Raipur	Deobhog	Dhurwapara - Bhatarabahali	4.50
64	Raipur	Deobhog	Jhiripani To Dahigaon (Vr-660)	1.02
65	Raipur	Deobhog	Karlaguda To Dhungiyamuda (Vr-686)	1.02
66	Raipur	Deobhog	Latapara To Fudelpara	2.10
67	Raipur	Deobhog	Kodobhata To Khwaspara (Vr-672)	2.00
68	Raipur	Deobhog	Dohel To Podaguda (Vr-697)	1.00
69	Raipur	Deobhog	Sargibahali To Limpara (Vr-678)	2.40
70	Raipur	Deobhog	Sh2b To Dhodhara	1.00
71	Raipur	Mainpur	Bhatapani - Kuchenga	3.95
72	Raipur	Mainpur	Chanabhata To Urmal	2.03
73	Raipur	Mainpur	Kachharpara To Sarnabahal	2.75
74	Raipur	Mainpur	Sh2b - Beharadih	1.15
75	Raipur	Mainpur	Shobha - Kareli	1.98
76	Raipur	Mainpur	Bargaon To Mongaradih	2.75
77	Raipur	Tilda	Chicholi To Keotara Via Gourkheda	2.25

S. No.	District	Block	Road Name	Length (Km)
78	Raipur	Tilda	Tulsi M To Sarfonga	2.63
78	**Total Raipur**			**215.97**
1	Surguja	Ambikapur	Bilaspur Road Dhanwar Road (SH 2a) Rd228.6 K.M. To Khaliwa Khas	3.00
2	Surguja	Lakhanpur	Belkharikha To Turna Baigapara	2.50
3	Surguja	Lundra	NH 78 Katni Gumla Road To Silsila Uparpara	2.80
3	**Total Surguja**			**8.30**
1	Bastar	Bakawand	Badepara Talnar To Khaspara Chitalur	7.20
2	Bastar	Bakawand	Bakawand To Bhirinda	3.80
3	Bastar	Bastanar	L036-Gaytaparairpa To Pujariparairpa	2.55
4	Bastar	Bastar	Farsaguda Chhurawand Road- Khaspara Khadka Vhaya Jamgaon	8.80
5	Bastar	Bastar	Farsaguda To Patelpara Chhurawand	7.50
6	Bastar	Darbha	NH 16 Pakhnar Road 9 Km To Koikimari	0.95
7	Bastar	Darbha	Manjhiguda To Khaspara	0.80
8	Bastar	Darbha	Darbha Chandameta Road To Thotapara	1.20
9	Bastar	Darbha	J K Road Rd 26 Km To Budagibhata	5.90
9	**Total Bastar**			**38.70**
1	Kanker	Durgukondal	Kewti Pakhanjur To Marrampani	2.20
2	Kanker	Koelibeda	Bande To Haridaspur	2.80
3	Kanker	Koelibeda	2 Km of Govindpur Markanar To Vijaynagar	2.35
4	Kanker	Koelibeda	Janakpur To Krishnanagar	1.50
5	Kanker	Koelibeda	Vishrampur To Alor	0.90
6	Kanker	Koelibeda	49 Km of Bhanpratappur Bande Road Badgaon To Badepara	1.40
7	Kanker	Koelibeda	Sankanrnagar To Padenga	1.90
8	Kanker	Koelibeda	Roopnagar To Jagannathpur	6.00
8	**Total Kanker**			**19.05**
1	Korba	Kartala	T04 To Kasipani	2.10
2	Korba	Kartala	L052 To Jhinka	6.60
3	Korba	Kartala	T01 To Dongama	4.10
4	Korba	Katghora	Dipka Ring Road To Binjhari	2.60
5	Korba	Katghora	Darri To Mohariyamuda	1.50
6	Korba	Korba	T01 Chirra To Along	1.60
7	Korba	Korba	T01 To Dadarpara	4.25
8	Korba	Korba	T09 To Narbada	3.25
9	Korba	Korba	L023 To Dhanpuri	3.50
10	Korba	Korba	T02 Batati To Darga	4.60
11	Korba	Korba	L054 To Daldalipara	1.20
12	Korba	Korba	T08 Ajgarbahar To Gaurbora	4.30
13	Korba	Pali	L047 To Bagaihapara	3.20
14	Korba	Pali	L048 To Bhelwadongri	1.70
15	Korba	Pali	L039 To Hardipara	2.55
16	Korba	Pali	L046 To Duggupara	1.50
17	Korba	Pali	T02 To Sadakpara	1.70
18	Korba	Podiuproda	L021 To Dhauramuda	3.15
19	Korba	Podiuproda	T05 To Barra	4.00

S. No.	District	Block	Road Name	Length (Km)
20	Korba	Podiuproda	T02 To Kodwari	6.05
21	Korba	Podiuproda	T02 To Nawapara	1.80
22	Korba	Podiuproda	T03 To Babupara Thotanpara	2.30
23	Korba	Podiuproda	L0100 To Bagdharidand	2.30
24	Korba	Podiuproda	T04 To Khamarpara	1.05
25	Korba	Podiuproda	T02 To Junapara	2.00
26	Korba	Podiuproda	T03 To Lalmatiya	1.35
27	Korba	Podiuproda	L0104 To Chuhari	3.85
28	Korba	Podiuproda	T07 To Mengadhi	5.05
29	Korba	Podiuproda	T02 to Khamharmuda	5.10
30	Korba	Podiuproda	L095 To Bagharidand	3.30
31	Korba	Podiuproda	T04 To Jambahar	4.15
32	Korba	Podiuproda	T06 to Manjhwarpara	9.00
32	**Total Korba**			**104.70**
320	**Grand Total**			**1055.89**

Appendix 2: Rural Roads: Environmental Checklist

Road Name: L023-LO70 Kurdur to Bagdhar via Sargod

Block Name: Kota

District Name: Bilaspur

Total Length of the Road: 20.30 km

A. Climatic Conditions

Temperature	High: **(May)** Low: **°C (Dec)**
Humidity	High: % **(Aug)** Low: **%**
Rainfall Rainy Season	mm/year **June** to **September**

B. Location of the Road and Generic description of Environment

S. No.	Type of Ecosystem	Yes	No	Explanation
1.	Coastal area Mangrove (along roadside)		√	Distance from Coastline: km ( ) more than 50% ( ) less than 20%
2.	Type of Terrain-(Plain/Hilly/ Mountainous etc.) *(Explain the topography of the area and how many km of the road are located in the hilly area)*		√	There was found Hilly area between Ch-3600m toCh-9200m and Ch-1500m to Ch-19000m along the project road. Altitude: The topography of the project road is flat at almost all locations.
4.	Forest Area *(Explain whether the road passes through forest areas or located along the forest areas and distance from shoulder to the forest area)?*		√	There was found forest area between Ch-00m toCh-14000m and Ch-15000m to Ch-19400m along the project road. Type of Vegetation: Legal Status of the Forest Area: Unclassified *(Reserved, National Park, Sanctuaries, Unclassified, etc.)* No part of the project road passes through any forest area.
5.	Wildlife (*Explain whether there are any wildlife species in the project area*)		√	Name of animals: **NA** Endangered species (if any): **None**
6.	Inhabited Area	√		The project road is passing through village namely Amagohan para, Tumadabra, Maluwari, Para, Sargod and Bagdhara between Ch-400m to Ch-600m, Ch-2000m to Ch-2400m, Ch03200m to Ch-14000m, Ch-11800m to Ch-12000m, Ch-14600 to Ch-15000m and Ch-19800m to Ch-20300m.

S. No.	Type of Ecosystem	Yes	No	Explanation
7.	Agricultural Land	√		The agriculture land lies between Ch-00m to Ch-1600m LHS, Ch-2600m to Ch-3200m both side, Ch-1140m to Ch-11800m, Ch-14200m to Ch-14600m and Ch-19400m to 148000m along the proposed alignment.
8.	Grazing grounds		√	No Grazing ground along the project road.
9.	Barren Land		√	No Barren land along the project road.

C. Specific description of the Road Environment

(Note: Questions number 1, 4, 5, 7 and 8 must be answered after discussions with the local community people)

S. No.	Parameter/ Component	Yes	No	Explanation
1.	Are there any areas with landslide or erosion problems along the road? (*If yes, indicate the location (right or ft side) and the chainage)*		√	No part of the project road lies in hilly terrain prone to landslide or erosion. However, sufficient cross drainage structures will be constructed to avoid any erosion. ( ) No Secondary Information is available and Local Community is not aware of this matter
2.	Are there any lakes/swamps beside the road? (*If yes, list them indicating the location (right or left side) and the chainage)*	√		There was found pond between Ch-8000m to Ch-1000m LHS along the proposed alignment.
3.	Are there any nallas/streams/rivers etc. along/crossing the road? (*If yes, list them indicating the location (right, left or crossing) and the chainage*	√		A few water crossing has been observed between at Ch-200m to Ch-300m, Ch-1300m to Ch-1400m and Ch-2600m to Ch-2700 Existing CD has been proposed on above mentioned locations and Ch-1200m to Ch-1300m, Ch-1300m to Ch-1400m and Ch-2800m to Ch-2900m has been CD proposed along the proposed alignment.
4.	Are there problems of water stagnation and other drainage issues on or near the road? (*If yes, mention chainage)*	√		There are at some points of water stagnation and other drainage issues on or near the road which is discussed above S.No.3. ( ) No Secondary Information is available and Local Community is not aware of this matter
5.	Is the area along the project road prone to flooding? *(If yes, mention flood level and frequency)*		√	There are not found any flood prone area along the project road. ( ) No Secondary Information is available and Local Community is not aware of this matter
6.	Are there any trees with a dbh of 30 cm or more within 10 m on either side from the center ine of the road alignment? (*If yes attach list of trees indicating the location (right or left side)and the chainage*)	√		There are 454 trees of dbh of 30 cm or more as attached in <u>Attachment I.</u> 04 Tree affected

S. No.	Parameter/ Component	Yes	No	Explanation
7.	Along the road and within 100m of the road shoulder, are there any faunal habitat areas, faunal breeding ground, bird migration area, or other similar areas? *(If yes, specify details of habitat with chainage)*		√	There was not found any faunal habitat at 100 m of the road shoulder. ( ) No Secondary Information is available and Local Community is not aware of this matter
8.	Along the road and within 100m of the road shoulder is there any evidence of floral and faunal species that are classified as endangered species?		√	No rare, endangered or threatened species were found within 100 m of the road shoulder. ( ) No Secondary Information Available and Local Community is not aware of this matter
9.	Are there any utility structures[22] within 10 m on either side from the center line of the road alignment? *(If yes, attach list with chainage)*	√		There are few utility structures found as listed in Attachment II.
10.	Are there any religious, cultural or community structures/buildings[23] within 10 m on either side from the center line of the road alignment? *(If yes attach list with chainage)*	√		Few religious cultural or community structures/buildings were found as listed in Attachment III.

D. Public Consultation

S No.	Consultation Activities	Yes	No	Remarks
1.	Consultation with local community was conducted before finalizing the alignment. *(Attach list of people met and dates)*	√		Yes, consulting held with the community.
2.	Any suggestion received in finalizing the alignment		√	NA
3.	If suggestions received, were they incorporated into the design.		√	NA

E. Please attach the following:

a) Sketch a map showing the bridge and the trees
b) List of trees indicating location (left or right side of the road) and chainage (as required under C. 6)
c) List of utility structures indicating location (left or right side of the road) and chainage (as required under C. 9)
d) List of community structures indicating location (left or right side of the road) and chainage (as required under C. 10)
e) Sketch of strip map of the road covering details of at least 10 m on either side from the center line of the road
f) Photographs of the project area showing at least 10 m on either side from center line of road alignment. Every 2 km or less of road must have at least 1 photograph.

[22] Water tap, hand pump, electric pole, telephone pole, water pipe and other similar strucutures.
[23] Mandir, Masjid, Church, religious/cultural/historical monuments, school, health center, public toilet and other similar structures.

Attachment I : List of Trees

Chainage			Left	Right
0	-	200	6	1
200	-	400	-	3
400	-	600	2	-
600	-	800	1	1
800	-	1000	2	1
1000	-	1200	-	2
1200	-	1400	-	1
1400	-	1600	1	3
2000	-	2200	18	14
2200	-	2400	12	10
2400	-	2600	2	5
2600	-	2800	-	2
3200	-	3400	1	-
3800	-	4000	1	2
4000	-	4200	2	4
4400	-	4600	6	-
5000	-	5200	2	1
6200	-	6400	1	1
6800	-	7000	-	3
8000	-	8200	6	4
8600	-	8800	4	3
8800	-	9000	6	8
9200	-	9400	-	6
9400	-	9600	8	6
9600	-	9800	4	2
9800	-	10000	7	-
10000	-	10200	4	3
10400	-	10600	6	6
10600	-	10800	6	6
10800	-	11000	4	6
11000	-	11200	-	3
11200	-	11400	8	8
11600	-	11800	10	4
11800	-	12000	2	4
12200	-	12400	3	4
12400	-	12600	4	6
12800	-	13000	4	2
13200	-	13400	6	1
13400	-	13600	6	4
13800	-	14000	2	6
14200	-	14400	4	2
14400	-	14600	8	8
14600	-	14800	-	2
15000	-	15200	3	3
15200	-	15400	4	2
15400	-	15600	9	6
16400	-	16600	3	-

Chainage			Left	Right
16600	-	16800	6	3
17200	-	17400	3	2
17400	-	17600	6	3
17600	-	17800	1	1
18000	-	18200	8	6
18400	-	18600	8	6
18600	-	18800	4	6
19000	-	19200	6	4
19400	-	19600	6	4
19600	-	19800	8	5
20200	-	20300	-	1
Total			**244**	**210**

Attachment II: List of Utilities

Chainage			Left	Right
0	-	200	-	-
400	-	600	EP, HP	-
800	-	1000	Pond	-
2000	-	2200	3 EP	2 EP
2200	-	2400	-	3 EP
2400	-	2600	HP	EP
3200	-	3400	-	EP
9200	-	9400	-	HP
11200	-	11400	-	HP
11800	-	12000	-	Solar plate
20000	-	20200	-	Solar plate

Attachment III: List of Community Structures

Chainage			Left	Right
2400	-	2600	School	-
3200	-	3400	-	School
9200	-	9400	-	Platform
11600	-	11800	-	School
20000	-	20200	School, Anganbadi	-

Attachment-IV

Left					Chainage (M)			Right				
8 to 10m	**6 to 8m**	**4 to 6m**	**2 to 4m**	**0 to 2m**				**0 to 2m**	**2 to 4m**	**4 to 6m**	**6 to 8m**	**8 to 10m**
-	-	6 Tree	-	-	0	-	200	-	1 Tree	-	-	-
-	-	-	-	-	200	-	400	-	3 Tree	-	-	-
-	-	2 Tree, EP	HP	-	400	-	600	-	-	-	-	-
-	-	1 Tree	-	-	600	-	800	-	1 Tree	-	-	-
Pond	-	2 Tree	-	-	800	-	1000	-	-	1 Tree	-	-
-	-	-	-	-	1000	-	1200	-	-	2 Tree	-	-
-	-	-	-	-	1200	-	1400	-	-	1 Tree	-	-
-	-	1 Tree	-	-	1400	-	1600	-	2 Tree	1 Tree	-	-
8 Tree	-	10 Tree, 2 EP	EP	-	2000	-	2200	-	2 EP	6 Tree	8 Tree	-
-	-	12 Tree	-	-	2200	-	2400	-	4 Tree	-	6 Tree, 3 EP	-
School	HP	2 Tree	-	-	2400	-	2600	-	2 Tree	3 Tree, EP	-	-
-	-	-	-	-	2600	-	2800	-	-	2 Tree	-	-
-	-	1 Tree	-	-	3200	-	3400	-	-	EP, School	-	-
-	1 Tree	-	-	-	3800	-	4000	-	2 Tree	-	-	-
-	-	-	2 Tree	-	4000	-	4200	-	-	4 Tree	-	-
-	-	6 Tree	-	-	4400	-	4600	-	-	-	-	-
-	-	-	2 Tree	-	5000	-	5200	-	1 Tree	-	-	-
-	-	-	1 Tree	-	6200	-	6400	-	1 Tree	-	-	-
-	-	-	-	-	6800	-	7000	-	-	3 Tree	-	-
6 Tree	-	-	-	-	8000	-	8200	-	-	4 Tree	-	-
4 Tree	-	-	-	-	8600	-	8800	-	-	3 Tree	-	-
-	-	6 Tree	-	-	8800	-	9000	-	2 Tree	-	-	6 Tree
-	-	-	-	-	9200	-	9400	-	Platform	-	HP	6 Tree
-	-	8 Tree	-	-	9400	-	9600	-	-	6 Tree	-	-
-	2 Tree	1 Tree	-	1 Tree	9600	-	9800	-	-	2 Tree	-	-
-	-	3 Tree	4 Tree	-	9800	-	10000	-	-	-	-	-
-	-	4 Tree	-	-	10000	-	10200	-	-	-	-	3 Tree
-	-	-	6 Tree	-	10400	-	10600	-	-	6 Tree	-	-
-	-	4 Tree	2 Tree	-	10600	-	10800	-	-	-	6 Tree	-
-	-	-	4 Tree	-	10800	-	11000	-	-	6 Tree	-	-
-	-	-	-	-	11000	-	11200	-	3 Tree	-	-	-
-	-	8 Tree	-	-	11200	-	11400	-	-	2 Tree, HP	-	6 Tree
-	-	-	10 Tree	-	11600	-	11800	-	4 Tree	-	-	School
-	-	2 Tree	-	-	11800	-	12000	-	-	-	4 Tree, Solar plat	-
-	-	-	3 Tree	-	12200	-	12400	-	-	-	-	4 Tree
-	-	4 Tree	-	-	12400	-	12600	-	-	6 Tree	-	-
-	-	-	4 Tree	-	12800	-	13000	-	2 Tree	-	-	-
-	-	6 Tree	-	-	13200	-	13400	-	-	1 Tree	-	-

Left					Chainage (M)			Right				
8 to 10m	**6 to 8m**	**4 to 6m**	**2 to 4m**	**0 to 2m**				**0 to 2m**	**2 to 4m**	**4 to 6m**	**6 to 8m**	**8 to 10m**
-	-	-	6 Tree	-	13400	-	13600	-	-	4 Tree	-	-
-	-	-	-	-	13600	-	13800	-	-	-	-	-
-	-	-	2 Tree	-	13800	-	14000	-	-	-	6 Tree	-
-	-	4 Tree	-	-	14200	-	14400	-	2 Tree	-	-	-
-	-	-	8 Tree	-	14400	-	14600	-	-	-	8 Tree	-
-	-	-	-	-	14600	-	14800	-	2 Tree	-	-	-
3 Tree	-	-	-	-	15000	-	15200	-	-	3 Tree	-	-
-	-	4 Tree	-	-	15200	-	15400	-	2 Tree	-	-	-
-	-	8 Tree	1 Tree	-	15400	-	15600	-	6 Tree	-	-	-
-	-	3 Tree	-	-	16400	-	16600	-	-	-	-	-
-	-	6 Tree	-	-	16600	-	16800	-	3 Tree	-	-	-
3 Tree	-	-	-	-	17200	-	17400	-	-	2 Tree	-	-
-	-	6 Tree	-	-	17400	-	17600	-	-	3 Tree	-	-
-	-	-	1 Tree	-	17600	-	17800	-	1 Tree	-	-	-
-	-	8 Tree	-	-	18000	-	18200	-	-	-	6 Tree	-
-	-	8 Tree	-	-	18400	-	18600	-	-	6 Tree	-	-
-	-	4 Tree	-	-	18600	-	18800	-	-	-	-	6 Tree
-	6 Tree	-	-	-	19000	-	19200	-	4 Tree	-	-	-
-	-	-	3 Tree	-	19400	-	19600	-	-	4 Tree	-	-
6 Tree	-	-	-	2 Tree	19600	-	19800	1 Tree	-	4 Tree	-	-
School, Anganbadi	-	-	-	-	20000	-	20200	-	-	-	Solar plate	-
-	-	-	-	-	20200	-	20300	-	-	-	-	1 Tree

Chainage wise Transect Walk Findings

Chainage (m)			Existing Land Width (M)	Additional Land Required		Losses		Type of loss		Village	Remarks/Suggestions
				LHS	RHS	LHS	RHS	LHS	RHS		
0	-	200	8 m	-	-	-	-	-	-	-	Curve LHS, EP RHS
200	-	400	8 m	-	-	-	-	-	-	-	Curve RHS
400	-	600	8 m	-	-	-	-	-	-	-	HP, EP LHS
600	-	800	8 m	-	-	-	-	-	-	-	Curve LHS
800	-	1000	8 m	-	-	-	-	-	-	-	Existing CD and Proposed CD, Pond LHS, Curve RHS
1000	-	1200	8 m	-	-	-	-	-	-	-	-
1200	-	1400	8 m	-	-	-	-	-	-	-	Curve LHS
1400	-	1600	8 m	-	-	-	-	-	-	-	Proposed CD, Curve RHS
1600	-	1800	8 m	-	-	-	-	-	-	-	-
1800	-	2000	8 m	-	-	-	-	-	-	-	Curve LHS
2000	-	2200	8 m	-	-	-	-	-	-	-	2 EP LHS, 2 EP RHS
2200	-	2400	8 m	-	-	-	-	-	-	-	EP LHS, 3 EP RHS
2400	-	2600	8 m	-	-	-	-	-	-	-	School, HP LHS, EP RHS
2600	-	2800	8 m	-	-	-	-	-	-	-	Existing CD
2800	-	3000	8 m	-	-	-	-	-	-	-	S curve, Curve RHS
3000	-	3200	8 m	-	-	-	-	-	-	-	Proposed CD
3200	-	3400	8 m	-	-	-	-	-	-	-	School, EP, Curve RHS
3400	-	3600	8 m	-	-	-	-	-	-	-	-
3600	-	3800	8 m	-	-	-	-	-	-	-	Existing CD
3800	-	4000	8 m	-	-	-	-	-	-	-	Existing CD, Curve LHS
4000	-	4200	8 m	-	-	-	-	-	-	-	Existing CD
4200	-	4400	8 m	-	-	-	-	-	-	-	Existing CD
4400	-	4600	8 m	-	-	-	-	-	-	-	Existing CD
4600	-	4800	8 m	-	-	-	-	-	-	-	Proposed CD
4800	-	5000	8 m	-	-	-	-	-	-	-	-
5000	-	5200	8 m	-	-	-	-	-	-	-	Proposed CD
5200	-	5400	8 m	-	-	-	-	-	-	-	Proposed CD
5400	-	5600	8 m	-	-	-	-	-	-	-	Proposed CD
5600	-	5800	8 m	-	-	-	-	-	-	-	Proposed CD
5800	-	6000	8 m	-	-	-	-	-	-	-	Proposed CD
6000	-	6200	8 m	-	-	-	-	-	-	-	Proposed CD
6200	-	6400	8 m	-	-	-	-	-	-	-	Proposed 2 CD
6400	-	6600	8 m	-	-	-	-	-	-	-	Proposed CD
6600	-	6800	8 m	-	-	-	-	-	-	-	Proposed CD
6800	-	7000	8 m	-	-	-	-	-	-	-	Proposed CD
7000	-	7200	8 m	-	-	-	-	-	-	-	Proposed CD
7200	-	7400	8 m	-	-	-	-	-	-	-	Proposed CD
7400	-	7600	8 m	-	-	-	-	-	-	-	Proposed CD
7600	-	7800	8 m	-	-	-	-	-	-	-	
7800	-	8000	8 m	-	-	-	-	-	-	-	Proposed CD
8000	-	8200	8 m	-	-	-	-	-	-	-	
8200	-	8400	8 m	-	-	-	-	-	-	-	
8400	-	8600	8 m	-	-	-	-	-	-	-	Proposed 2 CD
8600	-	8800	8 m	-	-	-	-	-	-	-	Proposed CD
8800	-	9000	8 m	-	-	-	-	-	-	-	-
9000	-	9200	8 m	-	-	-	-	-	-	-	-
9200	-	9400	8 m	-	-	-	-	-	-	-	Junction, 2nd Alignment, HP RHS
9400	-	9600	8 m	-	-	-	-	-	-	-	Junction
9600	-	9800	8 m	-	-	-	-	-	-	-	-
9800	-	10000	8 m	-	-	-	-	-	-	-	Proposed CD
10000	-	10200	8 m	-	-	-	-	-	-	-	Proposed CD
10200	-	10400	8 m	-	-	-	-	-	-	-	Curve RHS

Chainage (m)			Existing Land Width (M)	Additional Land Required		Losses		Type of loss		Village	Remarks/Suggestions
				LHS	RHS	LHS	RHS	LHS	RHS		
10400	-	10600	8 m	-	-	-	-	-	-	-	-
10600	-	10800	8 m	-	-	-	-	-	-	-	Curve LHS
10800	-	11000	8 m	-	-	-	-	-	-	-	-
11000	-	11200	8 m	-	-	-	-	-	-	-	-
11200	-	11400	8 m	-	-	-	-	-	-	-	HP RHS
11400	-	11600	8 m	-	-	-	-	-	-	-	-
11600	-	11800	8 m	-	-	-	-	-	-	-	School RHS
11800	-	12000	8 m	-	-	-	-	-	-	-	Commanding room LHS, Solar plate RHS
12000	-	12200	8 m	-	-	-	-	-	-	-	Proposed CD
12200	-	12400	8 m	-	-	-	-	-	-	-	Proposed CD
12400	-	12600	8 m	-	-	-	-	-	-	-	-
12600	-	12800	8 m	-	-	-	-	-	-	-	-
12800	-	13000	8 m	-	-	-	-	-	-	-	Proposed CD
13000	-	13200	8 m	-	-	-	-	-	-	-	-
13200	-	13400	8 m	-	-	-	-	-	-	-	Curve LHS
13400	-	13600	8 m	-	-	-	-	-	-	-	-
13600	-	13800	8 m	-	-	-	-	-	-	-	Proposed CD
13800	-	14000	8 m	-	-	-	-	-	-	-	-
14000	-	14200	8 m	-	-	-	-	-	-	-	-
14200	-	14400	8 m	-	-	-	-	-	-	-	Proposed CD
14400	-	14600	8 m	-	-	-	-	-	-	-	-
14600	-	14800	8 m	-	-	-	-	-	-	-	-
14800	-	15000	8 m	-	-	-	-	-	-	Sargod	Proposed CD
15000	-	15200	8 m	-	-	-	-	-	-	-	-
15200	-	15400	8 m	-	-	-	-	-	-	-	-
15400	-	15600	8 m	-	-	-	-	-	-	-	Curve LHS
15600	-	15800	8 m	-	-	-	-	-	-	-	Curve RHS
15800	-	16000	8 m	-	-	-	-	-	-	-	-
16000	-	16200	8 m	-	-	-	-	-	-	-	-
16200	-	16400	8 m	-	-	-	-	-	-	-	Curve RHS
16400	-	16600	8 m	-	-	-	-	-	-	-	Proposed CD
16600	-	16800	8 m	-	-	-	-	-	-	-	Proposed CD, Curve LHS
16800	-	17000	8 m	-	-	-	-	-	-	-	Proposed CD
17000	-	17200	8 m	-	-	-	-	-	-	-	Proposed CD
17200	-	17400	8 m	-	-	-	-	-	-	-	-
17400	-	17600	8 m	-	-	-	-	-	-	-	-
17600	-	17800	8 m	-	-	-	-	-	-	-	Proposed CD
17800	-	18000	8 m	-	-	-	-	-	-	-	Proposed CD
18000	-	18200	8 m	-	-	-	-	-	-	-	Proposed CD
18200	-	18400	8 m	-	-	-	-	-	-	-	
18400	-	18600	8 m	-	-	-	-	-	-	-	Curve LHS
18600	-	18800	8 m	-	-	-	-	-	-	-	Proposed CD
18800	-	19000	8 m	-	-	-	-	-	-	-	-
19000	-	19200	8 m	-	-	-	-	-	-	-	-
19200	-	19400	8 m	-	-	-	-	-	-	-	-
19400	-	19600	8 m	-	-	-	-	-	-	-	Curve RHS
19600	-	19800	8 m	-	-	-	-	-	-	-	Proposed CD
19800	-	20000	8 m	-	-	-	-	-	-	Bagdhara	Proposed CD
20000	-	20200	8 m	-	-	-	-	-	-	Bagdhara	School, Anganbadi LHS, Solar plate RHS
20200	-	20300	8 m	-	-	-	-	-	-	Bagdhara	EP LHS

RURAL ROADS: ENVIRONMENTAL CHECKLIST

Road Name**:** **L065-Bicharpur To Uslapur Singhanpur**

Block Name: **Mungeli**

District Name: **Mungeli**

Total Length of the Road: **8.60 Km (Surveyed Length)**

Package No. **CG02108**

A. Climatic Conditions

Temperature	High: **(May)** Low: **°C (Dec)**
Humidity	High: **(Aug)** Low: **%**
Rainfall Rainy Season	mm/year **June** to **September**

B. Location of the Road and Generic description of Environment

No.	Type of Ecosystem	Yes	No	Explanation
1.	Coastal area Mangrove (along roadside)		√	Distance from Coastline: km ( ) more than 50% ( ) less than 20%
2.	Type of Terrain-(Plain/Hilly/ Mountainous etc.) *(Explain the topography of the area and how many km of the road are located in the hilly area)*		√	Altitude: The topography of the project road is flat at almost all locations.
3.	Forest Area *(Explain whether the road passes through forest areas or located along the forest areas and distance from shoulder to the forest area)?*		√	Type of Vegetation: Legal Status of the Forest Area: *(Reserved, National Park, Sanctuaries, Unclassified, etc.)* No part of the project road passes through any forest area.
4.	Wildlife (*Explain whether there are any wildlife species in the project area*)		√	Name of animals: NA Endangered species (if any): None
5.	Inhabited Area	√		Inhabited area lies between Ch-00m to Ch-400m, Ch-3000m to Ch-3200m,Ch-5000m to Ch-5200m, Ch-8500m to Ch-6200m and Ch-7600m to Ch-8600m with connecting village Bicharpur, Chuchurungpur, Manpur, Bhimpur and Uslapur respectively.
6.	Agricultural Land	√		The agriculture land lies between Ch-400m to Ch-3000m, Ch-3200m to Ch-5200m Ch-5200m to Ch-5800m, Ch-6200m to Ch-7600m and Ch-7800m to Ch-8400m both side along the proposed alignment.
7.	Grazing grounds		√	No Grazing ground along the proposed alignment.
8.	Barren Land		√	No Barren land along the project road.

C. Specific description of the Road Environment

(Note: Questions number 1, 4, 5, 7 and 8 must be answered after discussions with the local community people)

No.	Parameter/ Component	Yes	No	Explanation
1.	Are there any areas with landslide or erosion problems along the road? (*If yes, indicate the location (right or left side) and the chainage)*		√	No part of the project road is passing through hilly terrain prone to landslide or erosion. However, sufficient cross drainage structures will be constructed to avoid any erosion. ( ) No Secondary Information is available and Local Community is not aware of this matter
2.	Are there any lakes/swamps beside the road? (*If yes, list them indicating the location (right or left side) and the chainage)*	√		There is Pond between Ch-2600m to Ch-2800m RHS, Ch-5000m to Ch-5200m LHS and Ch-7900m to Ch-7600 RHS along the C/L of alignment.
3.	Are there any nallas/streams/rivers etc. along/crossing the road? (*If yes, list them indicating the location (right, left or crossing) and the chainage*	√		Few water bodies are crossing the proposed alignment and cross drainage structures are provided at these locations. Proposed CD: Ch-00m to CH-200, Ch-200m to Ch-400m, Ch-400m to Ch-600m, Ch-1200m to CH-1400m, Ch-1600m to Ch-1800m, Ch-1800m to Ch-2000m, Ch-2000m to Ch-2200m-2,Ch-2200m to Ch-2400m, Ch-2400m to Ch-2600m-2, Ch-2800m to Ch-3000m, Ch-3000m to Ch-3200m-2, Ch-3400m to Ch-3600m, Ch-3800m to Ch-4000m, Ch-4000m to Ch-4200m, Ch-4800m to Ch-5000m, Ch-5000m to Ch-5200m, Ch-5400m to Ch-5600m, Ch-5600m to Ch-5800m-2, Ch-6400m to Ch-6600m and Ch-6800m to Ch-7000m. Existing CD: Ch-4400m to Ch-4600m
4.	Are there problems of water stagnation and other drainage issues on or near the road? (*If yes, mention chainage)*	√		There are some points of water stagnation and other drainage issues on or near the road which is discussed above S. No.3 along the proposed alignment. ( ) No Secondary Information is available and local Community is not aware of this matter
5.	Is the area along the project road prone to flooding? *(If yes, mention flood level and frequency)*	√		No flood prone area is observed along the proposed alignment except as discussed in S.No.3. ( ) No Secondary Information is available and local Community is not aware of this matter
6.	Are there any trees with a dbh of 30 cm or more within 10 m on either side from the center line of the road alignment? (*If yes attach list of trees indicating the location (right or left side)and the chainage*)	√		There are 64 trees of 30 cm dbh or more within 10m from C/L on both sides along the proposed alignment. Tree locations and distance from C/l is given in Attachment I. There is 01 tree loss identified at the alignment.
7.	Along the road and within 100m of the road shoulder, are there any faunal habitat areas, faunal breeding ground, bird migration area, or other similar areas? *(If yes, specify details of habitat with chainage)*		√	No Faunal Habitat Area, Faunal breeding ground and bird migration areas exist within 100 m of the road shoulder on both sides along the proposed alignment. ( ) No Secondary Information is available and local Community is not aware of this matter
8.	Along the road and within 100m of the road shoulder is there any evidence of floral and faunal species that are classified as endangered species?		√	No evidence of rare, endangered or threatened species are noticed or informed within 100 m of the road shoulder on both sides along the proposed alignment. ( ) No Secondary Information Available and Local Community is not aware of this matter

No.	Parameter/ Component	Yes	No	Explanation
9.	Are there any utility structures[24] within 10 m on either side from the center line of the road alignment? *(If yes, attach list with chainage)*	√		There are few utility structures observed during the transect walk. The location and type of utility structure along with their approximate distance from C/L is given in Attachemnt
10.	Are there any religious, cultural or community structures/buildings[25] within 10 m on either side from the center line of the road alignment? *(If yes attach list with chainage)*	√		Few religious cultural or community structures/buildings observed during the transect walk. The location and type of utility structure along with their approximate distance from C/L of proposed alignment is listed in Attachment III.

D. Public Consultation

S.No.	Consultation Activities	Yes	No	Remarks
1.	Consultation with local community was conducted before finalizing the alignment. ***(Attach list of people met and dates)***	√		Yes, consultation with the community was held on 23/12/13. Participants list is attached with CPF document
2.	Any suggestion received in finalizing the alignment		√	
3.	If suggestions received, were they incorporated into the design.	√		PIU will incorporate their suggestion in DPR

E. Please attach the following:

1) Sketch a map showing the bridge and the trees
2) List of trees indicating location (left or right side of the road) and chainage (as required under C. 6)
3) List of utility structures indicating location (left or right side of the road) and chainage (as required under C. 9)
4) List of community structures indicating location (left or right side of the road) and chainage (as required under C. 10)
5) Sketch of strip map of the road covering details of at least 10 m on either side from the center line of the road
6) Photographs of the project area showing at least 10 m on either side from center line of road alignment. Every 2 km or less of road must have at least 1 photograph.

[24] Water tap, hand pump, electric pole, telephone pole, water pipe and other similar structures.

[25] Mandir, Masjid, Church, religious/cultural/historical monuments, school, health center, public toilet and other similar structures.

Attachment I: List of Trees

Chainage			Left	Right
200	-	400	1	-
800	-	1000	1	-
3000	-	3200	2	3
3200	-	3400	-	7
3400	-	3600	-	2
4800	-	5000	6	-
5000	-	5200	-	1
5600	-	5800	2	-
6400	-	6600	4	-
6600	-	6800	1	-
7000	-	720	7	2
7200	-	7400	9	3
7400	-	7600	8	-
7600	-	7800	1	1
7800	-	8000	11	-
8200	-	8400	3	1
8400	-	8600	5	3
Total			**61**	**23**

Attachment II: List of Utilities

Chainage			Left	Right
0	-	200	EP	2 EP
200	-	400	3 EP, HP	EP
400	-	600	3 EP, HP	-
1200	-	1400	-	EP
2000	-	2200	-	EO
2600	-	2800	EP, HP	Pond
3000	-	3200	2 EP	EP
3200	-	3400	EP	-
5000	-	5200	Pond, EP	HP
5600	-	5800	Tube well	-
5800	-	6000	EP	2 EP, HP
6000	-	6200	EO	2 EP
6600	-	6800	EP	-
7600	-	7800	HP	-
7800	-	8000	2 EP, HP	HP, EP
8400	-	8600	-	DP

Attachment III: List of Community Structures

Chainage			Left	Right
200	-	400	GP, Community hall jaikham	-
400	-	600	School	-
2800	-	3000	School	-
5200	-	5400	School	Gouthan
6200	-	6400	Atalchouk, Leed godam	-

Attachment-IV

Left					Chainage (M)			Right				
8 to 10m	**6 to 8m**	**4 to 6m**	**2 to 4m**	**0 to 2m**				**0 to 2m**	**2 to 4m**	**4 to 6m**	**6 to 8m**	**8 to 10m**
-	-	EP	-	-	0	-	200	-	EP	EP	-	-
-	GP, Community hall, Jaikham	1 Tree, EP, HP	EP	-	200	-	400	-	-	EP	-	-
-	School	2 EP	EP	-	400	-	600	-	-	-	-	-
-	-	-	1 Tree	-	800	-	1000	-	-	-	-	-
-	**-**	-	-	**-**	1200	-	1400	**-**	**-**	**EP**	**-**	**-**
-	-	-	-	-	2000	-	2200	-	EP	-	-	-
EP	-	HP	-	-	2600	-	2800	-	-	Pond	-	-
School(20-25m)	-	-	-	-	2800	-	3000	-	-	-	-	-
-	EP	2 Tree	EP	-	3000	-	3200	-	3 Tree	-	EP	-
-	-	-	EP	-	3200	-	3400	-	-	7 Tree	-	-
-	-	-	-	-	3400	-	3600	-	2 Tree	-	-	-
-	-	6 Tree	-	-	4800	-	5000	-	-	-	-	-
-	Pond	EP	-	-	5000	-	5200	-	1 Tree	HP	-	-
School(15-20m)	-	-	-	-	5200	-	5400	-	-	-	-	Gouthan
Tube well	-	-	2 Tree	-	5600	-	5800	-	-	-	-	-
-	EP	-	-	-	5800	-	6000	-	-	2 EP	HP	-
-	-	EP	-	-	6000	-	6200	-	-	EP	EP	-
-	Leed godam	-	Atalchouk	-	6200	-	6400	-	-	-	-	-
-	-	-	4 Tree	-	6400	-	6600	-	-	-	-	-
-	-	EP	1 Tree	-	6600	-	6800	-	-	-	-	-
-	-	-	6 Tree	1 Tree	7000	-	720	-	2 Tree	-	-	-
-	-	9 Tree	-	-	7200	-	7400	-	3 Tree	-	-	-
-	-	-	8 Tree	-	7400	-	7600	-	-	-	-	-
-	-	HP	1 Tree	-	7600	-	7800	-	1 Tree	-	-	-
-	6 Tree	1 Tree, HP	4 Tree, 2 EP	-	7800	-	8000	-	HP, EP	-	-	-
-	-	3 Tree	-	-	8200	-	8400	-	-	1 Tree	-	-
-	-	4 Tree	1 Tree	-	8400	-	8600	-	3 Tree	DP	-	-

E.P. Electric Pole, H.P. – Hand Pump, T.W.; Tube Well, P.H.C; Primary Health Center
A.L. – Agricultural Land; C.D. – Cross Drainage structure, W.T.—Water Tank

Chainage wise Transect Walk Findings

Chainage (m)			Existing Land Width (M)	Additional Land Required		Losses		Type of loss		Village	Remarks /suggestion
				LHS	RHS	LHS	RHS	LHS	RHS		
0	-	200	8	-	-	-	-	-	-	Bicharpur	Proposed CD, EP LHS, 2 EP RHS
200	-	400	8	-	-	-	-	-	-	Bicharpur	3 EP, HP, GP, Community hall, Jaitkham LHS, EP RHS, Proposed CD
400	-	600	8	-	-	-	-	-	-	-	Proposed CD, 3 EP, School LHS, Curve RHS
600	-	800	8	-	-	-	-	-	-	-	-
800	-	1000	8	-	-	-	-	-	-	-	Junction
1000	-	1200	8	-	-	-	-	-	-	-	-
1200	-	1400	8	-	-	-	-	-	-	-	Proposed CD, EP, Junction RHS
1400	-	1600	8	-	-	-	-	-	-	-	-
1600	-	1800	8	-	-	-	-	-	-	-	Proposed CD
1800	-	2000	8	-	-	-	-	-	-	-	Proposed CD
2000	-	2200	8	-	-	-	-	-	-	-	Proposed 2 CD, EP RHS
2200	-	2400	8	-	-	-	-	-	-	-	Proposed CD, Curve LHS
2400	-	2600	8	-	-	-	-	-	-	-	Proposed 2 CD, EP RHS
2600	-	2800	8	-	-	-	-	-	-	-	EP, HP LHS, Pond RHS
2800	-	3000	8	-	-	-	-	-	-	-	Proposed CD, School LHS
3000	-	3200	8	-	-	-	-	-	-	Chuchrungpur	Proposed CD, Junction, 2 EP, Curve LHS
3200	-	3400	8	-	-	-	-	-	-	-	EP RHS
3400	-	3600	8	-	-	-	-	-	-	-	Proposed CD, Curve RHS
3600	-	3800	8	-	-	-	-	-	-	-	-
3800	-	4000	8	-	-	-	-	-	-	-	Proposed CD canal. Junction
4000	-	4200	8	-	-	-	-	-	-	-	Proposed CD
4200	-	4400	8	-	-	-	-	-	-	-	-
4400	-	4600	8	-	-	-	-	-	-	-	Existing CD, Junction
4600	-	4800	8	-	-	-	-	-	-	-	-
4800	-	5000	8	-	-	-	-	-	-	-	Proposed CD
5000	-	5200	8	-	-	-	-	-	-	Manpur	Pond, EP LHS, HO RHS, Proposed CD, Junction
5200	-	5400	8	-	-	-	-	-	-	-	School LHS, Gouthan
5400	-	5600	8	-	-	-	-	-	-	-	Proposed CD
5600	-	5800	8	-	-	-	-	-	-	-	Proposed 2 CD, Tune well
5800	-	6000	8	-	-	-	-	-	-	Bhimpur	2 EP, HP RHS, EP LHS
6000	-	6200	8	-	-	-	-	-	-	Bhimpur	2 EP RHS, EP LHS
6200	-	6400	8	-	-	-	-	-	-	-	Junction, Atalchouk, Leed godam LHS
6400	-	6600	8	-	-	-	-	-	-	-	Proposed CD
6600	-	6800	8	-	-	-	-	-	-	-	EP LHS
6800	-	7000	8	-	-	-	-	-	-	-	Proposed CD, Junction
7000	-	7200	8	-	-	-	-	-	-	-	-
7200	-	7400	8	-	-	-	-	-	-	-	-
7400	-	7600	8	-	-	-	-	-	-	-	junction, Pond RHs
7600	-	7800	5	-	-	-	-	-	-	Usalapur	Proposed CC road, HP LHS
7800	-	8000	8	-	-	-	-	-	-	Usalapur	2 EP, HP LHS, HP, EP, Curve RHS
8000	-	8200	8	-	-	-	-	-	-	Usalapur	-
8200	-	8400	8	-	-	-	-	-	-	Usalapur	Junction
8400	-	8600	5	-	-	-	-	-	-	Usalapur	Proposed CC road, DP LHS, Junction, School RHS

RURAL ROADS: ENVIRONMENTAL CHECKLIST

Road Name: L074-KATRA RD TO BARGAWA LUSADA KEDADAND

Block Name: Kota

District Name: Bilaspur

Total Length of the Road: 1.44 km

A. Climatic Conditions

Temperature	High: **(May)** Low: **°C (Dec)**
Humidity	High: % **(Aug)** Low: **%**
Rainfall Rainy Season	mm/year **June** to **September**

B. Location of the Road and Generic description of Environment

S. No.	Type of Ecosystem	Yes	No	Explanation
1.	Coastal area Mangrove (along roadside)		√	Distance from Coastline: km ( ) more than 50% ( ) less than 20%
2.	Type of Terrain-(Plain/Hilly/ Mountainous etc.) *(Explain the topography of the area and how many km of the road are located in the hilly area)*		√	Altitude: The topography of the project road is flat at almost all locations.
3.	Forest Area *(Explain whether the road passes through forest areas or located along the forest areas and distance from shoulder to the forest area)?*	√		There was found forest area between at Ch-00m to Ch-1440m LHS along the project road. Type of Vegetation: Legal Status of the Forest Area: Unclassified *(Reserved, National Park, Sanctuaries, Unclassified, etc.)*
4.	Wildlife (*Explain whether there are any wildlife species in the project area*)		√	Name of animals: NA Endangered species (if any): None
5.	Inhabited Area	√		The project road is passing through village namely Tatidhar between Ch-300m to Ch-400m, Ch-1200m to Ch-1400m respectively.
6.	Agricultural Land	√		The agriculture land lies between Ch-00m to Ch-1200m RHS and Ch-1200m to Ch-1400m both side along the proposed alignment.
7.	Grazing grounds		√	No Grazing ground along the project road.
8.	Barren Land		√	No Barren land along the project road.

C. Specific description of the Road Environment

(Note: Questions number 1, 4, 5, 7 and 8 must be answered after discussions with the local community people)

S. No.	Parameter/ Component	Yes	No	Explanation
1.	Are there any areas with landslide or erosion problems along the road? (*If yes, indicate the location (right or left side) d the chainage)*		√	No part of the project road lies in hilly terrain prone to landslide or erosion. However, sufficient cross drainage structures will be constructed to avoid any erosion. ( ) No Secondary Information is available and Local Community is not aware of this matter
2.	Are there any lakes/swamps beside the road? (*If yes, list them indicating the location (right or left side) and the chainage)*		√	There was not found any pond along the proposed alignment.
3.	Are there any nallas/streams/rivers etc. along/crossing the road? (*If yes, list them indicating the location (right, left or crossing) and the chainage*	√		A few water crossing has been observed between at Ch-100m to Ch-200m, Ch-600m to Ch-700m, Ch-1200m to Ch-1300m , Ch-1300m to Ch-1400m CD has been proposed on above mentioned locations and Ch-900m to Ch-1000m has been Existing CD.
4.	Are there problems of water stagnation and other drainage issues on or near the road? (*If yes, mention chainage*)	√		There are at some points of water stagnation and other drainage issues on or near the road which is discussed above S.No.3. ( ) No Secondary Information is available and Local Community is not aware of this matter
5.	Is the area along the project road prone to flooding? *(If yes, mention flood level and frequency)*		√	There are not found any flood prone area along the project road. ( ) No Secondary Information is available and Local Community is not aware of this matter
6.	Are there any trees with a dbh of 30 cm or more within 10 m on either side from the center line of the road alignment? (*If yes attach list of trees indicating the location (right or left side)and the chainage*)	√		There are 55 trees of dbh of 30 cm or more as attached in Attachment I.
7.	Along the road and within 100m of the road shoulder, are there any faunal habitat areas, faunal breeding ground, bird migration area, or other similar areas? *(If yes, specify details of habitat with chainage)*		√	There was not found any faunal habitat at 100 m of the road shoulder. ( ) No Secondary Information is available and Local Community is not aware of this matter
8.	Along the road and within 100m of the road shoulder is there any evidence of floral and faunal species that are classified as endangered species?		√	No rare, endangered or threatened species were found within 100 m of the road shoulder. ( ) No Secondary Information Available and Local Community is not aware of this matter

S. No.	Parameter/ Component	Yes	No	Explanation
9.	Are there any utility structures[26] within 10 m on either side from the center line of the road alignment? *(If yes, attach list with chainage)*	√		There are few utility structures found as listed in Attachment II.
10.	Are there any religious, cultural or community structures/buildings[27] within 10 m on either side from the center line of the road alignment? *(If yes attach list with chainage)*	√		Few religious cultural or community structures/buildings were found as listed in Attachment III.

D. Public Consultation

S No.	Consultation Activities	Yes	No	Remarks
1.	Consultation with local community was conducted before finalizing the alignment. ***(Attach list of people met and dates)***	√		Yes, consulting held with the community.
2.	Any suggestion received in finalizing the alignment		√	NA
3.	If suggestions received, were they incorporated into the design.		√	NA

E. Please attach the following:

1) Sketch a map showing the bridge and the trees
2) List of trees indicating location (left or right side of the road) and chainage (as required under C. 6)
3) List of utility structures indicating location (left or right side of the road) and chainage (as required under C. 9)
4) List of community structures indicating location (left or right side of the road) and chainage (as required under C. 10)
5) Sketch of strip map of the road covering details of at least 10 m on either side from the center line of the road
6) Photographs of the project area showing at least 10 m on either side from center line of road alignment. Every 2 km or less of road must have at least 1 photograph.

[26] Water tap, hand pump, electric pole, telephone pole, water pipe and other similar strucutures.

[27] Mandir, Masjid, Church, religious/cultural/historical monuments, school, health center, public toilet and other similar structures.

Attachment I: List of Trees

Chainage (m)			Left	Right
0	-	100	6	4
100	-	200	3	4
200	-	300	2	-
300	-	400	3	-
400	-	500	4	2
500	-	600	6	4
600	-	700	3	1
800	-	900	4	-
900	-	1000	4	1
1100	-	1200	1	1
1200	-	1300	1	-
1300	-	1400	-	1
Total			**37**	**18**

Attachment II: List of Utilities

Chainage (m)			Left	Right
0	-	100	2 EP	1 EP
100	-	200	-	2 EP
200	-	300	-	1 EP
300	-	400	-	1 EP
400	-	500	-	1 EP
500	-	600	-	1 EP
600	-	700	1 EP	-
700	-	800	-	1 EP
1100	-	1200	1 EP	-
1200	-	1300	-	DP

Attachment III:List of Community Structures

Chainage (m)	Left	Right
There was no Community structures		

Attachment-IV

Left					Chainage (m)			Right				
8 to 10m	**6 to 8m**	**4 to 6m**	**2 to 4m**	**0 to 2m**				**0 to 2m**	**2 to 4m**	**4 to 6m**	**6 to 8m**	**8 to 10m**
-	-	6 Trees	2 EP	-	0	-	100	-	4 trees	-	-	1 EP
-	-	-	2 trees	1 tree	100	-	200	-	-	4 trees	-	-
-	-	-	2 trees	-	200	-	300	1 EP	-	-	-	-
-	-	3 trees	-	-	300	-	400	-	1 EP	-	-	-
-	4 trees	-	-	-	400	-	500	-	1 EP	2 trees	-	-
-	-	-	6 trees	-	500	-	600	-	1 EP	4 trees	-	-
-	-	1 EP	3 trees	-	600	-	700	-	1 trees	-	-	-
-	-	-	4 trees	-	800	-	900	-	-	-	-	-
-	-	3 trees	1 tree	-	900	-	1000	-	-	1 tree	-	-
-	-	1 EP	1 tree	-	1100	-	1200	-	1 tree	-	-	-
-	-	-	1 tree	-	1200	-	1300	-	DP	-	-	-
-	-	-	-	-	1300	-	1400	-	-	1 tree	-	-

Attachment V: Chainage wise Transect Walk Findings

Chainage (M)			Existing Land Width (m)	Additional Land Required		Losses		Type of loss		Village	Remarks /Suggestion
				LHS	RHS	LHS	RHS	LHS	RHS		
0	-	100	8	-	-	-	-	-	-	-	2 EP-LHS. EP-RHS
100	-	200	8	-	-	-	-	-	-	-	CD proposed, EP-shifting
200	-	300	8	-	-	-	-	-	-	-	EP-RHS
300	-	400	8	-	-	-	-	-	-	-	EP-RHS
400	-	500	8	-	-	-	-	-	-	-	EP-RHS
500	-	600	8	-	-	-	-	-	-	-	EP-RHS
600	-	700	8	-	-	-	-	-	-	-	CD proposed, EP-LHS
700	-	800	8	-	-	-	-	-	-	-	EP-RHS
800	-	900	8	-	-	-	-	-	-	-	Forest boundary-LHS
900	-	1000	8	-	-	-	-	-	-	-	Existing CD
1000	-	1100	8	-	-	-	-	-	-	-	-
1100	-	1200	8	-	-	-	-	-	-	-	EP-LHS
1200	-	1300	8	-	-	-	-	-	-	Tatidhar	CD proposed
1300	-	1400	8	-	-	-	-	-	-	Tatidhar	-
1400	-	1440	8	-	-	-	-	-	-	Tatidhar	CD proposed

RURAL ROADS: ENVIRONMENTAL CHECKLIST

Road Name**:** **T010 - Aithulkapa**

Block Name: **Bilha**

District Name: **Bilaspur**

Total Length of the Road: **1.86 Km**

Package No. **CG02112**

A. Climatic Conditions

Temperature	High: **(May)** Low: **°C (Dec)**
Humidity	High: **(Aug)** Low: **%**
Rainfall Rainy Season	mm/year **June** to **September**

B. Location of the Road and Generic description of Environment

No.	Type of Ecosystem	Yes	No	Explanation
1.	Coastal area Mangrove (along roadside)		√	Distance from Coastline: km ( ) more than 50% ( ) less than 20%
2.	Type of Terrain-(Plain/Hilly/ Mountainous etc.) *(Explain the topography of the area and how many km of the road are located in the hilly area)*		√	Altitude: The topography of the project road is flat at almost all locations.
3.	Forest Area *(Explain whether the road passes through forest areas or located along the forest areas and distance from shoulder to the forest area)?*		√	Type of Vegetation: Legal Status of the Forest Area: *(Reserved, National Park, Sanctuaries, Unclassified, etc.)* No part of the project road passes through any forest area.
4.	Wildlife (*Explain whether there are any wildlife species in the project area*)		√	Name of animals: **NA** Endangered species (if any): **None**
5.	Inhabited Area	√		Inhabited area lies between Ch-1400m to CH-1860m with connecting village Aithulkapa.
6.	Agricultural Land		√	The agriculture land was not found along the proposed alignment.
7.	Grazing grounds	√		Grazing ground lies between Ch-00m to Ch-1400m was found along the proposed alignment.
8.	Barren Land			No Barren land along the project road.

C. Specific description of the Road Environment

(Note: Questions number 1, 4, 5, 7 and 8 must be answered after discussions with the local community people)

No.	Parameter/ Component	Yes	No	Explanation
1.	Are there any areas with landslide or erosion problems along the road? (*If yes, indicate the location (right or left side) and the chainage)*		√	No part of the project road is passing through hilly terrain prone to landslide or erosion. However, sufficient cross drainage structures will be constructed to avoid any erosion. ( ) No Secondary Information is available and Local Community is not aware of this matter
2.	Are there any lakes/swamps beside the road? (*If yes, list them indicating the location (right or left side) and the chainage)*	√		There is Pond between Ch-100m to Ch-200m, Ch-200m to Ch-300m LHS, Ch-400m to Ch-500mLHS (2 pond), Ch-1200m to Ch-1300m both side along the C/L of alignment.
3.	Are there any nallas/streams/rivers etc. along/crossing the road? (*If yes, list them indicating the location (right, left or crossing) and the chainage*	√		Few water bodies are crossing the proposed alignment and cross drainage structures are provided at these locations. Existing CD: Ch-400m to Ch-500m, Ch-700m to Ch-800m, Ch-1200m to Ch-1300m Proposed CD: Ch-00m to Ch-100m, Ch-200m to Ch-300m, Ch-1700m to Ch-1800m Proposed FC: Ch-1300m to Ch-1400m, and Ch-1600m to Ch-1700m
4.	Are there problems of water stagnation and other drainage issues on or near the road? (*If yes, mention chainage)*	√		There are some points of water stagnation and other drainage issues on or near the road which is discussed above S. No.3 along the proposed alignment. ( ) No Secondary Information is available and local Community is not aware of this matter
5.	Is the area along the project road prone to flooding? *(If yes, mention flood level and frequency)*	√		No flood prone area is observed along the proposed alignment except as discussed in S.No.3. ( ) No Secondary Information is available and local Community is not aware of this matter
6.	Are there any trees with a dbh of 30 cm or more within 10 m on either side from the center line of the road alignment? (*If yes attach list of trees indicating the location (right or left side)and the chainage*)	√		There are 20 trees of 30 cm dbh or more within 10m from C/L on both sides along the proposed alignment. Tree locations and distance from C/l is given in <u>Attachment I.</u> There is no tree loss identified at the alignment.
7.	Along the road and within 100m of the road shoulder, are there any faunal habitat areas, faunal breeding ground, bird migration area, or other similar areas? *(If yes, specify details of habitat with chainage)*		√	No Faunal Habitat Area, Faunal breeding ground and bird migration areas exist within 100 m of the road shoulder on both sides along the proposed alignment. ( ) No Secondary Information is available and local Community is not aware of this matter
8.	Along the road and within 100m of the road shoulder is there any evidence of floral and faunal species that are classified as endangered species?		√	No evidence of rare, endangered or threatened species are noticed or informed within 100 m of the road shoulder on both sides along the proposed alignment. ( ) No Secondary Information Available and Local Community is not aware of this matter
9.	Are there any utility structures[28] within 10 m on either side from the center line of the road alignment? *(If yes, attach list with chainage)*	√		There are few utility structures observed during the transect walk. The location and type of utility structure along with their approximate distance from C/L is given in Attachment II
10.	Are there any religious, cultural or			Few religious cultural or community structures/buildings

[28] Water tap, hand pump, electric pole, telephone pole, water pipe and other similar structures.

No.	Parameter/ Component	Yes	No	Explanation
	community structures/buildings[29] within 10 m on either side from the center line of the road alignment? *(If yes attach list with chainage)*	√		observed during the transect walk. The location and type of utility structure along with their approximate distance from C/L of proposed alignment is listed in Attachment III.

D. Public Consultation

S.No.	Consultation Activities	Yes	No	Remarks
1.	Consultation with local community was conducted before finalizing the alignment. *(Attach list of people met and dates)*	√		Yes, consultation with the community was held on 11/03/14. Participants list is attached with CPF document
2.	Any suggestion received in finalizing the alignment	√		Community suggested that between Ch-1600m to Ch-1700m has proposed FC.
3.	If suggestions received, were they incorporated into the design.	√		PIU will incorporate their suggestion in DPR.

E. Please attach the following:

1) Sketch a map showing the bridge and the trees
2) List of trees indicating location (left or right side of the road) and chainage (as required under C. 6)
3) List of utility structures indicating location (left or right side of the road) and chainage (as required under C. 9)
4) List of community structures indicating location (left or right side of the road) and chainage (as required under C. 10)
5) Sketch of strip map of the road covering details of at least 10 m on either side from the center line of the road
6) Photographs of the project area showing at least 10 m on either side from center line of road alignment. Every 2 km or less of road must have at least 1 photograph.

[29] Mandir, Masjid, Church, religious/cultural/historical monuments, school, health center, public toilet and other similar structures.

Attachment I: List of Trees

Chainage			Left	Right
0	-	100	1	2
100	-	200	-	1
700	-	800	2	1
800	-	900	-	1
900	-	1000	-	2
1200	-	1300	-	3
1600	-	1700	1	-
1700	-	1800	2	-
1800	-	1860	4	-
Total			**10**	**10**

Attachment II: List of Utilities

Chainage			Left	Right
0	-	100	2EP	-
100	-	200	-	-
200	-	300	-	1EP
400	-	500	-	1EP
600	-	700	1EP	-
1000	-	1100	-	1EP
1500	-	1600	HP	DP
1600	-	1700	2EP	HP
1700	-	1800	3EP	-
1800	-	1900	HP	-

Attachment III: List of Community Structures

Chainage			Left	Right
100	-	200	pond	-
200	-	300	pond	-
400	-	500	2pond	-
500	-	600	-	Nalla
1200	-	1300	pond	pond
1500	-	1600	-	School
1700	-	1800	Community building	-
1800	-	1860	-	temple, platform

Attachment-IV

Left					Chainage (M)			Right				
8 to 10m	**6 to 8m**	**4 to 6m**	**2 to 4m**	**0 to 2m**				**0 to 2m**	**2 to 4m**	**4 to 6m**	**6 to 8m**	**8 to 10m**
-	2 EP	1 tree	-	-	0	-	100	-	1 tree	1 tree	-	-
-	-	pond	-	-	100	-	200	-	-	1 tree	-	-
-	-	pond	-	-	200	-	300	-	1EP	-	-	-
-	-	2 pond	-	-	400	-	500	-	-	-	1EP	-
-	-	-	-	-	500	-	600	-	-	-	-	nalla (20m)
-	-	1 EP	-	-	600	-	700	-	-	-	-	-
2 tree	-	-	-	-	700	-	800	-	-	1 tree	-	-
-	-	-	-	-	800	-	900	-	-	-	-	1 tree
-	-	-	-	-	900	-	1000	-	-	2 tree	-	-
-	-	-	-	-	1000	-	1100	-	1EP	-	-	-
-	-	-	pond	-	1200	-	1300	-	Pond	2 tree	1 tree	-
HP	-	-	-	-	1500	-	1600	-	DP	School	-	-
-	-	1 tree	2EP	-	1600	-	1700	-	-	-	-	HP
-	1 tree, community building	1 tree,3EP	-	-	1700	-	1800	-	-	-	-	-
-	-	4 tree, HP	-	-	1800	-	1900	-	-	temple, plateform	-	-

.P. Electric Pole, H.P. – Hand Pump, T.W.; Tube Well, P.H.C; Primary Health Center
A.L. – Agricultural Land; C.D. – Cross Drainage structure, W.T.—Water Tank

Attachment V: Chainage wise Transect Walk Findings

Chainage (m)			Existing Land Width (M)	Additional Land Required		Losses		Type of loss		Village	Remarks /suggestion
				LHS	RHS	LHS	RHS	LHS	RHS		
0	-	100	8	-	-	-	-	-	-	-	Proposed CD, 2 EP RHS
100	-	200	8	-	-	-	-	-	-	-	Pond, Curve LHS, Junction, Small quarry way
200	-	300	8	-	-	-	-	-	-	-	Proposed CD, Pond LHS, EP RHS
300	-	400	8	-	-	-	-	-	-	-	Curve RHS
400	-	500	8	-	-	-	-	-	-	-	Existing CD, EP RHS, 2Pond LHS, Junction
500	-	600	8	-	-	-	-	-	-	-	EP LHS
600	-	700	8	-	-	-	-	-	-	-	EP LHS
700	-	800	8	-	-	-	-	-	-	-	Existing CD, EP RHS, 2Pond LHS, Junction
800	-	900	8	-	-	-	-	-	-	-	
900	-	1000	8	-	-	-	-	-	-	-	
1000	-	1100	8	-	-	-	-	-	-	-	EP RHS
1100	-	1200	8	-	-	-	-	-	-	-	
1200	-	1300	8	-	-	-	-	-	-	-	Existing CD, Curve LHS, Pond both side
1300	-	1400	8	-	-	-	-	-	-	-	Proposed FC
1400	-	1500	8	-	-	-	-	-	-	Aithulkapa	Habitation area starts
1500	-	1600	8	-	-	-	-	-	-	Aithulkapa	School, DP RHS, 2 Approach Junction RHS
1600	-	1700	8	-	-	-	-	-	-	Aithulkapa	Proposed FC, 2 EP LHS, HP RHS, Junction
1700	-	1800	7	1m	-	1m	-	Temporary Boundary	-	Aithulkapa	MoU signed, Community Hall, 2 EP, Approach LHS, 2 Approach RHS Junction, Proposed CD
1800	-	1860	8	-	-	-	-	-	-	Aithulkapa	HP LHS, Temple and Platform RHS

Appendix 3: Clearance from Forest Department

कार्यालय वनमण्डलाधिकारी, कोरबा वनमण्डल कोरबा (छ ग)

क्रमांक/मा.वि./ 1369 कोरबा, दिनांक 29/10/08

प्रति,

कार्यपालन अभियंता
प्रधान मंत्री ग्राम सड़क योजना
कोरबा

विषय :– वर्ष 1980 के पूर्व मौजूद वन क्षेत्र से गुजरने वाले मार्ग अजगरबहार कछार से कोसगाई मंदिर 0.75 कि.मी. को पक्का करने की अनुमति।

संदर्भ :– 01. छत्तीसगढ़ शासन वन विभाग का आदेश क्र./एफ/19/12/व/ 10–2/ 2005/1949 रायपुर दिनांक 21.06.07
02. आपका पत्र क्र./ 1350/प्र.मं.ग्रा.सं.यो/वन/ कोरबा दिनांक 04.10.07

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विषयान्तर्गत लेख है कि वर्ष 1980 के पूर्व मौजूद मार्ग अजगरबहार कछार रोड से कोसगाई मंदिर 0.75 कि.मी. 0.75 कि.मी. लंबाई में कोरबा वनमण्डल के बालको परिक्षेत्र के वनक्षेत्र से गुजरता है, को पक्का करने की अनुमति निम्न शर्तो के अधीन दी जाती है।

01. मार्ग की ब्लेक टापिंग करने हेतु आवश्यक कोलतार मिक्स उरगा में स्थापित प्लांट से लाया जावेगा। वनक्षेत्र के अंदर कोलतार पिघलाने एवं मिलाने का कार्य नहीं किया जावेगा।

02. वनक्षेत्रों के अंदर पत्थर तोड़ने की अनुमति नहीं होगी। मार्ग निर्माण हेतु आवश्यक सामाग्री यथा मिट्टी, मुरूम रेत,गिट्टी, बोल्डर आदि वनक्षेत्र से नहीं निकाला जावेगा। वनक्षेत्र से अवैध उत्खनन आदि की स्थिति में अधिरोपित अर्थदण्ड आदि अदा करने की जिम्मेदारी कार्य पालन अभियंता प्रधान मंत्री ग्राम सड़क योजना की होगी। अवैध उत्खनन संबंधी गंभीर वन अपराध उक्त मार्ग के निर्माण के संबंध में घटित होने की स्थिति में क्रियान्वयन विभाग को जिम्मेदार माना जावेगा।

03. उन्नयित सड़क के किनारे ईंट/पत्थर से सुदृढ़ किये जावेंगे तथा भू–क्षरण को रोकने हेतु इस कार्यालय द्वारा जारी किये गये निर्देशों के पालन किया जावेगा।

04. मार्ग निर्माण में किसी वृक्ष को नहीं काटा जावेगा।

05. सड़क का चौड़ीकरण नहीं किया जावेगा। पूर्व में वन विभाग व प्रधान मंत्री सड़क योजना के अधिकारियों द्वारा किये गये संयुक्त निरीक्षण में उक्त मार्ग में वनक्षेत्र की लंबाई 0.75 कि.मी. में चौड़ाई की स्थिति निम्नानुसार पाई गई है।

अ.क.	मार्ग का नाम	कुल लंबाई	वनक्षेत्र में	
			लंबाई	चौड़ाई
01.	अजगरबहार कछार रोड से कोसगाई मंदिर	0.75 कि.मी.	0.75 कि.मी.	10 मी.

उक्त चौड़ाई निर्माण के दौरान न बढ़ाई जावें।

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[redacted]वनक्षेत्र को कहीं भी तोड़ा नहीं जावें।

07. आवश्यकतानुसार उक्त मार्ग के दोनों ओर वृक्षारोपण हेतु प्रोजेक्ट तैयार किये जाकर आपको प्रस्तुत किया जावेगा, कार्य हेतु परियोजना लागत से आवश्यक धनराशि आपके द्वारा उपलब्ध कराया जावेगा।

08. वनभूमि पर श्रमिक कैम्प नहीं लगाया जायेगा।

09. सूर्यास्त के पश्चात् कोई कार्य नहीं किया जायेगा।

10. सड़क का उन्नयन कार्य के कारण यदि वनक्षेत्र में कोई नुकसान होता है तो कार्यान्वित करने वाली एजेंसी परियोजना लागत पर ऐसे नुकसान की भरपाई करेगी। ऐसी स्थिति पाये जाने पर नुकसान की गणना इस कार्यालय द्वारा कर आपको सूचित किया जावेगा, जिसे जमा करने हेतु आप बाध्य होगें।

11. इस उन्नयित की गई सड़क पर अथवा उन्नयन के अधीन सड़क पर स्थायी चेकपोस्ट उपयुक्त स्थानों पर शासन की पूर्व अनुमति प्राप्त कर लगाये जायेंगे।

12. भारत शासन पर्यावरण एवं वन मंत्रालय नई दिल्ली की अधिसूचना 50–1537 दिनांक 19.09.2006 के अनुसार इस मार्ग हेतु पर्यावरण स्वीकृति की आवश्यकता नहीं है। पर्यावरण स्वीकृति के संबंध में यदि कोई नई अधिसूचना/नियम आदि सक्षम स्तर से जारी होते है तो उसका पालन अनिवार्य होगा।

13. मार्ग निर्माण के दौरान वन अधिकारियों द्वारा क्षेत्र निरीक्षण करने पर यदि कोई अन्य शर्ते नियमानुसार अधिरोपित करने की स्थिति बनती है तो इससे आपको लिखित में अवगत कराया जावेगा। साथ ही क्षेत्र की Flora and fauna को सुरक्षित रखने के समस्त प्रयास निर्माण कार्य में लगे विभागीय व अन्य व्यक्तियों द्वारा किये जावें, इस बाबत् समस्त को निर्देशित करें।

वनमण्डलाधिकारी
कोरबा वनमण्डल कोरबा

पृ.क्रमांक/मा.चि./ कोरबा दिनांक

प्रतिलिपि :–

01. मुख्य वन संरक्षक, भू– सर्वे, छ.ग. रायपुर को सूचनार्थ सम्प्रेषित।

02. वन संरक्षक बिलासपुर वृत्त बिलासपुर को सूचनार्थ सम्प्रेषित।

03. उपवनमण्डलाधिकारी उत्तर कोरबा/ परिक्षेत्राधिकारी बालको को सूचनार्थ अग्रेषित। समय–समय पर उक्त निर्माण कार्यों का निरीक्षण कर उक्त अधिरोपित शर्तों का पालन सुनिश्चित करावें। मार्ग के दोनों ओर यदि वृक्षारोपण की आवश्यकता हो तो कार्य का प्रोजेक्ट बनाकर प्रस्तुत करें।

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Appendix 4 : Guidelines for Borrow Areas Management

A. SELECTION OF BORROW AREAS

1. Location of borrow areas shall be finalized as per IRC: 10-1961guidlines. The finalization of locations in case of borrows areas identified in private land shall depend upon the formal agreement between landowners and contractor. If, agreement is not reached between the contractor and landowners for the identified borrow areas sites, arrangement for locating the source of supply of material for embankment and sub-grade as well as compliance to environment requirements in respect of excavation and borrow areas as stipulated from time to time by the Ministry of Environment and Forests, Government of India, and local bodies, as applicable shall be the sole responsibility of the contractor.
The contractor in addition to the established practices, rules and regulation will also consider following criteria before finalizing the locations.

(a) The borrow area should not be located in agriculture field unless unavoidable i.e. barren land is not available.
(b) The borrow pits preferably should not be located along the roads.
(c) The loss of productive and agriculture soil should be minimum.
(d) The loss of vegetation is almost nil or minimum.
(e) The Contractor will ensure that suitable earth is available.

B. CONTRACTOR'S RESPONSIBILITY

2. The Contractor shall obtain representative samples from each of the identified borrow areas and have these tested at the site laboratory following a testing program approved by the Engineer. It shall be ensured that the sub-grade material when compacted to the density requirements shall yield the design CBR value of the sub-grade. Contractor shall begin operations keeping in mind following;

(a) Haulage of material to embankments or other areas of fill shall proceed only when sufficient spreading and compaction plants is operating at the place of deposition.
(b) No excavated acceptable material other than surplus to requirements of the Contract shall be removed from the site. Contractor should be permitted to remove acceptable material from the site to suit his operational procedure, then shall make consequent deficit of material arising there from.
(c) Where the excavation reveals a combination of acceptable and un-acceptable materials, the Contractor shall, unless otherwise agreed by the Engineer, carry out the excavation in such a manner that the acceptable materials are excavated separately for use in the permanent works without contamination by the un-acceptable materials. The acceptable material shall be stockpiled separately.

C. BORROWING FROM DIFFERENT LAND-FORMS

1. Borrow Areas located in Agricultural Lands

(a) The preservation of topsoil will be carried out in stockpile.
(b) A 15 cm topsoil will be stripped off from the borrow pit and this will be stored in stockpiles in a designated area for height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal).
(c) Borrowing of earth will be carried out up to a depth of 1.5m from the existing ground level.
(d) Borrowing of earth will not be done continuously through out the stretch.
(e) Ridges of not less than 8m widths will be left at intervals not exceeding 300m.
(f) Small drains will be cut through the ridges, if necessary, to facilitate drainage.
(g) The slope of the edges will be maintained not steeper than 1:4 (vertical: Horizontal).
(h) The depth of borrow pits will not be more than 30 cm after stripping the 15 cm topsoil aside.

2. Borrow Areas located in Elevated Lands

(a) The preservation of topsoil will be carried out in stockpile.
(b) A 15 cm topsoil will be stripped off from the borrow pit and this will be stored in stockpiles in a designated area for height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal).
(c) At location where private owners desire their fields to be levelled, the borrowing shall be done to a depth of not more than 1.5m or up to the level of surrounding fields

3. Borrow Areas near River side

(a) The preservation of topsoil will be carried out in stockpile.
(b) A 15 cm topsoil will be stripped off from the borrow pit and this will be stored in stockpiles in a designated area for height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal).
(c) Borrow area near to any surface water body will be at least at a distance of 15m from the toe of the bank or high flood level, whichever is maximum.

4. Borrow Areas near Settlements

(a) The preservation of topsoil will be carried out in stockpile.
(b) A 15 cm topsoil will be stripped off from the borrow pit and this will be stored in stockpiles in a designated area for height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal).
(c) Borrow pit location will be located at least 0.75 km from villages and settlements. If un-avoidable, the pit will not be dug for more than 30 cm and drains will be cut to facilitate drainage.
(d) Borrow pits located in such location will be re-developed immediately after borrowing is completed. If spoils are dumped, that will be covered with a layers of stockpiled topsoil in accordance with compliance requirements with respect MOEF/SPCB guidelines.

5. Borrow Pits along the Road

3. Borrow pits along the road shall be discouraged and if deemed necessary and permitted by the Engineer; following precautions are recommended

(a) The preservation of topsoil will be carried out in stockpile.
(b) A 15 cm topsoil will be stripped off from the borrow pit and this will be stored in stockpiles in a designated area for height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal).
(c) Ridges of not less than 8m widths should be left at intervals not exceeding 300m.
(d) Small drains shall be cut through the ridges of facilitate drainage.
(e) The depth of the pits shall be so regulated that there bottom does not cut an imaginary line having a slope of 1 vertical to 4 horizontal projected from the edge of the final section of bank, the maximum depth of any case being limited to 1.5m.
(f) Also, no pit shall be dug within the offset width from the toe of the embankment required as per the consideration of stability with a minimum width of 10m.

D. REHABILITATION OF BORROW AREAS

4. The objective of the rehabilitation program is to return the borrow pit sites to a safe and secure area, which the public should be able to safely enter and enjoy. Securing borrow pits in a stable condition is fundamental requirement of the rehabilitation process. This could be achieved by filling the borrow pit floor to approximately the access road level.

5. Re-development plan shall be prepared by the Contractor before the start of work inline with the owners will require and to the satisfaction of owner. The Borrow Areas shall be rehabilitated as per following;

- Borrow pits shall be backfilled with rejected construction wastes and will be given a vegetative cover. If this is not possible, then excavation sloped will be smoothed and depression will be filled in such a way that it looks more or less like the original round surface.
- Borrow areas might be used for aquaculture in case landowner wants such development. In that case, such borrow area will be photographed after their post use restoration and Environment Expert of Supervision Consultant will certify the post use redevelopment.

6. The Contractor will keep record of photographs of various stages i.e., before using materials from the location (pre-project), for the period borrowing activities (construction Phase) and after rehabilitation (post development), to ascertain the pre and post borrowing status of the area.

Appendix 5: Environmental Management Plan

SL. No.	Project Action/ Environmental Attributes	Mitigation Measures	Location	Time Frame	Cost	Responsible for Implementing	Responsible for Monitoring
	Measures common to all sample roads						
	Design and Pre Construction Stage						
1.	Climate Change Consideration and Vulnerability screening	• Compliance to climate change vulnerability check point given under EARF and adoption of necessary mitigative measures as may be required • Efforts shall be made to plant additional trees for increasing the carbon sink. The tree may be planted with help of PRI (Panchyati Raj Institution)	All through the alignment of each rural road	Pre Construction Phase	Part of Project Cost	Project Preparation Consultant/ design consultant	PIU/ CGRRDA
2.	Finalization of alignment	• The road will be part of district core network and will comply with PMGSY guidelines • Subproject shall not disturb any cultural heritage designated by the government or by the international agencies, such as UNESCO, and shall avoid any monuments of cultural or historical importance. • Subproject will not pass through any designated wild life sanctuaries, national park, notified Eco sensitive areas or area of international significance such as protective wet land designated under Wetland Convention, and reserve forest area.. • Subproject to comply with local and National legislative requirements such as forest clearance for diversion of forestland and ADB's Safeguard Policy Statement 2009. • Alignment finalization considering availability of right of way and in consultation with local people. • ROW may be reduced in built up area or constricted areas to minimize land acquisition as per PMGSY Guidelines. • Adjust alignment to the extent feasible to avoid tree cutting, shifting of utilities or community structure. • The road shall follow natural topography to	All through the alignment of each rural road	Pre Construction Phase	Part of Project Cost	Project Preparation Consultant/ design consultant	PIU/ CGRRDA

SL. No.	Project Action/ Environmental Attributes	Mitigation Measures	Location	Time Frame	Cost	Responsible for Implementing	Responsible for Monitoring
		avoid excessive cut and fill.					
3.	Land acquisition	• Avoid or minimize land acquisition. • Land acquisition, compensation packages, resettlement and rehabilitation, poverty alleviation programs for affected people and all other related issues are addressed through Social Impacts and Resettlement & Rehabilitation report.	All through the alignment of each rural road	Pre Construction Phase	Land to be made available by the state Governme nt	PIU, Govt. of Madhya Pradesh , and other	Environmental officer under the PIC will also coordinate and ensure implementation
4.	Biological environment - Tree planting	• All efforts shall be taken to avoid tree cutting wherever possible. • Requisite permission from forest department shall be obtained for cutting of roadside trees. • Provision of Compensatory Afforestation shall be made on 1:3.ratio basis. • Permission shall be taken for diversion of any forest land if involved. Provision shall be made for additional compensatory tree plantation.	Throughout the project section of the road. *(Highlight Tree cutting locations & proposed likely plantation location)*				
5.	Planning for land clearing	• The road land width shall be clearly demarcated on the ground. • The utility and community structure shifting shall be planned in consultations and concurrence of the community. • Tree felling shall be limited to those, which could not be saved even by design measures. The tree shall be cut with a prior permission of Forest department. • The vegetable cover shall be removed and disposed in consultation with community. • All public utilities shifting shall be planned with prior concurrence of respective agencies/authority and to the adjacent location approved by them	All through the Rural roads excepting in stretches of habitations *(Attach or Refer to specific sections of DPR for the utilities to be shifted along with chainages for the location of such structures)*	Pre Construction Phase	Necessary cost provisions have been made. All other costs are included under project cost.	PIC, PIU, Forest Department NGOs (shifting of utilities shall be carried out by respective governmental bodies at cost to be reimbursed by project, implementing agency). To increase survival rate of new saplings, a core Tree Management Committee is to be created to ensure complete retrieval of vegetative cover	Environmental officer under the PIC will coordinate and ensure Officials of Forest Department, Contractor and local NGOs and coordinated by Environmental officer of Construction Supervision Consultant for specific package.

SL. No.	Project Action/ Environmental Attributes	Mitigation Measures	Location	Time Frame	Cost	Responsible for Implementing	Responsible for Monitoring
						and timely replacement of perished plantations. implementation Unit (PIU) of CGRRDA,	
8.	Shifting on Common Properties Resources	• All efforts are made to minimize shifting of common utilities and community structures. • The community structures/utilities which can not be saved will be shifted to adjacent area with the concurrence and in consultation with community.	As determined by contractor under approval of PIC /PIU *(Attach or Refer to specific sections of DPR for community structures to be shifted along with chainages for the location of such structures)*	Construction Phase	Borne by Contractor	Contractor is responsible for ensuring provision of facilities under approval by PIC / PIU	Environmental officer and other team members of PIC will monitor and ensure appropriate implementation Environmental officer will regularly interact with the local people who are likely to be affected to ensure that their interests are protected and no social resentment sets in.
6.	Cut and Fill and Embankment Construction design & planning	• The alignment design shall consider options to minimize excessive cuts and fills. • The cut and fill quantities shall be used for embankment to minimize barrow earth requirement. • The design shall be as per relevant IRC provisions for cut and fill, slope protection and drainage. • Adequate provision shall be made for cross drainage structure for maintaining natural drainage pattern in the subproject area and	All through the alignment of each rural road *(Highlight the high flood level, chainage for action and linkages to DPR section)*	Pre Construction Phase	Part of Project Cost	Project Preparation Consultant/ design consultant	PIU/ CGRRDA

SL. No.	Project Action/ Environmental Attributes	Mitigation Measures	Location	Time Frame	Cost	Responsible for Implementing	Responsible for Monitoring
		preventing soil erosion. • Side drain for channelizing water to nearby natural drain in water stagnation /logging prone area. • The top soil of the cut and fill area shall be used for embankment slope protection • Embankment will be designed above High Flood Level (HFL) wherever, area is prone to flood.					
7.	Hydrology and Drainage	• Provision of adequate cross drainage structure shall be made to ensure smooth passage of water and maintaining natural drainage pattern of the area. The discharge capacity of the CD structure shall be designed accordingly. • Provision of adequate side drainage shall be made in water stagnant/logging areas. • The construction work near water body shall be planned preferably in dry season so that water quality of the water channel is not affected due to siltation and rain water runoff. • Elaborate drainage system shall be provided to drain the storm water from the roadway and embankment to ensure minimum disturbance to natural drainage of surface and subsurface water of the area. • Provision of additional cross drainage structure shall be made in the areas where nearby land is sloping towards road alignment on both the sides. • Provision of concrete road construction in habitat area with drainage of both side of the road shall be made as per the design provision and with adequate slope to prevent any water logging. • Road level shall be fixed above HFL. Embankment slope stabilization measures shall be planned. Stabilization measures may include vegetative treatment, stone pitching, retaining wall where feasible, low	Near all drainage crossing , nalas and river crossings etc. *(indicate HFL Level and Highlight the chainage for action and linkages to DPR section)*				

SL. No.	Project Action/ Environmental Attributes	Mitigation Measures	Location	Time Frame	Cost	Responsible for Implementing	Responsible for Monitoring
		cost options such as bamboo / eucalyptus tree pilling .					
8.	Establishment of Construction Camp, temporary office and storage area	• Construction camp sites shall be located away from any local human settlements (minimum 0.5 km away) and preferably located on lands, which are not productive barren/waste lands presently. • Similarly temporary office and storage areas shall be located away from human settlement areas (minimum 500 m). • The construction camps, office and storage areas shall have provision of adequate water supply, sanitation and all requisite infrastructure facilities. • The construction camps shall be located at a minimum 0.5 km from forest land/areas to deter the construction labour in trespassing. Similarly, temporary office and storage areas shall be located at a minimum 0.5 km from forest land/areas. • The construction camps, office and storage areas shall have provision of septic tank/soak pit of adequate capacity so that it can function properly for the entire duration of its use. • All construction camps shall have provision of rationing facilities particularly for kerosene/LPG so that dependence on firewood for cooking is avoided completely to the extent possible. • The construction camps, office and storage areas shall have provision of health care facilities for adults, pregnant women and children. • Personal Protective Equipments (PPEs) like helmet, boots, earplugs for workers, first aid and fire fighting equipments shall be available at construction sites before start of construction. An emergency plan shall be prepared to fight with any emergency like fire.	As determined by contractor under approval of PIC/PIU/ (ref- Labelled: WASTE OIL; and hazardous sign be displayed at oil handling areas and sold off to SPCB/ MoEF authorized re-refiners). *(Contractor to specify the cost provision made for PPE and other environmental sanitation measures required per construction camp / temporary office / storage area)*	Pre-construction and construction stage	To be included in contractor's cost	All facilities are to be planned and implemented by contractor under approval by PIU / PIC	PIU

SL. No.	Project Action/ Environmental Attributes	Mitigation Measures	Location	Time Frame	Cost	Responsible for Implementing	Responsible for Monitoring
		• Provision shall be made for domestic solid waste disposal in a control manner. The recyclable waste shall be sold off and non-saleable and biodegradable waste shall be disposed through secured land filling. • Provision of paved area for unloading and storage of fuel oil, lubricant oil, away from storm water drainage.					
9.	Traffic Movement	• The contractor will identify the areas were temporary traffic diversion may be required. He would prepare appropriate traffic movement plan for ensuring continued flow of traffic during construction phase. This may include movement of the traffic from the site of the construction area. This kind of a temporary diversion shall be finalized with the concurrence of respective PIU. • Wherever, cross drainage structure work require longer construction time and road is to be blocked for longer duration, the PIU / DPR Consultant shall define appropriate measures for traffic diversion before the start of the construction. • The diversion plan should ensure smooth flow of traffic, minimize accidents to road users during construction works. • Adequate signboards shall be placed much ahead of diversion site to caution the road users. The road signs should be bold and retro reflective in nature for good visibility in day and night both.	As proposed under DPR and determined by contractor and approved by PIC/PIU/ *(Highlight the chainages which may require traffic diversions)*	Pre-construction and construction stage	To be included in contractor's cost	All facilities are to be planned and implemented by contractor under approval by PIU / PIC	PIU
10.	Occupational Health and Safety	• Speed breakers (Rumble strips) as per IRC: 99-1988 shall be provided at sharp corves design and bends where the curve design speed is less than 40 km per hour in plain and rolling terrain. • Speed breakers shall also be provided at a threshold of habitation (as per NRRDA guidelines) at regular intervals (150-200 m) through habitation. • The speed breakers shall be provided and	Throughout the project section at the location determined by contractor and approved by PIU *(Highlight the location with chainage for*				

SL. No.	Project Action/ Environmental Attributes	Mitigation Measures	Location	Time Frame	Cost	Responsible for Implementing	Responsible for Monitoring
		directional sign boards installed at sites where reverse horizontal curves are closely spaced and speed reduction is required. • Provision shall be made for Hazard markers at each end of all box culverts, river crossing causeways and similar CD structures • Shoulder side slopes shall not be steeper than 2h:1V unless stone pitching of the slopes is provided. • Cement concrete pavement and V-shaped drain shall be constructed to the full width of the available roadway within densely populated habitation and as per feasibility. • Provision shall be made for Directional sight board shall be installed on all sharp curves and bends • At a main road, intersection or crossing "STOP" sign and 'T-intersection' warning sign shall be installed on the village road. • It is proposed to approach railways for adequate safety at unmanned railway crossing where applicable. Adequate clearly visible sign shall be provided on both side of the railway crossing	*such requirements)*				
	Construction Stage						
11.	Sourcing and transportation of construction material (aggregates , earth)	<u>Borrow Earth</u>: • The borrow earth shall be obtained from identified locations and with prior permission for landowner and clear understanding for its rehabilitation. The Indian Road Congress (IRC):10-1961 guideline should be used for selection of borrow pits and amount that can be borrowed. • Borrowing earth from agricultural land shall be minimized to the extent possible. Further, no earth shall be borrowed from already low-lying areas. • A 15 cm topsoil will be stripped off from the borrow pit and this will be stored in stockpiles in a designated area for height not exceeding 2m and side slopes not steeper	As Borrow sites and quarries (if required) location. *(List the probable locations for borrow areas. (Highlight the identified quarries, if already identified. Contractors should also*	During Design and construction Stage	Engineering cost	The selection of quarries and material selection will be the responsibility of contractor under approval of PIC /PIU/TSC Environmental officer and other team members of PIC will ensure appropriate implementation of mitigation	PIC /PIU/TSC Environmental officer and other team members of PIC will monitor

SL. No.	Project Action/ Environmental Attributes	Mitigation Measures	Location	Time Frame	Cost	Responsible for Implementing	Responsible for Monitoring
		than 1:2 (Vertical: Horizontal). • Borrowing of earth will not be done continuously through out the stretch. • Ridges of not less than 8m widths will be left at intervals not exceeding 300m. • Small drains will be cut through the ridges, if necessary, to facilitate drainage. • The slope of the edges will be maintained not steeper than 1:4 (vertical: Horizontal). • The depth of borrow pits will not be more than 30 cm after stripping the 15 cm topsoil aside. • Fly ash will also be used in road embankment as per IRC guidelines wherever thermal power plant is located within 100 km of the road alignment. • The borrow area shall be rehabilitated as per the understanding arrived with the land-owner. The re-habilitation plan may include the following: ▪ Borrow pits shall be backfilled with rejected construction wastes and will be given a vegetative cover. If this is not possible, then excavation sloped will be smoothed and depression will be filled in such a way that it looks more or less like the original ground surface. ▪ Borrow areas might be used for aquaculture in case landowner wants such development. <u>Aggregate :</u> • The stone aggregate shall be sourced from existing licensed quarries • Copies of consent/ approval / rehabilitation plan for use of existing source will be submitted to PIU. • Topsoil to be stockpiled and protected for use at the rehabilitation stage <u>Transportation of Construction Material</u> • Existing tracks / roads are to be used for hauling of materials to the extent possible.	*indicate the quarry they are likely to use if not already identified at DPR stag)*			actions.	

SL. No.	Project Action/ Environmental Attributes	Mitigation Measures	Location	Time Frame	Cost	Responsible for Implementing	Responsible for Monitoring
		• Prior to construction of roads, topsoil shall be preserved or at least shall be used for any other useful purposes like using in turfing of embankment rather than allowing its loss by construction activities. • The vehicles deployed for material transportation shall be spillage proof to avoid or minimize the spillage of the material during transportation. In any case, the transportation links are to be inspected at least twice daily to clear accidental spillage, if any.					
12.	Loss of Productive Soil, erosion and land use change	• It shall be ensured that the land taken on lease for access road, construction camp and temporary office of the storage facilities is restored back to its original land use before handing it over back to land owner. • The top soil from the productive land (borrow areas, road widening areas etc.) shall be preserved and reused for plantation purposes. • It shall also be used as top cover of embankment slope for growing vegetation to protect soil erosion. • Cut and fill shall be planned as per IRC provisions and rural road manual. • All steep cuts shall be flattened and benched. • Shrubs shall be planted in loose soil area. • IRC: 56 -1974 recommended practice for treatment of embankment slopes for erosion control shall be taken into consideration. • Soil erosion shall be visually checked on slopes and embankment areas. In case soil erosion is found, suitable measures shall be taken to control the soil erosion	Thought out the road section *(The contractor shall include the cost for the measures as part of the construction cost)*	During the Construction stage	Included in project cost	Design Consultant and Contractor	PIU / CGRRDA
13.	Compaction and Contamination of Soil	• To prevent soil compaction in the adjoining productive lands beyond the ROW, the movement of construction vehicles, machinery and equipment shall be restricted to the designated haulage route.	Throughout the project section of the road s *(The contractor*	• Design and constructi on stage	• Project preparati on cost and construct	• Design consultant and Contractor,	PIU

SL. No.	Project Action/ Environmental Attributes	Mitigation Measures	Location	Time Frame	Cost	Responsible for Implementing	Responsible for Monitoring
		• The productive land shall be reclaimed after construction activity. • Septic tank or mobile toilets fitted with anaerobic treatment facility shall be provided at construction camp/temporary office/storage areas. • Domestic solid waste at construction camp shall be segregated into biodegradable and non-biodegradable waste. • The non-biodegradable and recyclable waste shall be sold off. • Fuel and lubricants shall be stored at the predefined storage location. • The storage area shall be paved with gentle slope to a corner and connected with a chamber to collect any spills of the oils. • All efforts shall be made to minimise the waste generation. Unavoidable waste shall be stored at the designated place prior to disposal. • To avoid soil contamination at the wash-down and re-fuelling areas, “oil interceptors” shall be provided. Oil and grease spill and oil soaked materials are to be collected and stored in labelled containers (Labelled: WASTE OIL; and hazardous sign be displayed) and sold off to SPCB/ MoEF authorized re-refiners.	*shall include the cost for the measures as part of the construction cost)*		ion cost •		
14.	Construction Debris and waste	• All excavated materials from roadway, shoulders, verges, drains, cross drainage will be used for backfilling embankments, filling pits, and landscaping. • Unusable debris material should be suitably disposed off at pre-designated disposal locations, with approval of the concerned authority. • The bituminous wastes shall be disposed in secure manner at designated landfill sites only in an environmentally accepted manner. • For removal of debris, wastes and its disposal MOSRTH guidelines should be	• Throughout the project section of the road	• Design and constructi on stage	• Project preparati on cost and construct ion cost	• Design consultant and Contractor,	PIU

SL. No.	Project Action/ Environmental Attributes	Mitigation Measures	Location	Time Frame	Cost	Responsible for Implementing	Responsible for Monitoring
		followed. Unproductive/wastelands shall be selected with the consent of villagers and Panchayat for the same. The dumping site should be of adequate capacity. It should be located at least 500 m away from the residential areas. Dumping sites should be away from water bodies to prevent any contamination of these bodies.					
15.	Air and Noise Quality	• Vehicles delivering loose and fine materials like sand and aggregates shall be covered. • Dust suppression measures like water sprinkling, shall be applied in all dust prone locations such as unpaved haulage roads, earthworks, stockpiles and asphalt mixing areas. • Mixing plants and asphalt (hot mix) plants shall be located at least 0.5 km away and in downwind direction of the human settlements. • Material storage areas shall also be located downwind of the habitation area. • Hot mix plant shall be fitted with stack of adequate height (30 m) or as may be prescribed by SPCB to ensure enough dispersion of exit gases. Consent to establish and operate shall be obtained from State Pollution Control Board and comply with all consent conditions. • Diesel Generating (DG) sets shall also be fitted with stack of adequate height (as per regulation height of the stack of open to air DG set shall be about 0.5 m for 5 KVA and about 0.7 m for 10 KVA DG sets, above top of sound proofing enclosure of the Dg set). . Low sulphur diesel shall be used in DG sets and other construction machineries. Construction vehicles and machineries shall be periodically maintained. • The requisite PPE (helmet, mask, boot, hand gloves, earplugs) shall be provided to the construction workers.	• Near all drainage crossing , nalas and river crossings etc. *(The contractor shall include the cost for the measures as part of the construction cost)*	• During Construction stage	• Included in engineering cost	Contractor	PIU/ CGRRDA

SL. No.	Project Action/ Environmental Attributes	Mitigation Measures	Location	Time Frame	Cost	Responsible for Implementing	Responsible for Monitoring
		• Workers' exposure to noise will be restricted to less than 8 hours a day. Workers duty shall be regulated accordingly.					
16.	Biological environment - Tree planting	• Compensatory Afforestation shall be made on 1:3.ratio basis as per the plannings. • Additional trees shall be planted wherever feasible.	Throughout the project section of the road *(Highlight Tree cutting locations & proposed likely plantation location)*	during the design and Construction stage	Part of engineering work cost included	CGRRDA	PIU and CGRRDA
17.	Ground Water and Surface Water Quality and Availability	• Requisite permission shall be obtained for abstraction of groundwater from State Ground Water Board/Central Ground Water Authority if applicable. • The contractor shall arrange for water required during construction in such a way that the water availability and supply to nearby communities remains unaffected. • Water intensive activities shall not be undertaken during summer period to the extent feasible. • Provision shall be made to link side drains with the nearby ponds for facilitating water harvesting if feasible • Where ponds are not available, the water harvesting pits shall be constructed as per the requirement and rainfall intensity. • Preventive measures like slop stabilisation, etc shall be taken for prevention of siltation in water bodies.	Throughout the project section of the road *(The contractor shall include the cost for the measures as part of the construction cost)*	construction stage	constructio n cost	Contractor,	PIC/PIU
19.	Occupational Health and Safety	• Verification of implementation of provision made at planning stage. • Each worker is provided with requisite PPE • Directional sight board shall be installed on all sharp curves and bends • At a main road, intersection or crossing "STOP" sign and 'T-intersection' warning sign shall be installed on the village road.					
	Operation Stage						
	Air and Noise Quality	• Awareness sign board shall be provided for	Throughout the	Operation	constructio	Contractor,	PIC/PIU

SL. No.	Project Action/ Environmental Attributes	Mitigation Measures	Location	Time Frame	Cost	Responsible for Implementing	Responsible for Monitoring
19.		slow driving near the habitat areas to minimize dust generation due vehicle movement.. Speed limitation and honking restrictions may be enforced near sensitive locations.	project section at the location determined by contractor and approved by PIU	stage stage	n cost		
	Site restoration	• All construction camp/temporary office/material storage areas are to be restored to its original conditions. • The borrow areas rehabilitation will be ensured as per the agreed plan with the landowner. • Obtained clearance from PIU before handling over the site to SRRDA. • PIC to undertake survivability assessment and report to PIU the status of compensatory tree plantation at a stage of completion of construction with recommendation for improving the survivability of the tree if required	*(The contractor shall include the cost for the measures as part of the construction cost)*				
20.	Hydrology and Drainage	• Regular removal/cleaning of deposited silt shall be done from drainage channels and outlet points before the monsoon season. • Rejuvenation of the drainage system by removing encroachments/ congestions shall be regularly conducted	Throughout the project section at the location determined by contractor and approved by PIU	Operation stage stage	constructio n cost	Contractor,	PIC/PIU
21.	Occupational Health and Safety	• Directional sight board shall be installed on all sharp curves and bends • At a main road, intersection or crossing “STOP” sign and ‘T-intersection’ warning sign shall be installed on the village road.	Throughout the project section at the location determined by contractor and approved by PIU	Operation stage stage	constructio n cost	Contractor,	PIC/PIU

Note :

1. Road specific measures may vary depending on its location and environmental setting around. The exact extent of activities and related measures requires will depend on final alignment selection. Table 1 provides the list of common utilities, ponds, or community structures falling within 2-4 M of the road and may require shifting. Efforts shall be made to adopt the mitigative measures listed under respective section above including measures of aligning road on one end to save the the structures/trees as much as possible. The PIU will update this EMP before attaching it with the DPR and either list or refer to the section of DPR for highlighting the exact location with chainage of action areas (regarding shifting of common utilities, community structures, location of CD structures, embankment height in the flood prone areas, slope stabilization measures with locations near ponds or water bodies, tree cutting locations)
2. The information to be updated in the standard EMP before attaching it with DPR is highlighted under location column of the standard EMP.

Appendix 6: Environmental Monitoring Plan

I. ENVIRONMENTAL MONITORING DURING DESIGN AND PRE-CONSTRUCTION STAGE

Monitoring Responsibility: PIU with Support from PIC

Monitoring Frequency: Once prior to start of construction

Road Name with Block and District Name:…….

Road Length: ……

Report No.: …….

SL. No.	Environmental Attributes	Mitigation Measures	Location	Additional Monitoring Indicator if applicable	Compliance status	Corrective action proposed in case of delay
1.	Climate Change Consideration and Vulnerability screening	• Compliance to climate change vulnerability check point given under EARF and adoption of necessary mitigative measures as may be required • Efforts shall be made to plant additional trees for increasing the carbon sink. The tree may be planted with help of PRI (Panchyati Raj Institution)	All through the alignment	No. of Additional Tree plantation Proposed		
2.	Finalization of alignment	• The road will be part of district core network and will comply with PMGSY guidelines • Subproject shall not disturb any cultural heritage designated by the government or by the international agencies, such as UNESCO, and shall avoid any monuments of cultural or historical importance. • Subproject will not pass through any designated wild life sanctuaries, national park, notified Eco sensitive areas or area of international significance such as protective wet land designated under Wetland Convention, and reserve forest area.. • Subproject to comply with local and National legislative requirements such as forest clearance for diversion of forestland and ADB's Safeguard Policy Statement 2009. • Alignment finalization considering availability of right of way and in consultation with local people. • ROW may be reduced in built up area or constricted areas to minimize land acquisition as per PMGSY Guidelines. • Adjust alignment to the extent feasible to avoid tree cutting, shifting of utilities or community structure. • The road shall follow natural topography to avoid excessive cut and fill.	All through the alignment of each rural road	Compliance to Conditions of Forest Clearance if applicable		

SL. No.	Environmental Attributes	Mitigation Measures	Location	Additional Monitoring Indicator if applicable	Compliance status	Corrective action proposed in case of delay
3.	Land acquisition	• Avoid or minimize land acquisition. • Land acquisition, compensation packages, resettlement and rehabilitation, poverty alleviation programs for affected people and all other related issues are addressed through Social Impacts and Resettlement & Rehabilitation report.	All through the alignment of each rural road			
4.	Biological environment - Tree planting	• All efforts shall be taken to avoid tree cutting wherever possible. • Requisite permission from forest department shall be obtained for cutting of roadside trees. • Provision of Compensatory Afforestation shall be made on 1:3.ratio basis. • Permission shall be taken for diversion of any forest land if involved. Provision shall be made for additional compensatory tree plantation.	Throughout the project section of the road			
5.	Planning for land clearing	• The road land width shall be clearly demarcated on the ground. • The utility and community structure shifting shall be planned in consultations and concurrence of the community. • Tree felling shall be limited to those, which could not be saved even by design measures. The tree shall be cut with a prior permission of Forest department. • The vegetable cover shall be removed and disposed in consultation with community. • All public utilities shifting shall be planned with prior concurrence of respective agencies/authority and to the adjacent location approved by them	All through the Rural roads excepting in stretches of habitations	Tree cutting permission from Forests or Revenue department as applicable Permission of concerned utility Authorities No and proposed location of compensatory trees plantation, Concurrence from community for utility, community structure, and vegetation cover removal		
6.	Shifting on Common Properties Resources	• All efforts are made to minimize shifting of common utilities and community structures. • The community structures/utilities which can not be saved will be shifted to adjacent area with the concurrence and in consultation with community.	As determined by contractor under approval of PIC /PIU			
7.	Cut and Fill and Embankment Construction design and planning	• The alignment design shall consider options to minimize excessive cuts and fills. • The cut and fill quantities shall be used for embankment to minimize barrow earth requirement. • The design shall be as per relevant IRC provisions for cut and fill, slope protection and drainage.	All through the alignment of each rural road			

SL. No.	Environmental Attributes	Mitigation Measures	Location	Additional Monitoring Indicator if applicable	Compliance status	Corrective action proposed in case of delay
		• Adequate provision shall be made for cross drainage structure for maintaining natural drainage pattern in the subproject area and preventing soil erosion. • Side drain for channelizing water to nearby natural drain in water stagnation /logging prone area. • The top soil of the cut and fill area shall be used for embankment slope protection • Embankment will be designed above High Flood Level wherever, area is prone to flood.				
8.	Hydrology and Drainage	• Provision of adequate cross drainage structure shall be made to ensure smooth passage of water and maintaining natural drainage pattern of the area. The discharge capacity of the CD structure shall be designed accordingly. • Provision of adequate side drainage shall be made in water stagnant/logging areas. • The construction work near water body shall be planned preferably in dry season so that water quality of the water channel is not affected due to siltation and rain water runoff. • Elaborate drainage system shall be provided to drain the storm water from the roadway and embankment to ensure minimum disturbance to natural drainage of surface and subsurface water of the area. • Provision of additional cross drainage structure shall be made in the areas where nearby land is sloping towards road alignment on both the sides. • Provision of concrete road construction in habitat area with drainage of both side of the road shall be made as per the design provision and with adequate slope to prevent any water logging. • Road level shall be fixed above HFL. Embankment slope stabilization measures shall be planned. Stabilization measures may include vegetative treatment, stone pitching, retaining wall where feasible, low cost options such as bamboo / eucalyptus tree pilling .	Near all drainage crossing , nalas and river crossings etc.			
9.	Establishment of Construction Camp, temporary office and storage area	• Construction camp sites shall be located away from any local human settlements (minimum 0.5 km away) and preferably located on lands, which are not productive barren/waste lands presently. • Similarly temporary office and storage areas shall be located away from human settlement areas (minimum 500 m). • The construction camps, office and storage areas shall have provision of adequate water supply, sanitation and all requisite infrastructure facilities. • The construction camps shall be located at a minimum 0.5 km from forest land/areas to deter the construction labour in trespassing.	As determined by contractor under approval of PIC/PIU/ (ref- Labelled: WASTE OIL; and	Location of Construction camp with planning of requisite facilities and making provision of such facilities prior to start of construction. Availability of consent to establish from pollution control		

SL. No.	Environmental Attributes	Mitigation Measures	Location	Additional Monitoring Indicator if applicable	Compliance status	Corrective action proposed in case of delay
		Similarly, temporary office and storage areas shall be located at a minimum 0.5 km from forest land/areas. • The construction camps, office and storage areas shall have provision of septic tank/soak pit of adequate capacity so that it can function properly for the entire duration of its use. • All construction camps shall have provision of rationing facilities particularly for kerosene/LPG so that dependence on firewood for cooking is avoided completely to the extent possible. • The construction camps, office and storage areas shall have provision of health care facilities for adults, pregnant women and children. • Personal Protective Equipments (PPEs) like helmet, boots, earplugs for workers, first aid and fire fighting equipments shall be available at construction sites before start of construction. An emergency plan shall be prepared to fight with any emergency like fire. • Provision shall be made for domestic solid waste disposal in a control manner. The recyclable waste shall be sold off and non-saleable and biodegradable waste shall be disposed through secured land filling. • Provision of paved area for unloading and storage of fuel oil, lubricant oil, away from storm water drainage.	hazardous sign be displayed at oil handling areas and sold off to SPCB/ MoEF authorized re-refiners).	board for setting up the camp.		
10.	Traffic Movement	• The contractor will prepare appropriate traffic diversion scheme approved by respective PIU. This shall be implemented prior to start of construction to avoid any inconvenience to the present road users. This shall be implemented in other stretches of the road as per the progress of the construction work. • The diversion plan should ensure smooth flow of traffic, minimize accidents to road users during construction works. • Adequate signboards shall be placed much ahead of diversion site to caution the road users. The road signs should be bold and retro reflective in nature for good visibility in day and night both.	As proposed under DPR and determined by contractor and approved by PIC/PIU			
11.	Occupational Health and Safety	• Speed breakers (Rumble strips) as per IRC: 99-1988 shall be provided at sharp corves design and bends where the curve design speed is less than 40 km per hour in plain and rolling terrain. • Speed breakers shall also be provided at a threshold of habitation (as per NRRDA guidelines) at regular intervals (150-200 m) through habitation. • The speed breakers shall be provided and directional sign boards installed at sites where reverse horizontal curves are closely spaced and speed reduction is required. • Provision shall be made for Hazard markers at each end of all box	Throughout the project section at the location determined by contractor and approved by PIU			

SL. No.	Environmental Attributes	Mitigation Measures	Location	Additional Monitoring Indicator if applicable	Compliance status	Corrective action proposed in case of delay
		culverts, river crossing causeways and similar CD structures • Shoulder side slopes shall not be steeper than 2h:1V unless stone pitching of the slopes is provided. • Cement concrete pavement and V-shaped drain shall be constructed to the full width of the available roadway within densely populated habitation and as per feasibility. • Provision shall be made for Directional sight board shall be installed on all sharp curves and bends • At a main road, intersection or crossing “STOP” sign and ‘T-intersection’ warning sign shall be installed on the village road. • It is proposed to approach railways for adequate safety at unmanned railway crossing where applicable. Adequate clearly visible sign shall be provided on both side of the railway crossing				
	Grievance Redress	• Obtaining information from Village level Grievance redress committee, PIU as applicable	Each Sample road once.			

NOTE: Each report must enclose Photograph to the maximum possible action points, even if work is in progress.

II. ENVIRONMENTAL MONITORING DURING CONSTRUCTION STAGE

Monitoring Responsibility : PIU with Support from PIC

Monitoring Frequency : (First Report after third month of start of construction or 25% construction . Second report after ninth month of construction or 75% construction).

Project Details:…….

Road Stretch Name : …….

Monitoring Report Quarter No.: ……..

SL. No.	Environmental Attributes	Mitigation Measures	Location	Additional Monitoring Indicator if applicable	Compliance status	Corrective action proposed in case of delay
1.	Sourcing and transportation of construction material (aggregates , earth)	**Borrow Earth:** • The borrow earth shall be obtained from identified locations and with prior permission for landowner and clear understanding for its rehabilitation. The Indian Road Congress (IRC):10-1961 guideline should be used for selection of borrow pits and amount that can be borrowed. • Borrowing earth from agricultural land shall be minimized to the extent possible. Further, no earth shall be borrowed from already low-lying areas. • A 15 cm topsoil will be stripped off from the borrow pit and this will be stored in stockpiles in a designated area for height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal). • Borrowing of earth will not be done continuously through out the stretch. • Ridges of not less than 8m widths will be left at intervals not exceeding 300m. • Small drains will be cut through the ridges, if necessary, to facilitate drainage. • The slope of the edges will be maintained not steeper than 1:4 (vertical: Horizontal). • The depth of borrow pits will not be more than 30 cm after stripping the 15 cm topsoil aside. • Fly ash will also be used in road embankment as per IRC guidelines wherever thermal power plant is located within 100 km of the road alignment. • The borrow area shall be rehabilitated as per the	At Borrow sites and quarries (if required) location.	Compliance to IRC guidelines and stated criteria, Permission from land owners, Rehabilitation of borrow areas Availability of valid consent of quarries		

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		understanding arrived with the land-owner. The re-habilitation plan may include the following: ▪ Borrow pits shall be backfilled with rejected construction wastes and will be given a vegetative cover. If this is not possible, then excavation sloped will be smoothed and depression will be filled in such a way that it looks more or less like the original ground surface. ▪ Borrow areas might be used for aquaculture in case landowner wants such development. **Aggregate :** • The stone aggregate shall be sourced from existing licensed quarries • Copies of consent/ approval / rehabilitation plan for use of existing source will be submitted to PIU. • Topsoil to be stockpiled and protected for use at the rehabilitation stage **Transportation of Construction Material** • Existing tracks / roads are to be used for hauling of materials to the extent possible. • Prior to construction of roads, topsoil shall be preserved or at least shall be used for any other useful purposes like using in turfing of embankment rather than allowing its loss by construction activities. • The vehicles deployed for material transportation shall be spillage proof to avoid or minimize the spillage of the material during transportation. In any case, the transportation links are to be inspected at least twice daily to clear accidental spillage, if any.				
2.	Loss of Productive Soil, erosion and land use change	• It shall be ensured that the land taken on lease for access road, construction camp and temporary office of the storage facilities is restored back to its original land use before handing it over back to land owner. • The top soil from the productive land (borrow areas, road widening areas etc.) shall be preserved and reused for plantation purposes. • It shall also be used as top cover of embankment slope for growing vegetation to protect soil erosion. • Cut and fill shall be planned as per IRC provisions and	Thought out the road section			

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		rural road manual. • All steep cuts shall be flattened and benched. • Shrubs shall be planted in loose soil area. • IRC: 56 -1974 recommended practice for treatment of embankment slopes for erosion control shall be taken into consideration. • Soil erosion shall be visually checked on slopes and embankment areas. In case soil erosion is found, suitable measures shall be taken to control the soil erosion				
3	Compaction and Contamination of Soil	• To prevent soil compaction in the adjoining productive lands beyond the ROW, the movement of construction vehicles, machinery and equipment shall be restricted to the designated haulage route. • The productive land shall be reclaimed after construction activity. • Septic tank or mobile toilets fitted with anaerobic treatment facility shall be provided at construction camp/temporary office/storage areas. • Domestic solid waste at construction camp shall be segregated into biodegradable and non-biodegradable waste. • The non-biodegradable and recyclable waste shall be sold off. • Fuel and lubricants shall be stored at the predefined storage location. • The storage area shall be paved with gentle slope to a corner and connected with a chamber to collect any spills of the oils. • All efforts shall be made to minimise the waste generation. Unavoidable waste shall be stored at the designated place prior to disposal. • To avoid soil contamination at the wash-down and re-fuelling areas, “oil interceptors” shall be provided. Oil and grease spill and oil soaked materials are to be collected and stored in labelled containers (Labelled: WASTE OIL; and hazardous sign be displayed) and sold off to SPCB/ MoEF authorized re-refiners.	• Throughout the project section of the road s			

SL. No.	Environmental Attributes	Mitigation Measures	Location	Additional Monitoring Indicator if applicable	Compliance status	Corrective action proposed in case of delay
4	Construction Debris and waste	• All excavated materials from roadway, shoulders, verges, drains, cross drainage will be used for backfilling embankments, filling pits, and landscaping. • Unusable debris material should be suitably disposed off at pre-designated disposal locations, with approval of the concerned authority. • The bituminous wastes shall be disposed in secure manner at designated landfill sites only in an environmentally accepted manner. • For removal of debris, wastes and its disposal MOSRTH guidelines should be followed. Unproductive/wastelands shall be selected with the consent of villagers and Panchayat for the same. The dumping site should be of adequate capacity. It should be located at least 500 m away from the residential areas. Dumping sites should be away from water bodies to prevent any contamination of these bodies.	• Throughout the project section of the road			
5.	Air and Noise Quality	• Vehicles delivering loose and fine materials like sand and aggregates shall be covered. • Dust suppression measures like water sprinkling, shall be applied in all dust prone locations such as unpaved haulage roads, earthworks, stockpiles and asphalt mixing areas. • Mixing plants and asphalt (hot mix) plants shall be located at least 0.5 km away and in downwind direction of the human settlements. • Material storage areas shall also be located downwind of the habitation area. • Hot mix plant shall be fitted with stack of adequate height (30 m) or as may be prescribed by SPCB to ensure enough dispersion of exit gases. Consent to establish and operate shall be obtained from State Pollution Control Board and comply with all consent conditions. • Diesel Generating (DG) sets shall also be fitted with stack of adequate height (as per regulation height of the stack of open to air DG set shall be about 0.5 m for 5 KVA and about 0.7 m for 10 KVA DG sets, above top of sound proofing enclosure of the Dg set). . Low sulphur diesel shall be used in DG sets and other construction machineries. Construction vehicles and machineries shall	• Near all drainage crossing , nalas and river crossings etc.			

SL. No.	Environmental Attributes	Mitigation Measures	Location	Additional Monitoring Indicator if applicable	Compliance status	Corrective action proposed in case of delay
		be periodically maintained. • The requisite PPE (helmet, mask, boot, hand gloves, earplugs) shall be provided to the construction workers. • Workers' exposure to noise will be restricted to less than 8 hours a day. Workers duty shall be regulated accordingly.				
6.	Biological environment - Tree planting	• Compensatory Afforestation shall be made on 1:3.ratio basis as per the plannings. • Additional trees shall be planted wherever feasible.	Throughout the project section of the road			
7.	Ground Water and Surface Water Quality and Availability	• Requisite permission shall be obtained for abstraction of groundwater from State Ground Water Board/Central Ground Water Authority if applicable. • The contractor shall arrange for water required during construction in such a way that the water availability and supply to nearby communities remains unaffected. • Water intensive activities shall not be undertaken during summer period to the extent feasible. • Provision shall be made to link side drains with the nearby ponds for facilitating water harvesting if feasible • Where ponds are not available, the water harvesting pits shall be constructed as per the requirement and rainfall intensity. • Preventive measures like slop stabilisation, etc shall be taken for prevention of siltation in water bodies.	Throughout the project section of the road			
8.	Occupational Health and Safety	• Verification of implementation of provision made at planning stage. • Each worker is provided with requisite PPE • Directional sight board shall be installed on all sharp curves and bends • At a main road, intersection or crossing "STOP" sign and 'T-intersection' warning sign shall be installed on the village road.	Throughout the project section at the location determined by contractor and approved by PIU			
9.	Grievance Redress	• Obtaining information from Village level Grievance redress committee, PIU as applicable	Each Sample road once.			

NOTE: Each report must enclose Photograph to the maximum possible action points, even if work is in progress.

III. ENVIRONMENTAL MONITORING DURING OPERATION STAGE

Monitoring Responsibility: PIU with Support from PIC

Monitoring Frequency: On completion of construction and after one month of first and second year of maintenance period

Project Details :…….

Road Stretch Name: …….

Monitoring Report No.: ……..

SL. No.	Environmental Attributes	Mitigation Measures	Location	Additional Monitoring Indicator if applicable	Compliance status	Corrective action proposed in case of delay
1.	Air and Noise Quality	• Awareness sign board shall be provided for slow driving near the habitat areas to minimize dust generation due vehicle movement.. Speed limitation and honking restrictions may be enforced near sensitive locations.	Throughout the project section at the location determined by contractor and approved by PIU			
2.	Site restoration	• All construction camp/temporary office/material storage areas are to be restored to its original conditions. • The borrow areas rehabilitation will be ensured as per the agreed plan with the landowner. • Obtained clearance from PIU before handling over the site to SRRDA. • PIC to undertake survivability assessment and report to PIU the status of compensatory tree plantation at a stage of completion of construction with recommendation for improving the survivability of the tree if required	Throughout the road stretch	Survivability report, land owner concurrence of land reversal		
	Hydrology and Drainage	• Regular removal/cleaning of deposited silt shall be done from drainage channels and outlet points before the monsoon season. • Rejuvenation of the drainage system by removing encroachments/ congestions shall be regularly conducted	Throughout the project section at the location determined by contractor and approved by PIU			

SL. No.	Environmental Attributes	Mitigation Measures	Location	Additional Monitoring Indicator if applicable	Compliance status	Corrective action proposed in case of delay
3.	Road Safety	• Directional sight board shall be installed on all sharp curves and bends • At a main road, intersection or crossing “STOP” sign and ‘T-intersection’ warning sign shall be installed on the village road.	Throughout the project section at the location determined by contractor and approved by PIU	Monitor road crashes and compile. Estimate no. crashes vs number of vehicles passing section and compare with applicable national standards for blackspots		
4.	Grievance Redress	• Obtaining information from Village level Grievance redress committee, PIU as applicable	Each Sample road once.			

NOTE: Each report must enclose Photograph to the maximum possible action points, even if work is in progress.

Appendix 7: Public Consultation

District	Name	Designation	Contact Number
Raipur	Mr. S K Agrawal	Chief Executive Office	771-2424275
	Mr. S K Srivastav	Chief Engineer	9313999940
	Mr. Rakesh Sharma	Superintending Engineer	9329100353
	Mr. A K Sai	Superintending Engineer	9425290994
	Mr. S C Arya	Executive Engineer, HQ	9406127733
Baloda Bazar	Mr. S N Rai	Executive Engineer	
	Mr. S K Tiwari	SAE	
Bilaspur	Mr. A K Rahi	Superintending Engineer	9474145678
	Mr. Sanjay Sharma	Executive Engineer	
	Mr. S N Sahoo	SAE	
	Ms, Aarti Kosle	Sarpanch, Aameri Kampa	
	Mr. Maniram Yadav	Villager, Tatighar	
	Ms. Sobha Marawi	Sarpanch, Tatighar	
	Ms. Manju Bai	Sarpanch, Bhimpuri	
Janjgir-Champa	Mr. C D Khobragade	SAE	9074626864
	Mr. Kartik Ram Kanwar	Sarpanch, Bokrel	
	Chhedilal Mali	Villager, Kasapani	
Korba	Mr. Chaman Mishra	SAE	9826934653
	Ms. Sarojini Sihar	Sarpanch, Bhawed	
Bemetara	Mr. P R Thakur	Executive Engineer	9425215565
	Mr. B K Tirki	SAE	9993653622
	Mr. Mohandas Manikpuri	Sarpanch, Dhangaon	
Raigarh	Mr. Hari Om Sharma	Executive Engineer	9782802342
	Mr. R R Chauhan	AE	
	Mr. B K Bahidar	AE	
	Jogendra Bhoi	Affected Person	
Mahasamund	Mr. Rajeev Verma	Executive Engineer	
	Mr. Lalit Sinha	SAE	
	Mr. Nizam Singh Diwan	Dy. Sarpanch Umarpali	
Durg	Mr. P K Malviya	AE	9924123099
	R Mehta	AE	9827169075
	Mr. Amar Singh Sahu	Sarpanch, Parsadapar	