Initial Environmental Examination

August 2014

IND: Madhya Pradesh District Connectivity Sector Project

Hardua to Chakghat Road

Prepared by Madhya Pradesh Road Development Corporation for the Asian Development Bank.

CURRENCY EQUIVALENTS

(as of 24th August 2014)

Currency unit	=	Indian rupee (INR)
INR1.00	=	$ 0.0164
$1.00	=	INR 60.86

ABBREVIATIONS

AAQ	–	ambient air quality
AAQM	–	ambient air quality monitoring
ADB	–	Asian Development Bank
APHA	–	American Public Health Association
BGL	–	below ground level
BOD	–	biological oxygen demand
BOQ	–	bill of quantity
CO	–	carbon monoxide
COD	–	chemical oxygen demand
CPCB	–	Central Pollution Control Board
CSC	–	construction supervision consultant
MPRDC	–	Madhya Pradesh Road Development Corporation
DG	–	diesel generating set
DO	–	dissolved oxygen
DPR	–	detailed project report
E&S	–	environment and social
EA	–	executing agency
EAC	–	Expert Appraisal Committee
EIA	–	environmental impact assessment
EMP	–	environmental management plan
EMOP	–	environmental monitoring plan
GHG	–	greenhouse gas
GIS	–	geographical information system
GOM	–	Government of Madhya Pradesh
GRC	–	grievance redress committee
GRM	–	grievance redress mechanism
HFL	–	highest flood level
IEE	–	initial environmental examination
IMD	–	Indian Meteorological Department
IRC	–	Indian Road Congress
LHS	–	left hand side
LPG	–	liquefied petroleum gas
Max	–	Maximum
Min	–	Minimum
MJB	–	major bridge
MNB	–	minor bridge
MORT&H	–	Ministry of Road Transport and Highways
MOEF	–	Ministry of Environment and Forests
MPRSD	–	Master Plan Road Sector Development
N, S, E, W, NE, SW, NW	–	Wind Directions (North, South, East, West or combination of two directions like South West, North West)
HC Road	–	Hardua – Chakghat Road

NGO	–	nongovernmental organization
NH	–	National Highway
NIC	–	National Information Centre
NOC	–	No Objection Certificate
NOx	–	oxides of nitrogen
OBC	–	other backward classes
PCC	–	Portland Cement Concrete
PCU	–	Passenger Car Units
PD	–	Project Director
PFR	–	project feasibility report
PIU	–	project implementation unit
PPE	–	personal protective equipment
PPT	–	parts per trillion
PWD	–	Public Works Department
RCC	–	reinforced cement concrete
REA	–	rapid environmental assessment
RHS	–	right hand side
ROW	–	right of way
RSPM	–	respiratory suspended particulate matter
SH	–	state highway
SOI	–	Survey of India
SO_2	–	Sulphur Dioxide
SPCB	–	State Pollution Control Board
SPL	–	sound pressure level
SPM	–	suspended particulate matter
SPS	–	ADB Safeguard Policy Statement, 2009
TA	–	technical assistance
UT	–	Union Territories
WHC	–	Water holding capacity

WEIGHTS AND MEASURES

dB (A)	A-weighted decibel
ha	Hectare
km	Kilometre
km^2	square kilometre
KWA	kilowatt ampere
Leq	equivalent continuous noise level
µg	Microgram
m	Meter
MW (megawatt)	Megawatt
PM 2.5 or 10	Particulate Matter of 2.5 micron or 10 micron Size

NOTE

In this report, "$" refers to US dollars.

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EXECUTIVE SUMMARY

A. Introduction

1. The Madhya Pradesh District Connectivity Sector Project will improve transport connectivity in the state by rehabilitating and upgrading Major District Roads (MDRs). The Project constitutes: (i) rehabilitating and upgrading about 1,600 km of MDRs, (ii) improving road maintenance and asset management, and (iii) developing an efficient accident response system. MPRDC specifically targets MDRs to form key linkage between rural, semi urban and urban areas and complete the state roads connectivity.

2. Madhya Pradesh Road Development Corporation Ltd (MPRDC), the Government of Madhya Pradesh, has started the improvements of State highway and Major District Roads network for meeting the supply-demand gap of the traffic in near future. As a part of this strategy MPRDC has taken up the up-gradation of Hardua to Chakghat Road. The main objectives are to improve the regional as well as inter- and intra-state transport flows to improve access to services and making the State attractive to developers and investors. To fulfill the above objectives and due considerations to environmental feasibility of above road section, this initial environmental examination (IEE) was carried out for this section.

3. Since the project is following the sector loan modality four subprojects were selected as which is one of the sample roads. This subproject is categorized as Category “B‟ and hence, an initial environmental examination (IEE) has been undertaken. The IEE is carried out in accordance applicable laws and regulations of the Government of India and in ADB’s Safeguard Policy Statement (SPS), 2009. The report is also consistent with the requirements of the Environment Assessment and Review Framework (EARF) which was prepared for the sector loan. Since the project road will be upgraded within existing available RoW, no Environmental Clearance is required for the proposed road widening project as per EIA Notification 2006.

B. Description of Project

4. The Project road starts from T- Junction at Hardua town on Rewa – via – Semariya road (3.6 km from end point of Rewa – Bankuiya – Semariya section and existing Km 37+201), Passing through Hataha, Majhiyaar, Rangoli, Jadua, Devkhar, Atraila, Chaukhandi, Rambagh,Gadwa, Java, Chilla, Chandpur, Chakghat and merges NH-27 (Rewa- Allahabad), then passes in built up areas i.e. Koni, Raipur, Sonauri, Bhagatpurwa & Choura, after that it crosses hilly area known as Chouraghat between Choura and Ganigawan, then passes through Gauri, Hardiha, Shahpur, Charaiya and merges to NH-7 (Rewa-Mirzapur) at Hanumana. The Section describing in this report is from Hardua to Chakghat (From Km 0 to Km 92.256, Design) for a length of 92.256 kms only.

5. The alignment is single lane having width of 3-3.75 m only with poor road conditions. The Project road is falling in Rewa District & forms a major link in between Rewa ,Satna and Allahabad and other connecting roads in Madhya Pradesh.

6. The project involves widening & Strengthening of existing roads within available ROW to in, 2-lane carriageway (7.0 m wide with 3.5 m width of each lane and 2.5m paved shoulder either side

C. Description of Environment

7. Rewa lies between 24'18 and 25'12 north latitudes and 81'2 and 82'18 east longitudes in the north-east of the division of the same name . The district is bounded on the north and east by the state of Uttar Pradesh, in the south Sidhi district and in the west with Amarpatan and Raghurajnagar tahsils of Satna district. In shape the district can be compared to an isosceles triangle, with its base along the Satna border and the two longer arms converging towards Mauganj in east.

8. The region has a tropical climate characterized by hot summer season, except during the southwest monsoon season. It has four seasons: cold from December to February, hot from March to mid-June, southwest monsoon from mid-June to September, and post monsoon from October and November. The maximum temperature during summers ranges from 33ºC to 44ºC while minimum temperature from 30ºC to 19ºC. During winter season, temperature ranges between of 27ºC to 10ºC. The monsoon season spreads from June to September with average rainfall of 1,000 mm in the west to 2,000 mm in the east parts of the state. The mean annual rainfall in the state is 1200 mm.

9. Baseline data on ambient air quality including noise levels meet the national air quality standards. Water quality from hand pumps along the project road complies with the drinking water standards.

10. A section of the road passes through forest area but the available RoW is adequate and will not require forest land conversion. Hardua-Chakghat Road does not pass through any wildlife sanctuary, national park, or bio-reserve and its buffer zones. Approximately 664 (Right side 261 and Left side 403) trees will be cleared within the right-of-way to accommodate needed road upgrading. No rare or endangered species were found along the subproject road's impact area. There is no archaeological and historical monument along or near the road. No community religious properties will be affected by during road widening.

D. Anticipated Environmental Impacts and Mitigation Measures

1. Design and Construction Phase

a. Impact on Physiography and Topography

11. Since proposed project is only widening of existing road within available ROW without any land acquisition, impact on the physiography of the area is not significant. The design will consider the improvement of roadside drainage conditions through the improvement of cross drainage structures. Design of the cross drainage structures will follow IRC Guidelines (IRC,1995).

b. Potential Environmental Impacts on Soil

12. **Loss of Productive Soil**. All activities will occur within the available RoW, no adverse environmental impact is anticipated on the productive soil. Lands taken on lease for access road and for construction camp will be restored its original land use.

13. **Soil Erosion**. Land clearing and grubbing will remove vegetation and soil cover which may cause some soil erosion during monsoon. Excavations in borrow pits may lead to loss of top soil and soil erosion. The risks of stream and river bank erosion near bridges and cross

drainage works are significant. To avoid or minimize erosion, land clearing and grubbing will be conducted during dry season, productive top soils from borrow pits will be stored and reused in road embankment slope protection. Erosion control measures like silt screens will be installed along rivers and nallahs.

14. **Contamination of Soil.** There is the risk of contamination of soil from construction material and oil spills. Contractors are required to ensure proper handling materials and able to implement spills containment. Oil contaminated waste will be properly collected, stored disposed through 3rd party service providers. All fuel and lubricant storage and handling area will be located at least 500 meters from the nearest water body and provided with perimeter interceptor drains. All constructuction debris will disposed by the Contractor on pre-designated area as identified by the CSC-Environmental Specialist.

c. Impact on Water Resources and Drainage

15. Deterioration of water quality may occur near the construction camp and active construction camps. This will be minimized by timing land clearing and earthmoving during the dry season; proper handling of materials including oil, and lubricants; prohibiting the disposal of untreated sewage; and proper erosion control near rivers and nallahs.

d. Impact on Ambient Air Quality

16. Significant amount of dust will be generated during project construction. The following mitigation measures will also be undertaken:

i. Asphalt and hot-mix plants will be located at least 1 km away from any inhabited urban and rural stretches along the road with the clearance from MP Pollution Control Board.
ii. Sprinkling of water on the active construction fronts and construction yard.
iii. Regular maintenance of machinery and equipment.

17. Substantial noise will be generated from the use of heavy equipment and processing of rocks and asphalt. Adequate distance separating the rock crusher and hotmix plants will be required and the sourcing of “ready made” gravel and asphalt will be promoted to avoid the establishment of these plants. Along the road particularly near sensitive sites like schools and hospitals, the use of less noisy equipment, scheduling of noisy activities, and provision of noise barriers will be implemented by the contractor to minimize disturbance.

e. Impact on Flora, Fauna and Ecosystem

18. Clearing and grubbing activities will result to the removal of shrubs, grasses, and an estimated 664 trees, majority of trees which are Tactona Grandis ,Neem,Acasia Species Babul or Acacia nilotica species. All cut trees will be compensated at the rate of 1:10 with preference to fast growing local species that are more efficient in absorbing carbon emissions.

f. Construction Workers’ Camp

19. As the Contrator are required to source labor from the local communities along the subproject road, the size of the construction camps will be relatively small. It is the contractual responsibility of the Contractors to maintain a hygienic camp with adequate water and electric supply; toilet facilities located away from the water bodies and wells; proper disposal of

domestic refuse; temporary medical facilities; pest control; clean and adequate food; and security.

g. Impacts on Social Environment

20. Construction and operation phases of project road will have some beneficial impact on social environment. Some increase in income of local people is expected as local unskilled, semiskilled and skilled persons may gain direct or indirect employment during construction phase. Since the immigration of work force during construction phase is likely to be very small, the social impacts on literacy, health care, transport facilities and cultural aspects are expected to be insignificant.

2. Operation Phase

21. Increase in vehicular emissions, noise level, road crashes due to higher speed vehicular speed, and oil contaminated road surface runoff will occur during project operation phase. The impact on air quality is not expected to be significant given the low projected traffic.

22. Community safety is enhanced through the crash barriers, speed brakes, traffic signs, and pavement markers. Oil contamination will occur but expected to be in trace amounts based on the low level vehicular traffic. To control the anticipated increase in noise level the following measures will be implemented; good road surface will reduce the road-tire noise, prohibition of horns along sensitive areas, road widening will increase capacity and decrease congestion of vehicles, and compensatory tree plantation will be located near sensitive areas.

E. Public Consultation and Information Disclosures

23. Public consultations have been carried out in the project area during the feasibility as well as detailed design stage. Key issues raised during the consultations were:

i. Provision of suitable drainage in the settlements areas.
ii. Provisions of safety measures in school and settlement areas.
iii. Suitable mitigation measures to address air and noise pollution.
iv. Provision of safety signage near school.
v. Avoid sourcing water for construction from public water sources.
vi. Minimize the cutting of trees.
vii. Construction labour camps should not be located near settlements area.
viii. Avoid borrow of earth near settlement and schools.
ix. Start tree plantation during construction phase.

F. Environmental Management Plan and Grievance Redress Mechanism

1. Environmental Management Plan

24. The Hardua - Chakghat Road specific Environment Management Plan has been formulated which consists mitigation and monitoring measures, and clear definition of roles and responsibilities. The project will have one grievance redress mechanism for social and environment issues comprising a village level and district level committee. The nodal officer under the PIU will be the key person to coordinate the receiving of complaints and addressing them.

2. Environmental Monitoring Program (EMoP)

25. A comprehensive monitoring plan has been prepared for all stages of the project. This includes parameters to be measured, methods to be used, sampling locations, frequency of measurements, detection limits, cost and responsibility for implementation and supervision. Construction Stage Monitoring to be carried out by contractor under supervision of construction supervision consultant (CSC). Monitoring will focus on air, water, noise, soil erosion, drainage congestion and compensatory tree plantation. For tree plantation, the 75% survival rate of re-plantation shall be monitored for three years of the operation phase.

3. Institutional Arrangement and Capacity Building

26. The implementation arrangements basically follow the ongoing MPSRSP-II with the following improvements: i) expansion of the Environmental and Social cell (ESC) staff from 1 to 4 with the recruitment of two social safeguard and one environmental safeguard officers; ii) MPRDC ten division offices acting as Project Implementation Units (PIUs) will appoint a social and environment safeguards focal person; and iii) Construction Supervision Consultant's environmental specialist from the CSC will provide technical support to MPRDC and the PIU for implementation of environment safeguards.

27. To enable MPRDC officials to implement for environmental safeguard requirements

28. Effectively, a training programme will be conducted for the EA and IA of the sector loan to improve environmental awareness, construction practices, legislative compliance requirements, EMP and EMoP implementation requirements, and roles and responsibilities.

G. Conclusions and Recommendations

29. The findings of the IEE show that overall the project has limited and short term environmental impacts. Effective EMP implementation will ensure elimination and minimization of identified adverse impacts. MPRDC shall ensure that EMP and EMoP is included in Bill of Quantity (BOQ) and forms part of bid document and civil works contract. If there is any change in the project design the EMP and EMOP will accordingly. MPRDC needs capacity building and practical exposure. Adequate training shall be imparted as proposed under environmental management plan to enhance the capability of concerned EA and IA officials.

I. INTRODUCTION

A. Project Background

1. The Madhya Pradesh District Connectivity Sector Project (MPDCSP) will improve transport connectivity in the state by rehabilitating and upgrading Major District Roads (MDRs). The Project constitutes (i) rehabilitating and upgrading about 1600 km of MDRs (ii) improving road maintenance and asset management and (iii) developing an efficient accident response system. MPRDC specifically targets MDRs to form key linkage between rural, semi urban and urban areas and complete the state roads connectivity. A consulting service will be provided to supervise the implementation of civil works and a piggy-backed technical assistance (TA) will support the development of an accident response system and a computerized road asset management system (RAMS). A sector lending modality is preferred considering the large number of distributed MDRs and MPRDC has the requisite institutional capacity to prepare and implement a sector development plan and prepare the individual road packages.

2. Government of Madhya Pradesh (GoMP) has been using a combination of budgetary, PPP, and ADB financing, to improve state highways. Rural roads are specifically addressed through MPRRDA and funds are made available from the Pradhan Mantri Gram Sadak Yojana (PMGSY) which is the national rural roads plan. ADB's funds are made available to the rural roads in the state through past loans to the central line ministry. However, the intermediate tier – the major district roads or MDRs – have not been specifically targeted for improvement. MDRs form the key linkage between rural, semi urban and urban areas and needs to be developed to complete state road connectivity. The GoMP is now proposing to improve the MDRs through the plan indicated in Table 1.

Table 1: Proposed Improvement Plan for MDRs

Total MDRs in Madhya Pradesh	-	(Km) 19,574
Under construction by MPPWD (Under Central Road Fund Scheme)	-	5,398
(Under Major District Roads Scheme)	-	1,134
Under Construction by MPRDC (Under build operate transfer (BOT) Toll + Annuity & Annuity Scheme)	-	1,992
Total Under Construction	-	8,524
Balance to be constructed	-	11,050
Proposed under the Project [a]	**-**	**1600**
[a]The actual estimates will depend on the assessment from the DPRs. *Source: MPRDC*		

3. The actual estimates will depend on the assessment from the DPRs.

4. Since the project will follow a sector loan modality, the present MDR was selected to screen significance of potential impacts and determine the environmental assessment required to address the safeguard issues, and needed disclosure and consultation requirements.

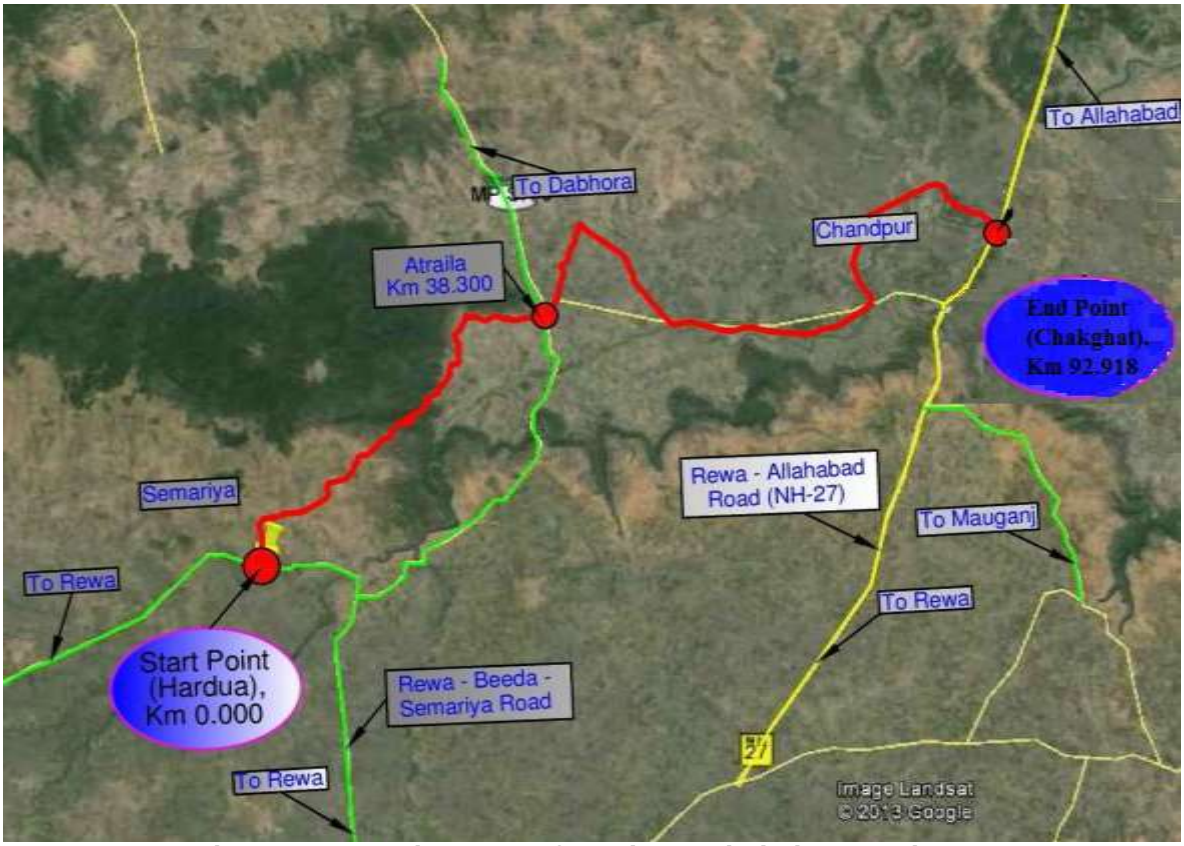


Figure 1 : Location map of Hardua – Chakghat Road

5. An environmental assessment and review framework (EARF) has been prepared separately for the entire project to guide the subprojects, preparation of IEE or EIA reports and implementation of all environment safeguards requirements in accordance with relevant policies and regulations of the Government of India, SGoMP, and the ADB Safeguard Policy Statement 2009 (SPS). The IEE report and the EARF are disclosed in the MPRDC and ADB websites.

6. This report focuses on the Hardua-Chakghat (HC) road.

B. Nature, Size and Location of the Project

7. The Project road starts from T- Junction at Hardua town on Rewa – via – Semariya road (3.6 km from end point of Rewa – Bankuiya – Semariya section and existing Km 37+201), Passing through Hataha, Majhiyaar, Rangoli, Jadua, Devkhar, Atraila, Chaukhandi, Rambagh,Gadwa, Java, Chilla, Chandpur, Chakghat and merges NH-27 (Rewa- Allahabad), then passes in built up areas i.e. Koni, Raipur, Sonauri, Bhagatpurwa & Choura, after that it crosses hilly area known as Chouraghat between Choura and Ganigawan, then passes through Gauri, Hardiha, Shahpur, Charaiya and merges to NH-7 (Rewa-Mirzapur) at Hanumana. The Section describing in this report is from Hardua to Chakghat (From Km 0 to Km 92.256, Design) for a length of 92.256 kms only.

C. Purpose and Scope of the Study

8. This IEE report documents the environmental assessment of the HC Road subproject and identifies the environmental issues to be considered in the project planning and design

stages. In this report, the different activities that are likely to take place to achieve the project objectives have been analyzed and the potential impacts that may accompany them have been identified, assessed for significance, and concomitant avoidance, mitigation, and compensation measures were prepared in consultation with stakeholders to be incorporated on the engineering design and project implementation. The IEE addresses the environmental management requirements of the Government of India (GOI) and Asian Development Bank. Specifically, this report:

i. Provides information about the baseline environmental setting of the subproject;
ii. Provides information on potential environmental impacts of the proposed subproject activities with its magnitude, distribution and duration.
iii. Provides information on required mitigation measures with cost to minimize the impacts.
iv. Analyses the alternatives options considering alternative locations, designs, management approaches for selection of most feasible and environmental acceptable options.
v. Provides details of stakeholder's consultations.
vi. Designs an environmental management and monitoring plan with institutional measures for effective implementation of mitigates measures proposed and addressing grievances.

9. The IEE was based on proposed road alignment and key construction activities such as site clearing, removal of trees, excavation, filling, grading and embankment formation, excavation for utility trenches, sub grade preparation, base course and asphalt overlay, shoulder, and construction of permanent structures like retaining walls, culverts and drains. The IEE also covered ancillary activities like camp site establishment and maintenance, sourcing of materials, and operation of equipment like rock crusher and hot mix plant. The corridor of impact is taken as 10 meters either side of the alignment. However, the study area impact zone is considered up to 5 km on both sides of road alignment to allow for coverage of indirect and induced impacts and a larger analysis of land use and other environmental features. Assessment is carried out on the following environment components: terrestrial and aquatic ecology, soil, water, air, noise, and socio economic aspects.

10. This IEE report is presented in eight chapters as follow:

Chapter 1 - Introduction
Chapter 2 - Policy, Legal and Administrative Framework
Chapter 3 - Description of Project
Chapter 4 - Description of Environment
Chapter 5 - Anticipated Impacts and Mitigation Measures
Chapter 6 - Information Disclosure, Consultation, and Participation
Chapter 7 - Environment Management Plan and Grievance Redress Mechanism
Chapter 8 - Conclusion and Recommendation

D. Methodology

11. The methodology for IEE adopted complies with the ADB Safeguard Policy Statement (SPS) 2009 and environmental guidelines. The study was carried out using reconnaissance survey, field visits, consultation with stakeholders, review of existing data, identification of adverse impacts and preparation of environmental management and monitoring plans. The stepwise activities carried out include:

I. Review of legal requirements
II. Review of feasibility study
III. Reconnaissance survey for identification of key issues data requirement and preliminary consultation
IV. Primary and secondary data collection
V. Consultation with stakeholders
VI. Identification of impacts and mitigation measures

1. Data Collection

12. Primary and secondary data on the Physical, Ecological, and Socio-economic resources were collected to provide baseline conditions to be used in impact assessment and monitoring plan design.

13. The type and source of information compiled in this IEE are below:

Table 2: Primary and Secondary Information Sources

Information	Sources
Technical information on existing road features and proposed	MPRDC Design Consultant Ground physical surveys and graphics consultants
Rehabilitation work. Inventorisation of road features; viz. water bodies community structures, environmental sensitive location areas, congested locations, etc.	Indian Meteorological Department, ENVIS Website, NIC, primary data collection
Climatic Condition	Geological survey of India, SOI
Geology, Seismicity, Soil and Topography	Toposheets, Primary data collection
Land Use/ Land Cover	Survey of India (SoI) Toposheet, Observation during survey.
Drainage Pattern	Survey of India Toposheet and field observation
Status of forest areas. Compensatory afforestation norms etc	Divisional Forest Office, Rewa District
Status of Fishing Activity	District Fisheries Offices at Rewa District
Air quality Noise, Soil and Water	Onsite monitoring and Analysis of Field samples
Borrow Areas, Quarries and other construction material source	Design consultant and public consultation during field visit
River geo-morphology, hydrology, drainage, flood patterns.	Feasibility report, field observations
Socioeconomic Environment	Primary Census Abstract of Rewa District 2001. Official websites maintained by state Govt., and Public Consultation during the Field survey

2. Public Consultation

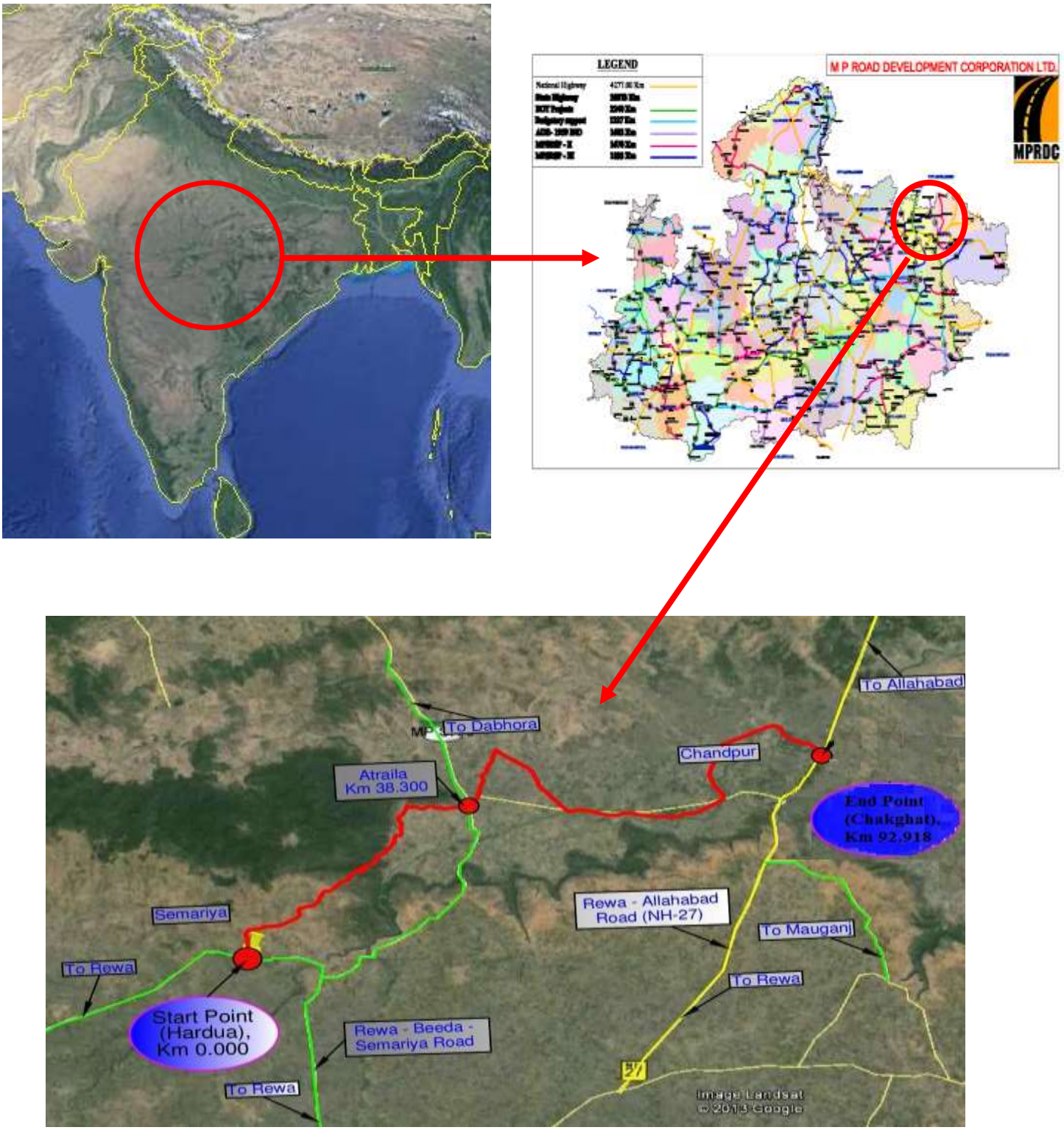
14. Extensive consultations were held during different stages (reconnaissance, detailed design and design review) with key stakeholders that includes local and beneficiary population,

government departments/agencies, road users, and project-affected persons. These consultations allowed the interaction between the stakeholders and road designers to identify road features and construction methods that will enhance road upgrading and minimize potential impacts. Information gathered were integrated in the project design and formulating mitigation measures and environmental management plan. Detailed description of public consultation is presented in Chapter 6.

E. Organizational Setting of Implementing Agency

15. The Madhya Pradesh Road Development Corporation (MPRDC) is mandated for construction and maintenance of roads in behalf of the Government of Madhya Pradesh. MPRDC is the executing agency (EA) for this project and a PIU is created within MPRDC at headquarter which is responsible for the proper implementation of all ADB funded road projects. The EA capability for effective implementation of Environmental Management Plan (EMP) has been assessed and presented in Chapter 7.

Figure 2: Location Map



II. POLICY AND LEGAL FRAMEWORK

16. 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. The environmental legislations in India are framed to protect the valued environmental components and comply with its commitment to international community under various conventions and protocols as well. Asian Development Bank has also developed interventions to guide social and environment safeguards, in their Safeguard Policy Statement, 2009. This assessment is about the applicability of above laws and regulations, and safeguards. This chapter summarizes the following:

a. Applicability of ADB safeguards policies and categorization of the project.
b. Applicability of various National and local laws and regulations at different stages of project implementations

A. Country's Legal Framework and Regulatory Requirements for the Project

17. The legal framework of the country consists of several acts, notifications, rules, and regulations to protect environment and wildlife. Key policies, acts and regulations relevant for the project are provided in table 3 below.

Table 3: Summary of Relevant Environmental Legislation

Act	Objective	Responsible Institution
Environment (Protection) Act (1986) and Rules (1986)	To protect and improve the overall environment	MoEF
Environmental Impact Assessment (EIA) Notification under Environmental Protection Rules (2006, 2009, 2011) and relevant Office Memorandums (OM)	To provide guidance on environmental clearance requirements and clarification on related specific technical issues	MoEF
Wildlife Protection Act (1972 and amended in 1993)	To protect wild animals and birds through the creation of National Parks and Sanctuaries	MoEF
The Water (Prevention and Control of Pollution) Act 1972 (Amended 1988) and Rules 1974	To provide for the prevention and control of water pollution and the maintaining or restoring of wholesomeness of water.	CPCB
The Air (Prevention and Control of Pollution) Act, 1981(Amended 1987) and Rules 1982	To provide for the prevention, control and abatement of air pollution, and for the establishment of Boards to carry out these purposes.	CPCB and Road Authorities
Hazardous Waste (Management, Handling and Trans-boundary Movement) Rules 2008 (Amended 2009),	To protection the general public against improper handling, storage and disposal of hazardous wastes	State Pollution Control Board
The Forest (Conservation) Act 1980 (Amended 1988) and Rules 1981 (Amended 2003)	To protect and manage forests	MoEF
Central Motor Vehicle Act (1988) and Rules (1988)	To control vehicular air and noise pollution. To regulate development of the transport sector, check and control vehicular air and noise pollution.	State Transport Department

Act	Objective	Responsible Institution
Ancient Monuments and Archaeological Sites and Remains	Conservation of Cultural and historical remains found in India.	Archaeological Dept. GOI
Act (1958)		
Building and Other construction workers (Regulation and the Employment and conditions of service) Act, 1996	To regulate the employment and conditions of service of building and other construction workers and to provide for their safety, health and welfare measures	Ministry of Labour and Employment
Child labour (Prohibition and Regulation) Act, 1986	To regulate the employment of children including age limits, type of employment, timing of work, information disclosure and health and safety.	Ministry of Labour and Employment

18. As per provisions of Environmental Impact Assessment Notification 2006 amended 2009), and its amendments, vide notification S.O.3067(E), dated the 1st December 2009 all State Highway expansion projects, except those in hilly terrain (above 1000 m AMSL) and ecologically sensitive areas, have been exempted from Environmental Clearances.

19. Since, the project road is a major district road and not a state, the above EIA Notification, 2006 (amended till date) promulgated under Environment (Protection) Act 1986 is not applicable for the project road and hence no Environmental Clearance is required for the proposed road widening project.

2. Forests Clearance

20. As per Indian Forests Conservation Act (1980), any project requiring diversion of frosts land for non-forestry purposes require forest clearance from MoEF for the same. The forestry clearance is granted through two stages process.

21. Since no diversion of forestland is involved in Hardua to Chakghat Road, no forest clearance is required for this road Only NOC will require from forest deptt for working in forest area and permission for tree cutting will be required from Revenue deptt.

3. Permission to Withdraw Ground Water

22. As per the power Granted under Environmental Protection Act, 1986, Permission from Central Ground Water Authority is required for extracting ground water for construction purposes, from areas declared as critical or semi critical from ground water potential prospective.

4. Required Clearances/Permissions

23. For up-gradation of the project road, required clearances/ permissions related to environment has been summarized in Table 4.

Table 4: Permissions/Clearances Required for the Subproject

Sl.No.	Permissions/ Clearances	Acts/ Rules/ Notifications/Guidelines	Concerned Agency	Responsibility
A.	**Pre-construction Stage**			
1	Permission for cutting of trees	Forest Conservation Act (1980)	District Forest Office/State Forest Department for	MPRDC
Sl.No.	Permissions/ Clearances	Acts/ Rules/ Notifications/Guidelines	Concerned Agency	Responsibility
		Procedural Guidelines developed by the Department of Environment, Government of M. P. under the orders of the Honorable High Court Tree removal will be guided as per state government rules.	trees felling in forest areas and District Authorities in non-forests Areas (Compensatory tree plantation to be made 1:10 as per the permission granted)	
B.	**Implementation Stage**			
2	Consent to operate hot mix plant, Crushers, Batching plant	Air (Prevention and Control Pollution) Act of 1981	M.P. State Pollution Control Board (To be obtained before installation)	Contractor
3	Authorization for Disposal of hazardous waste	Hazardous Waste (Management and Handling) Rules 1989	M.P. State Pollution Control Board (To be obtained before generation)	Contractor
4	Consent for Disposal of sewage from labor camps	Water (Prevention and Control of Pollution) Act 1974	M.P. State Pollution Control Board (Before setting up the camp)	Contractor
5	Pollution Under Control Certificate	Central Motor and Vehicle Act 1988	Department of Transport, Government of M. P. authorized testing centers	Contractor
6	Employing Labour/Workers	The Building and Other Construction Workers (Regulation and Employment Conditions of Service) Act, 1996	District Labour Commissioner	Contractor

B. International Agreements

24. India has been playing an active role in environmental conservation since the first United Nations (UN) conference on Human Environment in Stockholm in 1972 and recognizes that protection of environment is closely linked to combating poverty. Key international agreements that India is signatory to and relevant for the project are provided below:

a. Convention Relative to the conservation of Flora and Fauna in their Natural State

(1933)
b. International Plan Protection Convention (1951)
c. Convention on Wetlands of International Importance, Especially as Waterfowl Habitat (Ramsar,1971)
d. Convention concerning the Protection of the World Cultural and Natural Heritage (Paris, 1972)
e. Convention in International Trade in Endangered Species of Wild Fauna and Flora (Washington, 1973)
f. Convention on Migratory Species of Wild Animals (Bonn, 1979)
g. Convention on the Prior Informed Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (PIC or Rotterdam, 1990)
h. United Nations Framework Convention on Climate Change (Rio De Janeiro, 1992)
i. Convention on Biological Diversity (Rio De Janeiro, 1992)
j. Protocol to the United Nations Convention on Climate Change (Kyoto,1997)

25. The above list of international conventions served as requirements for the project to comply. However, due to the limited scale of the road upgrading and the predicted traffic increase during operation, the expected environmental issues that are governed by these international conventions would be insignificant.

C. Asian Development Bank Safeguard Policies

26. The Asian Development Bank has defined its safeguard requirements in the Safeguard Policy Statement 2009 (SPS). The prime objectives of these safeguard policies are to: (i) avoid adverse impacts of projects on the environment and affected people, where possible; and (ii) minimize, mitigate, and/or compensate for adverse project impacts on the environment and affected people when avoidance is not possible.

D. Category of the Project as per SPS

27. Using the prescribed ADB Rapid Environmental Assessment Checklist (see Appendix 1), UM road was classified as environmental category “B.” This categorization was primarily based on the following considerations:

i. Subproject road does not pass through or located within 10 km from any wildlife sanctuary, national park, or any other environmentally sensitive or protected areas.
ii. Anticipated impacts from road upgrading on relatively flat terrain along agricultural land are mostly site specific and easily mitigated through proper design and good construction practices.
iii. Majority of the activities have short-term duration co-terminus with the construction phase.
iv. Subproject road does not pass through or located within 10 km from any wildlife sanctuary, national park, or any other environmentally sensitive or protected areas.

III. PROJECT DESCRIPTION

A. Rational and Project Settings

28. The Project road starts from T- Junction at Hardua town on Rewa – via – Semariya road (3.6 km from end point of Rewa – Bankuiya – Semariya section and existing Km 37+201), Passing through Hataha, Majhiyaar, Rangoli, Jadua, Devkhar, Atraila, Chaukhandi, Rambagh,Gadwa, Java, Chilla, Chandpur, Chakghat and merges NH-27 (Rewa- Allahabad), then passes in built up areas i.e. Koni, Raipur, Sonauri, Bhagatpurwa & Choura, after that it crosses hilly area known as Chouraghat between Choura and Ganigawan, then passes through Gauri, Hardiha, Shahpur, Charaiya and merges to NH-7 (Rewa-Mirzapur) at Hanumana. The Section describing in this report is from Hardua to Chakghat (From Km 0 to Km 92.256, Design) for a length of 92.256 kms only.

29. Present Road Location: The Project Road starts from 3 arm junction at Hardua town on Rewa-Veeda-Semariya road (3.6 km from end point of Rewa-Bankuiya-Semariya section and existing Km 37+201), Passing through Hataha, Majhiyaar, Rangoli, Jadua, Devkhar, Atraila, Chaukhandi, Rambagh, Gadwa, Jawa, Chilla, Chandpur, Chakghat and ends at NH-27 (Rewa-Allahabad). , then passes in built up areas i.e. Koni, Raipur, Sonauri, Bhagatpurwa & Choura, after that it crosses hilly area known as Chouraghat between Choura and Ganigawan, then passes through Gauri, Hardiha, Shahpur, Chairaiya and merges to NH-7 (Rewa-Mirzapur) at Hanumana. The Section describing in this report is from Hardua to Chakghat (From km 0 to km 92.256, Design) for a length of 92.256 kms only. The Total length of road is 92.256kms (Existing) and 151.646 Kms (Design). The alignment is single lane having width of 3.0 – 3.5m only with poor stretches in most of the lengths.

30. The salient Features of the Hardua –Chakghat Road is given at Table 5.

Table 5: Summary Road Components and Design Standard

Road Length	92.256Km length
Alignment	Follow the exits road alignment. Except some of the locations where geometric improvements is required.
Flyovers/overpasses/ ROB	There is no flyovers/overpasses/ ROB in the alignment.
Bridges	Eight nos. Bridges
Other Structures	Total 219 nos of culverts (117 Reconstruction and 102 New Construction) one
Embankment Design	Embankment height established for 1m free board on 20 years frequency HFL Embankment height up to 3.0 m with 2H: 1V for embankment height from 3.0 m to 6.0 m with 15H: 1V. Construction of embankment of height more than 3.0 m, using borrow soil is recommended. However high embankment have been restricted within Row providing returning walls
Design Standard	As per IRC Codes and MORSTH Guidelines. Vertical Clearance 0.60 m above HFL for bridges upto 30 m length 0.90m above HFL for bridges above 30 m length The discharges for which the bridge has been designed are maximum flood discharge on record for a period of 100 years for major bridges and 50 years for minor bridges.
Speed	Design : 100 Km/h

	Permissible : 80 km/h
Horizontal Controls	As per IRC: 73 -1980
	Maximum value of 7% for super elevation and 15% for side friction factor, the minimum radius for for horizontal curves is 230m for design speed 80Km/hr
Vertical Controls	Grade break of 0.5%, vertical curves will be provided . Length of vertical curve will be restricted to minimum 50m
Carriageway	Carriageway : 7m Cross fall will be 2.5% for pavement and 3% for earthen shoulder.

Table 6: Existing Land Use Pattern of Hardua - Chakghat Section

S. no.	Existing Chainage		Length (m)	Side			Village/ town
	From	To		LHS	RHS	Both	
1	0+800	1+500	700			AG	Hadaha
2	7+000	7+300	300	PBU	AG		Rangoli
3	27+360	29+500	2440			AG+BU	Devkhar
4	39+200	39+960	760			BU+PBU	Ramgadwa
5	57+500	58+300	800			BU	Jawa
6	62+500	64+500	2000			BU+PBU+AG	Akori
7	64+500	65+250	750			AG+BU	Chandi
8	73+000	74+500	1500			AG+BU	Chilla
9	81+600	85+750	4150			AG+BU	Pansi
10	91+400	92+918	1518			BU	Chak Khotar

31. The pavement type is flexible throughout the length of project road. The condition of the pavement is generally fair to poor. The condition of shoulders is also poor and now covered with vegetation. There is no formal drainage system along the Hardua to Chakghat road and the existing shoulders slope does not facilitate proper drainage. On an average the project road traverses through 0.50m to 2.0m embankment. Suitable measures will be carried out by site specific drainage deigns. Stretches of telephone and electric utilities need to be shifted to allow planned upgrading.

Table 7: Stretches for Improvements

S.no	Extending Change		Length	Carriageway width(m)	Formation with (m)	Type of Road	Condition
	From	to					
1	0+800	92+918	92+118	7	10	BT	POOR

B. Project Road Condition:

32. The existing road condition is poor , during the survey it is found that- (1) construction of CC road at Jawahas been completed by Nagar Nigam the length of this road is around 1 km and width of this road is 3.75 mtr one side.(2) construction of CC and BT road at Chalkghat has been completed by Nagar Nigam the length of this road is around 1 km and width of this road is 7.5 mtr.(3) construction of CC and BT road at Chilla is completed by Nagar Nigam the length of this road is around 800 mtr and width of this road is 7.5 mtr. (4) Construction of BT road Hardua to Rangolihas been complited by PWD the length of this road is around 13 km and width of this

road is 5.5mtr. It need overlay at Jawa ,Chalkghat , Chilla and Hardua to Rangoli.The condition of existing road including pavement, shoulder, embankment and drainage is not at satisfaction level. In pavement condition data regarding pavement distress like cracking, raveling, and potholes are recorded in terms of pavement affected. The edge break is measured in length and rutting is measured in mm depth. Shoulder Condition is assessed as earthen shoulder, corrugation or ruts development in mm and shoulder edge drop in mm. Distresses like raveling, Patching and Cracks are found during the investigation at many locations along the project road hence, entire project road goes under reconstruction right from Granular Sub-base layer.

33. The local people are reliable on public transport and travel with available transport. The travel cost is also affordable as well. The condition is worst in rainy season, maintenance work of road is totally stopped, difficult to identify potholes due to full of water. During rainy season, in most parts, especially built up area water logging and water overflow due to poor drainage system is one of the key issues. In some sections the road is blocked by huge quantity of rain water at the slope provided in the roads. Poor maintenance of existing drainage, especially in built up area is also one of the problems of blocking road by rain water. Mobility during rainy season is also limited due to agricultural activities. During rainy season the built up area become muddy and slippery due to water logging.

34. **Traffic:** A number of traffic surveys have been carried out on the project corridor in order to identify present and likely future problems and to device suitable remedial measures and to evolve appropriate design method.

35. Classified traffic volume obtained during the traffic surveys were analyzed both in terms of number of vehicles and Passenger Car Units (PCU's). PCU factors were adopted as per recommendations of Indian Road Congress (IRC: 64) and based on factors used in other similar studies. Average Daily Traffic (ADT) at each count stations were derived as a simple average of seven day volumes and Annual Average Daily Traffic (AADT) has been worked out by applying the seasonal correction factor to the Average Daily Traffic are shown in following table 8.

Table 8: Summary of average Daly Traffic

SN	Location	CVPD	ADT	PCU	Remarks
1	At Km 41+000, Tedani Village	24	569	364	At Atraila, traffic diverts mostly to Rambagh, Satna, Rewa
2	At Km 65+000, Chandi Village	24	588	374	At Chakghat, traffic diverts mostly to Allahabad, Sidhi, Rewa & Hanumana

IRC: SP 19-2001, IRC: 108-1996, IRC SP: 41-1994, IRC: 102-1998, IRC 103-1988 Pedestrian Facilities and IRC: 09-1972

Table 9: Summary of Projected Total Traffic Volume

Section	Year					
	2013	2020	2025	2027	2030	2035
At Km 41+000, Tedani Village	363	584	752	836	978	1281
At Km 65+000, Chandi Village	374	602	774	861	1008	1321

C. Proposed Improvement

36. Hardua to Chakghat Road will received the following upgrades under the project:

a. Curvature improvement and realignment
b. Widening
c. Flexible pavement
d. Rearrangement of junctions
e. Road side drains
f. Bridge and cross drainage structures
g. User facilities
h. Traffic control and safety measures

1. Realignment and Curvature Improvement

37. Based on approved geometric standards the alignment plan of the existing road requires correction of sub-standard geometry at various locations. In plain or rolling terrain, a minimum curve radius of 230 m has been attempted to achieve design speed, however an absolute minimum radius of 155m is used at location with space constraints like urban areas, structure approach, and forest area.

a. Carriageway Width

38. The carriageway configuration of two lane with hard shoulder is proposed for the project road having a 7.0m carriageway width.

b. Hard Shoulder

39. Hard shoulders are proposed to be 2.5m wide both sides of the proposed main carriageway for rural plain and rolling terrains.

c. Footpath

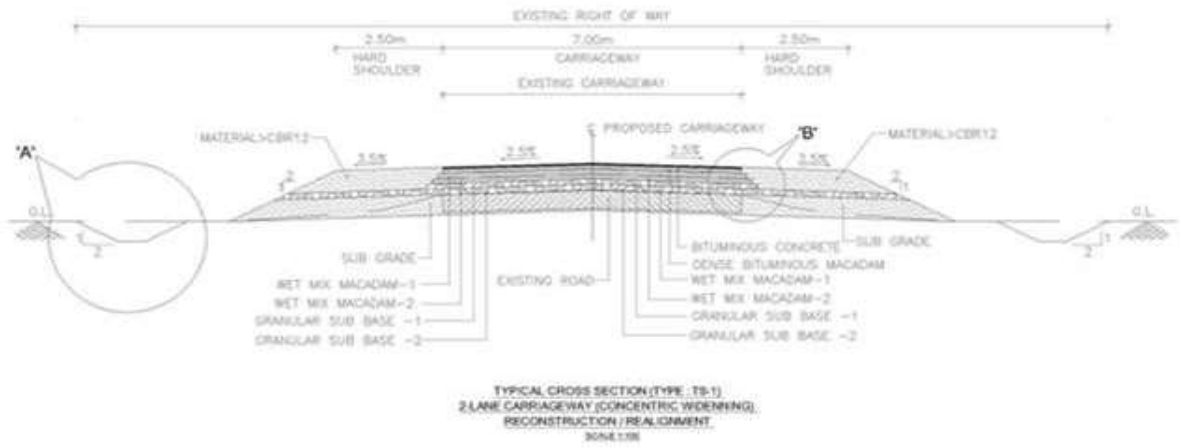
40. The minimum width of footpath in urban stretches is proposed to be 1.50m. The side drain in such stretches may be accommodated under the footpath.

d. Utility Corridor

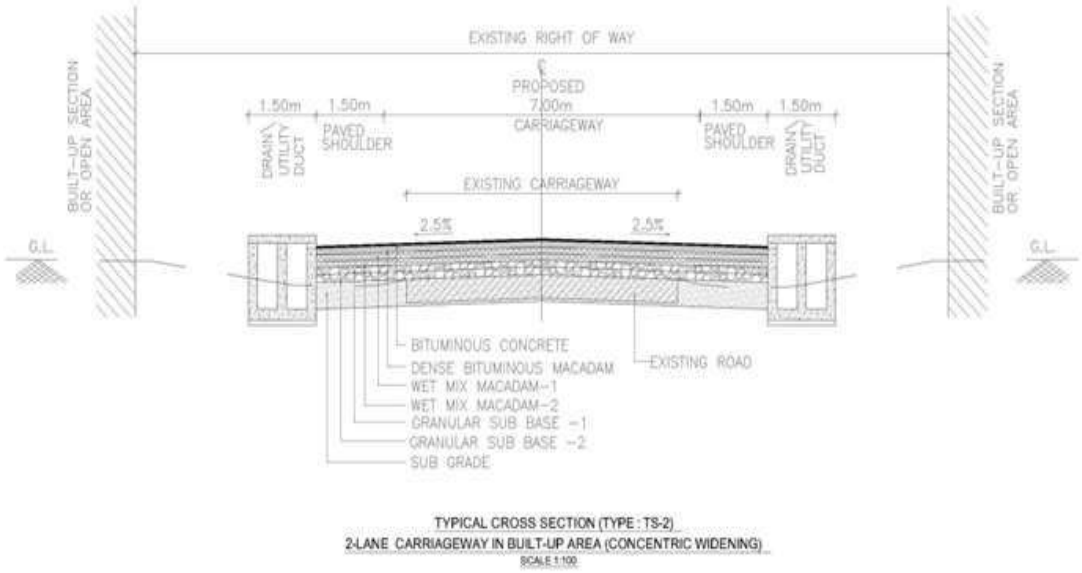
41. Minimum width of utility corridor for rural sections will be 2.0m and for urban/ built-up sections will be 1.00m.

e. Embankment Slopes

42. Side slopes shall not be steeper than 2H: 1V unless soil is retained by suitable soil retaining structures



Typical Cross-section of Geometric Realignment



f. Pavement Composition

43. The existing crust of project alignment is WBM and BT layer (Approx 50 mm thick), the crust has been dismantled in most of the stretches. As per traffic plying on Project road, the capacity of project road in terms of PCU is coming very less due to some breakage / road blockage at several places on project road, so the traffic for long distances does not ply on project road. The sections of project road due to breakage are Semariya – Gudguda (Km 22.0), breakage due to dismantled of Bridge, Gudguda (Km 22.0) to Chakghat.

44. So all t he freight/commercial vehicles and long distance running vehicles are not using the project road presently and using the adjacent roads, which is also only 3 m wide in fair / poor conditions. After development of the project road, the traffic plying on adjacent roads will divert to project road and the intensity of traffic will increase. As per traffic plying on Project

road, the capacity of project road is achieving less than 1 CMSA on both locations considering design period of 8 years, according to crust design of adjacent project roads, it is recommended to design crust for strengthening for the both homogenous section i.e on basis of 5% CBR and 6msa.

a. BC 30 mm
b. DBM 50 mm
c. WMM 250 mm
d. GSB 300 mm

g. Proposed Bypasses/Realignment

45. No any bypass proposed for this section but the project road is realigned for a length of 6030 m due to geometric improvement. The details of realignment Sections are as under –

S. no	Existing Chanage		Length (m)
	From	To	
1	0+400	0+520	**120**
2	1+440	1+560	110
3	1+660	1+960	310
4	4+000	4+120	100
5	9+400	9+500	100
6	10+320	10+440	110
7	14+340	14+440	100
8	16+850	16+980	120
9	21+680	22+080	340
10	22+560	23+780	1040
11	23+920	24+000	80
12	24+200	24+320	120
13	25+100	25+200	100
14	25+500	25+760	400
15	26 +480	26+580	130
16	27+120	27+220	100
17	28+000	28+100	90
18	28+300	28+480	180
19	29+040	29+200	160
20	29+580	29+680	80
21	30+120	30+480	330
22	32+640	32+740	100
23	35+160	35+500	340
24	36+040	36+160	120
26	42+020	42+300	250
27	45+420	42+980	100
28	46+140	45+680	240
29	86+540	86+940	260
	Total		**6030**

h. Intersection Turning Movement Survey

46. The Project road crosses 85 major & minor roads having traffic of less than 500 PCU, so it is proposed to develop these junctions as at grade. The Flow chart of vehicles at major intersection is –

i. Design of Roadside Drains

47. The following drainage improvement are have been incorporated in the design:

a. Road-side earthen drains of trapezoidal sections (please refer Typical Drawings) on both sides along the entire length,
b. Open chute drain in RCC on slopes of high embankment and as rapids on high cut sections. Further dissipation basins are provided at the toe of high embankments to reduce the velocity of water flow, especially where pitching is
c. Road-side RCC covered drains for urban areas.
d. Open lined drain in RCC on hillside mountainous terrain.

Table 10: Cement Concrete Lined Drain

S. no.	Existing Chainage		Length (m)	Village/ town
	From	To		
1	0+800	1+500	Hadaha	700
2	7+000	7+300	Rangoli	300
3	27+360	29+500	Devkhar	2440
4	39+200	39+960	Ramgadwa	760
5	57+500	58+300	Jawa	800
6	62+500	64+500	Akori	2000
7	64+500	65+250	Chandi	750
8	73+000	74+500	Chilla	1500
9	81+600	85+750	Pansi	4150
10	91+400	92+918	Chak Khotar	1518

j. Pavement Design

48. The project road envisages two lane carriageway with hard shoulders and upgrading of the existing pavement to carry the anticipated traffic over the design period. This would involve the construction of new pavement on the widened side and strengthening and rehabilitation of the existing pavements. Flexible asphalt pavement is proposed for the entire length of project road. The applicable IRC Guidelines would be used for this purpose, but using other internationally accepted design method(s) to ensure that the recommended design is the most appropriate one would further check the design.

k. Traffic Control and Safety Measures

49. In addition to adequate provisions for roadway width, geometric elements and junction improvement, the following provisions will enhance the safety of road users. Due consideration has been made for the provisions contained in IRC: SP 44-1994, “Highway Safety Code”. Also, various measures have been proposed to increase traffic control for the High-speed highway.

50. **Road Signs.** Adequate road signs are proposed for the project road in order to provide advance information to regulate/control traffic flow and ensure safety of operations. All road signs are provided in accordance with IRC.

51. Appropriate road markings are provided with stop signs, give-way signs, traffic merging and diverging signs, lane closure signs, compulsory keep left/right signs or any other signs as per IRC-67. Advance cautionary signs will be installed on sharp curves along with chevron signs at the outer edge of the curves. In hilly areas, curve-ahead signs are accompanied with appropriate delineators.

52. The signs will be of retro reflective sheeting of high intensity grade with encapsulated lens and fixing details as per clause 801 of MoRT&H Specifications for Road and Bridge Works, 2001 (4th Revision, latest reprint).

53. **Pavement Markings**. In project road, pavement will comply with the IRC: 35-1997, "Code of Practice for Road Marking" with centre-line, edge line, continuity line, stop line, give way lines,diagonal / chevron markings and zebra crossings. The pavement marking shall be of hot applied thermoplastic paint with glass beads as per the MORT&H specification for Road and Bridge Works, 2001(4th Revision, latest reprint).

2. Material Investigation

a. Type of Materials

54. The objective of material investigations is to identify the source of natural materials like soil, sand, stone, etc. near and along the alignment of the projectroad as required for the construction of the embankment and subgrade under the pavement and as also the source of aggregates/stones and sand for the construction of road pavement, embankment, bridges, culverts and other structures.

b. Source of Materials

55. **Soil Borrow Sources**. Suitable soil conforming to MORT&H specifications will be required to construct embankment, sub-grade and earthen shoulder. An investigation to identify potential soil borrow sources have confirmed the availability of suitable soil at number of locations along the project road corridor. The soil can be imported from the land near to the project road which is suitable with nature of the type of the soil. The identification of borrow areas were done mainly through local inquiries and contacting the Villagers and Local (Panchayat) bodies. A total of fifteen soils borrow sources which define the type and nature of soil in that area. The results are presented in Volume III – Material Report.

56. **Fly Ash/ Pond Ash**. No any NTPC found in 50 Km periphery (as per ToR Clause 4.12.5 point 1) of Project Road thus no Fly ash /Pond ash is proposed for embankment filling.

57. **Stone Quarry**. Good quality aggregate of various sizes is available at the quarries at Bankuiya (From Km 10 to Km 12). This quarry is approved by the PWD, Govt. of Madhyan Pradesh and the material available there confirms acceptable specifications.

58. **Cement.** Cement to be used in the construction work shall be any of the following types with the prior approval of the Engineer:

a. Ordinary Portland cement, 33 Grade, conforming to IS: 269
b. Rapid Hardening Portland Cement, conforming to IS: 8041
c. Ordinary Portland cement, 43 Grade, conforming to IS: 8112
d. Ordinary Portland cement, 53 Grade, conforming to IS: 12269
e. Sulphate Resistance Cement, Conforming to IS: 12330

59. The chloride content in cement shall in no case exceed 0.05 percent by mass of cement. Also, total sulphur content calculated as sulphuric anhydride (SO3) shall in no case exceed 2.5 percent and 3.0 percent when tri-calcium aluminates percent by mass is upto 5 or greater than 5 respectively. Good quality Cement is locally available.

60. **Steel.** For plain and reinforced concrete (PCC and RCC) or pre-stressed concrete (PSC) works, the reinforcement/un-tensioned steel as the case may be shall consists of the following grades of reinforcing bars as shown in following table-

Strength of Steel

Grade Designation	Bar Type conforming to governing IS Specification	Characteristic Strength fy (MPa)	Elastic Modulus GPa
S 240	IS:432 Part I, Mild Steel Bar	240	200
S 415	IS:1786 High Yield Strength Deformed Bars (HYSD)	415	200

61. **Bitumen.** Bitumen can be used from Mathura refinery approximate 570 km from Chakghat and the tentative locations for HMP camps are –

S.No.	Locations (Design Ch.)	Side	Distance from Mathura Refinary
1	Km 45+000	LHS	620 Kms
2	Km 144+000	LHS	620 Kms

62. **Sand**. A good source of sand is available at bank of Gopadriver from 150 km away from Project road.

IV. DESCRIPTION OF THE ENVIRONMENT

A. Introduction

63. The collection of baseline information on biophysical, social and economic aspects of the project area is the most important reference for conducting Initial Environmental Examination (IEE) study. The description of environmental settings includes the characteristic of area in which the activity of the project road would occur and cover area affected by all impacts. The existing baseline line conditions has been analysed based on primary data collection with regard to air quality, water quality, noise, soil, biodiversity and socio- economic aspects and secondary data collection from published source and various government agencies.. Efforts have been made to collect the latest information both at regional as well as local level especially along the project roads alignment. The primary survey for water, air, noise and soil was carried out during July,2014. The sampling has been done along the project alignment. The existing baseline data and analysis around Hardua to Chakgnat Road is presented in the following sections.

B. Physical Environment

1. Topography, Geology & Soil

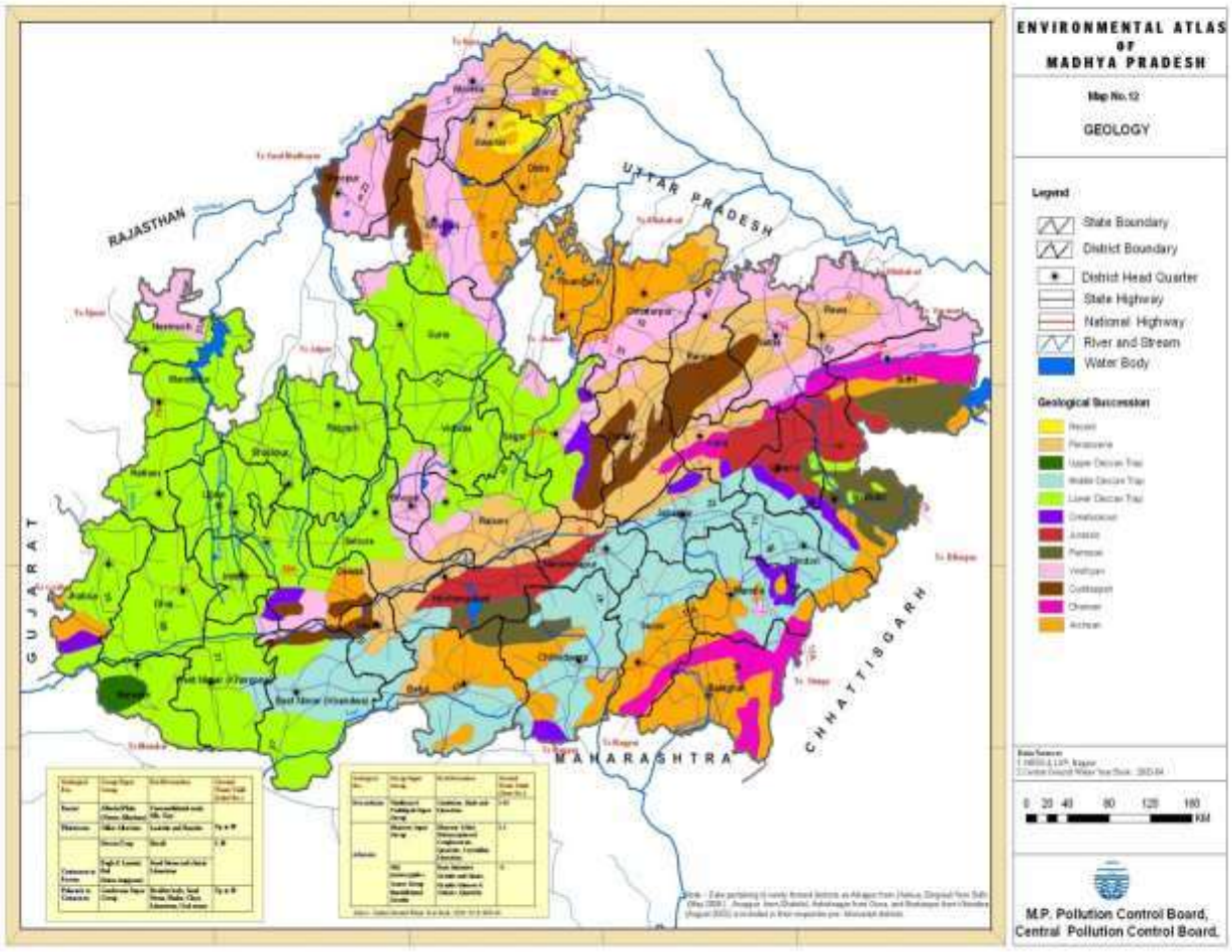
64. Madhya Pradesh nicknamed the "heart of India" due to its geographical location in India is bordered by Uttar Pradesh to the northeast, Chhattisgarh to the southeast, Maharashtra to the south, Gujarat to the west, and Rajasthan to the northwest. Madhya Pradesh the second largest state of the country has a geographic area of 30.82 million hectare, which constitutes 9.37% of the land area of the country. Geologically the State is divided in two zones; Central Plateau and Hill Region, and the Western Plateau and Hill Region. The Central Plateau and Hill Region is further divided into 7 sub-regions, namely: Bundelkhand, Madhya Pradesh Hills, Keymore Plateau and Satpura Hills, Vindhya Plateau, Satpura Plateau, Central Narmada Valley, and Gird. The Western Plateau and Hill Region hasn 2 sub-regions: Jhabua Hills, and Malwa and Nimar Plateau.

Table 11: Geological features of the State

Zone	Sub-group (Region)	District covered	Rain fall (mm)	Climate	Type of Soil
Central Plateau and Hill Region	Bundelkhand	Chatterpur, Datia, Tikamgarh	700	Dry sub humid	Mixed red & Black
	Madhya Pradesh Hills	Mandla, Dindori	1570	Moist sub humid	Red & Yellow
	Keymore Plateau & Satpura Hills	Jabalpur, Panna, Satna, Rewa, Sidhi, Seoni, Katni, Balaghat, Shahdol, Anooppur, Umariya Bhopal, Damoh,	1100	Dry sub humid	Medium Black
	Vindhya Plateau	Raisen, Sagar, Sehore, Vidisha	1130	Dry subhumid	Shallow to Medium Black
	Satpura Plateau	Betul, Chhindwara Narsinghpur,	1220	Dry subhumid	Shallow to Medium Black
	Central Narmada Valley	Hosangabad, Harda	1300	Dry subhumid	Deep Black

Zone	Sub-group (Region)	District covered	Rain fall (mm)	Climate	Type of Soil
	Gird	Morena, Bhind, Gwalior, Guna, Shivpuri, Ashoknagar, Sheopur	670	Semi-arid	Medium Black alluvial
Western Plateau and Hill Region	Jhabua Hills	Jhabua	988	Semi-arid	Medium to deep black
	Malwa & Nimar Plateau	Indore, Dhar, Ujjain, Ratlam, Dewas, Mandsaur, Rajgarh, Shajapur, Khandwa, Khargone, Neemuch, Badwani, Burhanpur	874	Semi-arid	Medium to deep black

Figure 6: The geological Map of MP



65. The proposed Hardua to Chakghat project road between is situated on the North East and Hill Region agro climate zone and forms Gird sub-group. The soil type in the area is Medium Black. Collected soil samples along the project corridor were analyzed and results are presented in Table 12. The results show that pH of the soil is alkaline, and available nutrients indicated medium nitrogen, low phosphorus, and high potassium contents.

Table 12: Soil Characteristics of Study Area

Sr. No.	Parameters	Test method	Unit	Hardua Village (KM 0+150)	Vijay Ramba g (KM 48+400)	Kayat Village (KM 59+700)	Murlidhar Hospital Makshi (KM 96+000)
1.	pH(1:5 suspension)	IS:2720 (Part-26)		7.72	7.18	7.37	7.45
2.	Electrical Conductivity at 25oC (1:5 suspension.)	IS:2720 (Part-21)	µmhos/cm	203	208	207	207
3	Water Holding Capacity	STP/SOIL	%	33	32	36	33
4	Nitrogen	STP/SOIL	Kg/Ha	50.18	48.92	48.92	48.92
5	Potassium (as K)	STP/SOIL	Kg/Ha	26.99	27.10	28.22	28.0
6	Phosphorus	STP/SOIL	Kg/Ha	46.82	47.25	43.90	45.25

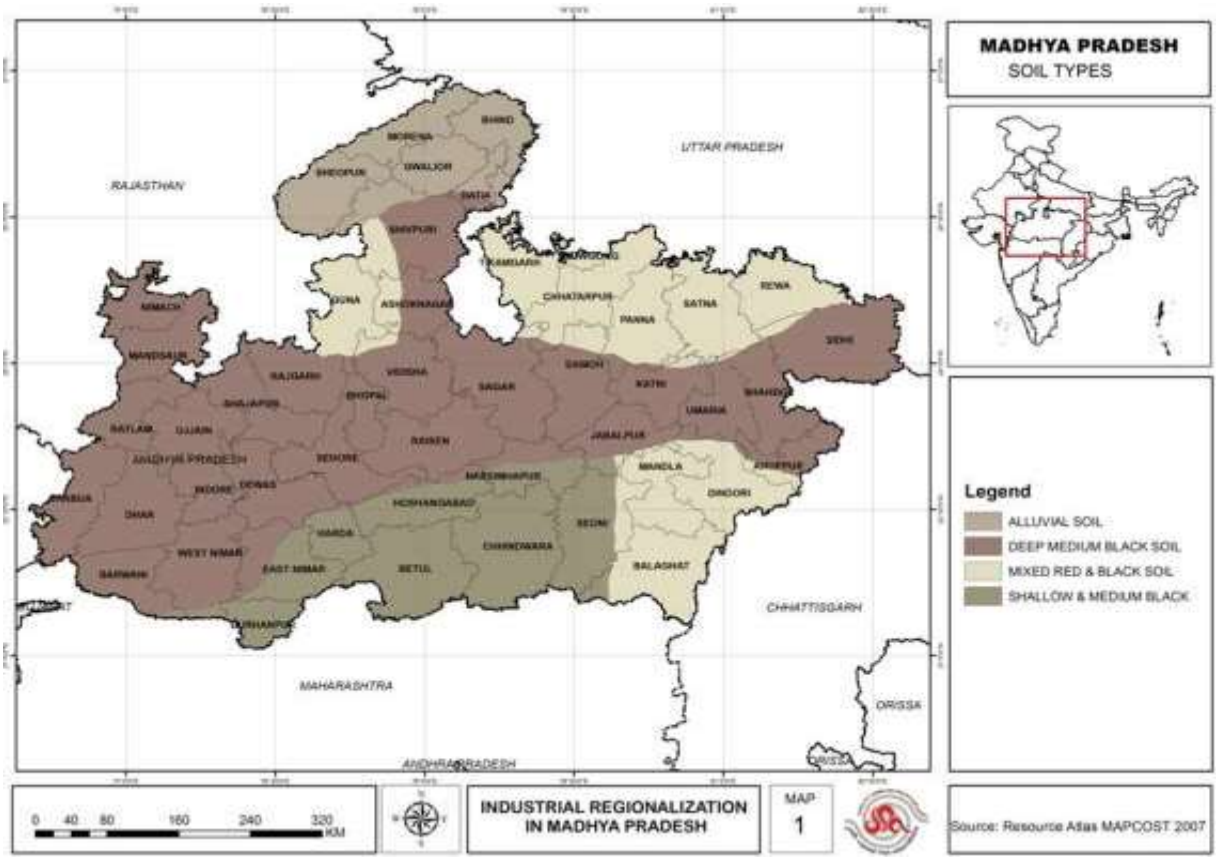
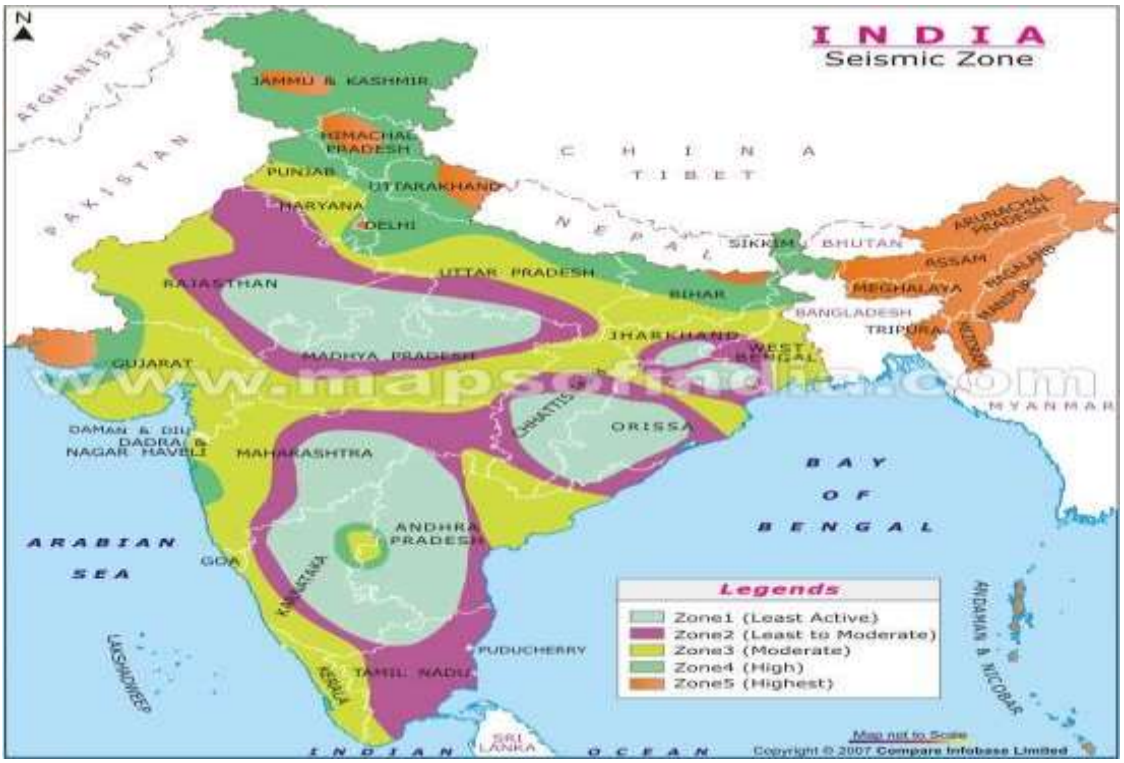


Figure 7: Soil Map of MP

2. Seismicity

66. The entire Madhya Pradesh falls under zone least active to moderate zone as per seismic map of India. In the moderate damage risk zone structures are at risk of a Medvedev–

Sponheuer–Karnik (MSK) scale VII with very strong earthquake where most people are frightened and try to run outdoors causing serious damage to older buildings, masonry chimneys collapse and small landslides. In the least active zone an MSK VI or less and is classified as the Low Damage Risk Zone where earthquake can frighten most people dishes and glassware may break and visible damage to masonry structures, cracks in plaster may occur. Figure 8 shows seismic Zone map of India.



Source:IS1893(Part1)2002

Figure 8: Seismic Zone Map of India

3. Climate

67. The region experiences typical tropical climate. It is characterized by hot summer season and general dryness except in the southwest monsoon season. The year may be divided into four seasons; cold season from December to February is followed by the hot season from March to about the middle of June. The periods from mid-June to September is the southwest monsoon season, and from October to November constitute the post monsoon or retreating monsoon season. The maximum temperature during summers ranges from 30ºC to 44ºC while minimum temperature from 30ºC to 19ºC. The temperature during the winter season ranges between of 27ºC to 10ºC. The monsoon season spreads from the month of June to September with average rainfall of 1000 mm in the west to 1500 mm in the eastern part of state. The mean annual rainfall in the state is 1200 mm. Table: 20 shows the climate condition of Rewa district.

4. Surface Water Hydrology

68. There are ten major rivers that originate from the State. As Madhya Pradesh is located in the center of India, most of the rivers are interstate rivers. The rivers namely Chambal, Sindh, Betwa, Ken flow northward and meet with Yamuna whereas the river Sone falls directly into Ganga. Narmada, Tapti and Mahi rivers flow westward and meet Arabian Sea whereas Wainganga and Pench rivers meet Godavari in the south. Rivers in Madhya Pradesh are mostly seasonal and rainfed, receiving maximum water flow during the monsoon season. The non - monsoon flow in some perennial rivers is mainly due to flow from groundwater.

5. Ground Water Hydrology

69. Ground water is the major water source in the area for drinking purpose. The source of recharging of ground water is mostly from rainfall and canals. Hand pumps are commonly used to draw the water from ground in the villages. Static water levels vary along the stretch of the sample roads. First or upper ground water aquifer lies in the range of 12 to 18 m below ground level (bgl). The ground water levels in the area show a decline of 0.8 m to 1.2 m from post monsoon to pre monsoon period. The details of water boides along the project road are given in Table 13.

70. No of hand pump falling within RoW /near the carriageway and need to be shifted.

Table 13: Water Bodies (Hardua To Chakghat)

Sl. No.	Chainage	Distance (m)	L/R or Crossing	Type - Pond, River, Well, HP, Tubwell etc	Remarks
1	0.05	10.5	LHS	HP	Harduwa Chauraha
2	0.15	8	LHS	HP	Harduwa Village
3	0.50	10	LHS	HP	Harduwa Village
4	0.70	-	Crossing	River	Tedha Rever, all time water, vill- Harduwa
5	1.00	13	RHS	Well	Harduwa Village
6	1.10	4.5	LHS	HP	Harduwa Village
7	1.30	6	LHS	Well	Harduwa Village
8	1.50	4, / 6	RHS	;well /HP	Harduwa Village
9	3.00	10	LHS	HP	Majhiyar
10	3.40	15	RHS	Well	Majhiyar
11	3.40	8	LHS	HP	Majhiyar
12	4.50	-	Crossing	Canal	Majhiyar
13	5.50	-	Crossing	Nala	all time water, Vill- Majhiyar
14	5.70	-	Crossing	Nala	Kushol Nala, all time water, vill- Kushol
15	5.90	4.5	LHS	HP	Kushol
16	7.20	-	Crossing	Nala	Seasonal nala, Khaphtiha
17	7.40	10	RHS	HP	Khaphtiha
18	7.50	13	LHS	HP	Khaphtiha
19	9.10	-	Crossing	Nala	Seasonal nala, Khaphtiha
20	9.30	14	LHS	HP	Gundwa
21	10.40	7	LHS	HP	Rangoli

Sl. No.	Chainage	Distance (m)	L/R or Crossing	Type - Pond, River, Well, HP, Tubwell etc	Remarks
22	12.80	-	Crossing	Nala	Seasonal Nala, Bamni Ajmer
23	13.30	9	RHS	HP	Bamni Ajmer
24	13.90	7	RHS	HP	Bamni Ajmer
25	14.00	11	RHS	HP	Bamni Ajmer
26	15.80	-	Crossing	Nala	Seasonal,Bamni Ajmer
27	24.30	6.5	RHS	Bauli	Kurali
28	24.30	-	crossing	Nala	Kurali
29	24.70	-	Crossing	River	Kurali Pahari River, Seasonal, Kurali
30	27.10	-	Crossing	Nala	Seasonal Nala
31	27.50	15	LHS	HP	Kurali
32	27.80	-	Crossing	River	All time water, Kurali Pahadi
33	28.00	8	LHS	HP	Dewkhar
34	28.90	7	LHS	HP	Dewkhar
35	29.20	2	RHS	Well	Dewkhar
36	30.70	3	RHS	HP	Marwa
37	30.80	10	LHS	HP	Marwa
38	39.10	4	RHS	HP	Atrala
39	39.80	4	RHS	HP	Atrala
40	40.30	3.5	LHS	HP	Atrala
41	40.40	4	RHS	HP	Atrala
42	40.40	5	RHS	HP	Atrala
43	40.50	3	LHS	HP	Atrala
44	41.20	10	RHS	HP	Atrala
45	41.20	11	RHS	Ponds	Atrala
46	41.50	13	RHS	HP	Atrala
47	41.60	3.5	LHS	HP	Atrala
48	41.80	3	RHS	HP	Atrala
49	42.10	6	LHS	HP	Atrala
50	42.30	7	LHS	HP	Atrala
51	42.30	8	LHS	Ponds	Atrala
52	42.50	5	RHS	Well	Atrala
53	42.55	4.5	LHS	HP	Atrala
54	42.60	5	RHS	HP	Atrala
55	43.00	4.5	RHS	HP	Atrala
56	43.10	7	LHS	Well	Atrala
57	43.40	5	RHS	Well	Atrala
58	43.80	8	RHS	Well	Tenduni
59	43.90	10	LHS	HP	Tenduni
60	44.00	9	LHS	Well	Tenduni
61	44.10	7	LHS	HP	Chaukhandi
62	44.20	6	RHS	HP	Chaukhandi
63	44.30	4	RHS	HP	Chaukhandi
64	44.35	5.5	RHS	Well	Chaukhandi

Sl. No.	Chainage	Distance (m)	L/R or Crossing	Type - Pond, River, Well, HP, Tubwell etc	Remarks
65	44.60	9	LHS	HP	Chaukhandi
66	44.70	-	Crossing	Nala	Seasonal nala, Vill- Chaukhandi
67	45.10	6	LHS	HP	Chaukhandi
68	45.30	2.5	RHS	HP	Chaukhandi
69	44.30	3	RHS	HP	Chaukhandi
70	45.40	3	RHS	Well	Chaukhandi
71	45.50	3	RHS	HP	Chaukhandi
72	45.70	2.5	LHS	HP	Chaukhandi
73	45.70	3	LHS	Well	Chaukhandi
74	45.80	2.5	RHS	HP	Chaukhandi
75	46.00	2.5	LHS	HP	Chaukhandi
76	46.00	3	RHS	Well	Chaukhandi
77	46.10	2.5, / 3	RHS	2 no HP	Chaukhandi
78	46.10	4	RHS	HP	Chaukhandi
79	46.20	3.5	RHS	HP	Chaukhandi
80	46.40	4	RHS	HP	Chaukhandi
81	46.40	3.5	LHS	HP	Chaukhandi
82	46.70	5	RHS	Well	Chaukhandi
83	47.10	6	RHS	HP	Chaukhandi
84	47.20	4	RHS	Well	Chaukhandi
85	47.40	6	RHS	HP	Chaukhandi
86	47.70	8	LHS	HP	Chaukhandi
87	48.10	9	LHS	HP	Rambagh
88	48.20	3	LHS	Ponds	Rambagh
89	48.20	4	LHS	HP	Rambagh
90	48.20	3.5	RHS	HP	Rambagh
91	48.60	4	RHS	HP	Rambagh
92	48.80	-	Crossing	Nala	Seasonal nala, vill- Rambagh
93	48.90	-	Crossing	Nala	Seasonal nala, vill- Rambagh
94	49.10	4	LHS	HP	Rambagh
95	49.20	4	LHS	HP	Rambagh
96	49.40	3	LHS	HP	Rambagh
97	49.50	4	RHS	HP	Rambagh
98	49.60	5	LHS	HP	Rambagh
99	50.10	7	RHS	HP	Khamaria
100	50.70	5	RHS	HP	Khamaria
101	51.40	5	LHS	HP	Khamaria
102	51.90	5	LHS	HP	Khamaria
103	52.10	6	LHS	HP	Khamaria
104	52.10	6	LHS	HP	Khamaria

Sl. No.	Chainage	Distance (m)	L/R or Crossing	Type - Pond, River, Well, HP, Tubwell etc	Remarks
105	52.90	5	LHS	HP	Khamaria
106	53.00	5	LHS	HP	Khamaria
107	53.00	6	LHS	HP	Khamaria
108	53.40	7	RHS	HP	Hardawa
109	54.20	-	Crossing	Nala	Hardawa Nala, Seasonal
110	54.70	7	LHS	HP	Kirhaimid
111	55.50	5.5	LHS	HP	Bamandhar
112	56.00	7	RHS	HP	Garhwa
113	56.00	7	LHS	HP	Garhwa
114	56.20	6	RHS	HP	Garhwa
115	56.20	6	RHS	HP	Garhwa
116	56.30	8	RHS	HP	Garhwa
117	56.50	8	LHS	HP	Garhwa
118	56.60	6	RHS	HP	Garhwa
119	56.70	6	RHS	HP	Garhwa
120	56.70	7	RHS	HP	Garhwa
121	56.80	8	RHS	HP	Sitlaha
122	57.00	6.5	LHS	HP	Sitlaha
123	57.10	5	RHS	HP	Sitlaha
124	57.20	5	RHS	HP	Sitlaha
125	57.20	6	RHS	HP	Sitlaha
126	57.80	5	RHS	HP	Sitlaha
127	58.60	6	RHS	HP	Taktaiya
128	58.80	8	LHS	HP	Jawa
129	59.60	8	RHS	HP	Jawa
130	59.70	6	RHS	HP	Jawa
131	59.80	7	RHS	HP	Jawa
132	59.90	8	RHS	HP	Jawa
133	60.00	10	LHS	HP	Jawa
134	60.10	6	RHS	HP	Jawa
135	60.20	5	RHS	HP	Jawa
136	60.40	5	RHS	HP	Jawa
137	60.70	5	LHS	HP	Jawa
138	60.80	5	LHS	HP	Jawa
139	61.00	5	LHS	HP	Jawa
140	61.10	5	LHS	HP	Jawa
141	61.10	-	Crossing	Nala	Seasonal Nala, Jawa
142	61.10	5	RHS	HP	Jawa
143	61.20	6	RHS	HP	Jawa

Sl. No.	Chainage	Distance (m)	L/R or Crossing	Type - Pond, River, Well, HP, Tubwell etc	Remarks
144	61.30	7	RHS	HP	Jawa
145	61.40	8	LHS	HP	Jawa
146	61.40	8	LHS	HP	Jawa
147	61.70	6	LHS	HP	Jawa
148	61.80	8	LHS	HP	Jawa
149	62.00	7	LHS	HP	Jawa
150	62.10	6	LHS	HP	Jawa
151	62.20	8	RHS	HP	Jawa
152	62.30	8	LHS	HP	Jawa
153	62.30	8	LHS	HP	Jawa
154	62.40	7	LHS	HP	Jawa
155	62.50	7	LHS	HP	Jawa
156	62.60	9	RHS	HP	Jawa
157	62.70	8	LHS	HP	Jawa
158	62.70	8	RHS	HP	Jawa
159	62.80	8	RHS	HP	Jawa
160	62.90	6	LHS	HP	Jawa
161	63.10	9	RHS	HP	Itaw
162	63.20	6	RHS	Ponds	Itaw
163	63.30	6	LHS	HP	Itaw
164	63.40	9	RHS	HP	Itaw
165	43.70	6	LHS	HP	Itaw
166	63.80	5	LHS	HP	Itaw
167	64.10	5	LHS	HP	Itaw
168	64.20	6	RHS	HP	Itaw
169	64.20	10	RHS	Well	Itaw
170	64.50	10	RHS	HP	Chandi
171	64.90	3	LHS	Ponds	Chandi
172	65.00	5	LHS	HP	Chandi
173	65.10	5	RHS	HP	Chandi
174	65.20	6	LHS	HP	Chandi
175	65.30	6	RHS	HP	Chandi
176	65.30	7	LHS	HP	Chandi
177	65.60	6	LHS	HP	Chandi
178	66.30	8	RHS	HP	Chandi
179	66.30	7	LHS	HP	Chandi
180	66.40	7	LHS	HP	Chandi
181	66.70	8	LHS	HP	Chandi
182	66.90	8	LHS	HP	Chandi
183	67.60	5	LHS	HP	Chandi
184	67.70	9	RHS	HP	Chandi
185	67.80	9	RHS	HP	Chandi
186	68.20	12	RHS	HP	Chandi
187	68.70	7	RHS	HP	Kush Mada
188	68.80	9	LHS	HP	Kush Mada

Sl. No.	Chainage	Distance (m)	L/R or Crossing	Type - Pond, River, Well, HP, Tubwell etc	Remarks
189	68.90	7	RHS	HP	Kush Mada
190	69.90	6	LHS	HP	Kush Mada
191	69.40	6	RHS	HP	Kush Mada
192	69.50	8	RHS	HP	Kush Mada
193	69.60	8	LHS	HP	Kush Mada
194	69.70	7	LHS	HP	Kush Mada
195	69.90	8.5	RHS	HP	Kush Mada
196	70.00	15	LHS	Well	Kush Mada
197	70.10	5	RHS	HP	Kush Mada
198	70.40	8	LHS	HP	Kush Mada
199	71.10	7	LHS	HP	Koniya Kala
200	71.30	6	RHS	HP	Koniya Kala
201	71.70	7	RHS	HP	Koniya Kala
202	71.90	8	RHS	HP	Koniya Kala
203	72.10	5	RHS	HP	Kuthila
204	72.20	6	LHS	HP	Kuthila
205	72.40	6	LHS	HP	Kuthila
206	72.40	8	RHS	HP	Kuthila
207	72.60	10	LHS	Well	Kuthila
208	72.65	6	RHS	HP	Kuthila
209	73.10	6	RHS	HP	Kuthila
210	73.80	6	LHS	HP	Kuthila
211	73.90	7	LHS	HP	Kuthila
212	74.20	6	RHS	HP	Kuthila
213	74.50	7	RHS	HP	Kuthila
214	74.70	7.5	RHS	HP	Kuthila
215	74.80	8	LHS	HP	Kuthila
216	75.00	6	LHS	HP	Chilladhehar
217	75.05	11	LHS	Well	Chilladhehar
218	75.50	5	LHS	HP	Chilla
219	75.70	5	LHS	HP	Chilla
220	75.75	5	RHS	HP	Chilla
221	75.80	10	LHS	HP	Chilla
222	75.90	10	LHS	HP	Chilla
223	75.90	10	LHS	HP	Chilla
224	76.90	6	RHS	HP	Chilla
225	76.90	6	LHS	HP	Chilla
226	76.90	7	RHS	HP	Chilla
227	76.00	9	LHS	HP	Chilla
228	76.10	7	LHS	HP	Chilla
229	76.60	12	LHS	HP	Chilla
230	76.80	7	LHS	HP	Chilla
231	76.80	12	LHS	Well	Chilla
232	76.90	7	LHS	HP	Chilla
233	77.00	4.5	RHS	HP	Chilla

Sl. No.	Chainage	Distance (m)	L/R or Crossing	Type - Pond, River, Well, HP, Tubwell etc	Remarks
234	77.00	15	RHS	Well	Chilla
235	77.20	6	RHS	HP	Chilla
236	77.30	4.5	LHS	HP	Chilla
237	77.35	8	LHS	HP	Chilla
238	77.50	5	LHS	HP	Chilla
239	77.60	10	LHS	HP	Chilla
240	77.90	6	LHS	HP	Kotra
241	78.10	6.5	LHS	HP	Kotra
242	78.20	5	RHS	HP	Kotra
243	78.40	6	RHS	HP	Kotra
244	78.50	8	LHS	HP	Kotra
245	78.60	9	RHS	HP	Kotra
246	79.20	10	LHS	HP	Purwa
247	79.40	11	RHS	HP	Purwa
248	79.50	7	LHS	HP	Purwa
249	79.80	6	RHS	HP	Purwa
250	79.90	5	RHS	HP	Purwa
251	80.30	6.5	RHS	HP	Purwa
252	80.40	7.5	LHS	HP	Purwa
253	81.10	5	RHS	HP	Purwa
254	82.20	-	Crossing	Nala	Seasonal nala, Vill - Chandela
255	82.50	8	RHS	HP	Chandela
256	82.80	12	LHS	HP	Chandela
257	83.10	-	Crossing	Nala	Sukhad nala, all time water, Vill - Chandela
258	83.50	9	LHS	HP	Chandpur
259	83.60	6	LHS	HP	Chandpur
260	83.80	9.5	RHS	HP	Chandpur
261	83.90	6	LHS	HP	Chandpur
262	84.50	7	RHS	HP	Chandpur
263	84.70	5	RHS	HP	Chandpur
264	84.90	5	RHS	HP	Chandpur
265	85.20	8.5	LHS	HP	Panasi
266	85.40	5.5	RHS	HP	Panasi
267	85.50	4.5	RHS	HP	Panasi
268	85.90	5	LHS	HP	Panasi
269	86.00	15	RHS	HP	Panasi
270	86.10	6	RHS	HP	Jhagaduwa
271	86.40	5.5	RHS	HP	Jhagaduwa
272	86.80	5.5	RHS	Tube Well	Panasi
273	86.90	8	LHS	HP	Panasi
274	87.30	12	LHS	HP	Panasi
275	87.50	8	LHS	HP	Panasi
276	87.80	10	RHS	HP	Papaura
277	89.10	4	LHS	HP	Papaura

Sl. No.	Chainage	Distance (m)	L/R or Crossing	Type - Pond, River, Well, HP, Tubwell etc	Remarks
278	89.50	7	LHS	HP	Loniyapar
279	89.70	5	LHS	HP	Loniyapar
280	89.80	5	RHS	HP	Loniyapar
281	90.30	10	RHS	HP	Loniyapar
282	90.50	-	Crossing	Nala	Seasonal nala, Vill - Loniyapar
283	91.90	5	RHS	HP	Deura
284	92.90	4	RHS	HP	Deura
285	93.00	5	LHS	HP	Deura
286	93.40	5	LHS	HP	Deura
287	94.00	4	LHS	HP	Deura
288	94.90	12	RHS	HP	Deura
289	95.00	5	LHS	HP	Patiwar
290	95.60	4	RHS	HP	Chakghat
291	95.70	6	LHS	HP	Chakghat
292	95.90	5	RHS	HP	Chakghat
293	96.10	6	LHS	HP	Chakghat
294	96.20	7	LHS	HP	Chakghat
295	96.60	5	LHS	HP	Chakghat
296	96.80	2.5	RHS	HP	Chakghat

6. Water Quality

71. Water quality along the sample roads were sampled and analysed for a physicochemical characteristics based on procedures specified in published by NABL and Certified by ISO 9001 : 2008. Results were compared to the standards for drinking water as per IS: 10500 and were all found suitable for drinking water and all parameters are within desirable. The results are enclosed as Appendix10

7. Ambient Air Quality

72. The baseline status of the ambient air quality has been established through ambient air quality monitoring at selected points along the project roads. The ambient air quality has been monitored at 4 along the project road for particulate matter (PM2.5 and PM10), sulphur dioxide (SO2), oxides of nitrogen (NOX); and carbon monoxides (CO) using standard analysis technique (Table 14).

Table 14: Techniques Used for Ambient Air Quality Monitoring

Sl. No.	Parameter	Technique	Minimum Detectable Limit (ug/m3)
1.	Particulate Matter ($PM_{2.5}$)	Gravimetric Method	1.0
2.	Particulate Matter (PM_{10})	Gravimetric Method	1.0
3.	Sulphur dioxide	Modified West and Gaeke	5.0
4.	Nitrogen Oxide	Modified Jacob & Hochheiser	5.0
5.	Carbon Monoxide	Non Dispersive Infrared Spectroscopy (NDIR)	1

73. Ambient air quality monitoring results for PM2.5, PM10, SO2, NOx and CO concentrations are given in Table 25 and summarized below. The monitored values are compared with National Ambient Air Quality Standards prescribed by Central Pollution Control Board (CPCB) for residential, rural and other areas. The Ambient air quality levels meet the National air quality standards for rural, residential and industrial area all along the project road.

- **PM_{10}**: The mean $PM_{2.5}$ concentration at ambient air quality monitoring locations varies from 76.5 to 81.7 /m^3.
- **$PM_{2.5}$:** The mean PM_{10}concentration at ambient air quality monitoring locations varies from 34.2 to 41.07 /m^3. The values are within the permissible limit at all the stations.
- **SO_2:** The mean concentrations of SO_2at all ambient air quality monitoring locations are <4. The values are within the permissible limit at all the stations.
- **NOx:** The mean concentrations of NOx at all AAQM locations are <5. The values are within the permissible limit at all the stations.
- **CO:** The mean concentrations of CO at all AAQM locations are <1. The values are within the permissible limit at all the stations.

Table 15: Ambient Air Quality along the Project Road

Sr No.	Parameter	Test Method	Units	Limits as per Environment (Protection) Act.	Hardua	Rambag	Jawa	Chalghat
1.	Particulate Matter(PM_{10}	IS:5182 Part XXIII -	µg/m^3	100.0	80.25	76.5	78.5	81.7
2.	Particulate Matter ($PM_{2.5}$)	CPCB Volume– 1 / Grav	µg/m^3	60.0	38.9	34.2	37.5	41.07
3.	Sulphur Dioxide	IS:5182 Part-II	µg/m^3	80.0	<4	<4	<4	<4
4.	Nitrogen Dioxide	IS:5182 Part-VI	µg/m^3	80	<5	<5	<5	<5
5.	Carbon Monoxide	IS:5182 Part-X	mg/m^3	4.0	<1	<1	<1	<1

8. Noise Measurements

74. Preliminary reconnaissance survey was undertaken to identify the major noise generating sources in the area. The noise at different noise generating sources has been identified based on the industrial, commercial and residential activities, traffic and noise at sensitive areas. Sound Pressure Level (SPL) measurements were undertaken at all locations, with an interval of about 5 seconds over a period of 10 minutes per hour for 24 hr. The day noise level has been monitored during 6 AM to 10 PM and night levels during 10 P.M. to 6 AM at all locations. Day and night-time Leq have been calculated from hourly Leq values and compared with the stipulated standards. Table 16 gives the day and night-time Leq noise levels. Measured Leq noise levels exceed prescribed standards during the day time due to various commercial activities and the location of monitoring points close to the road.

Table 16: Day and Night Time Leq in the Area

Locations	Day Time dB(A)	Night Time dB(A)	Prescribed Standards dB(A)	
			Day Time	Night Time
Rewa	66.9	44.2	55	45
Bakia	64.5	37.9	55	45
Bankunia	61.8	36.8	55	45
Simaria	64.9	42.2	55	45

Source: Field monitoring, July 2014

9. Abutting Land Use Pattern

75. The existing alignment is a link for Semariya–Atraila-Rambagh & Chakghat. The pattern on both side of road is agricultural and built-up. The details of land use pattern along the project road are:

Agricultural land – 67.26%,
Built-up Land – 26.74%,
Barren Land – 3.53% &
Hill / Valley – 2.48%

76. The alignment passes through one ghat section i.e. Bhulia Ghat

C. Ecological Resources

1. Forests

77. The forest cover has been classified as dense forest and open forest. The latest estimates of Forest Survey of India (FSI), published in the State of Forest Report (SFR) 2003, suggest that the total forest cover of M.P. is 76,429 sq. km., constituting 24.79% of the State's total land area. Of the total forest cover, dense forest accounts for 13.57% and open forest about 11.22%. Central, eastern, and southern parts of the state are rich in forest cover. Figure 9 show the forest map of the state.

Figure 9: Forest Cover in the District of Madhya Pradesh

2. Wild Life and Protected Areas

78. The project road does not pass through any protected area such as Wildlife Sanctuary, National park or bio –reserve. There is no wildlife sanctuary Wildlife Sanctuary, National park or bio –reserve within 10 km from the project road.At some section ,the road passing through only protected forest area.

3. Trees

79. Moderate tree density is observed all along the Hardua to Chakghat road. The main tree species observed are, Neem, Babool, Plash, Eucplitus, Mango. An estimated 668 trees will be cleared to accommodate the require road upgrading .Most dominating of which is Neem (Azadirachta Indica) tree.

Table 17: List of Trees

S. No.	Chainage	Distance from centre of existing road*	Girth (0-30cm , 30-60cm , 60-90,90-120, >120cm	Approx Ht.(M)	Left *	Right *	Local Name	Botanical Name	Remarks
***Laft and Right are based on assending chainage *With in ROW i.e. 6 mtr from the centre of road**									
1	0.200	5.5	90-120	12	R		Eucklipuls	*Eucalyptus cinerea*	
2	0.210	4.5	30-60	8		L	Shubabul	*Eucalyptus cinerea*	
3	0.220	4.75	30-60	7		L	Shubabul	*Eucalyptus cinerea*	
4	0.230	4.75	30-60	6		L	Shubabul	*Eucalyptus cinerea*	
5	0.240	5	60-90	7		L	Shubabul	*Eucalyptus cinerea*	
6	0.250	5	30-60	7		L	Eucklipuls	*Eucalyptus Radiata*	
7	0.260	5	0-30	6		L	Eucklipuls	*Eucalyptus Radiata*	
8	0.270	4.5	0-30	6		L	Eucklipuls	*Eucalyptus Radiata*	
9	0.300	5.5	0-30	5		L	Neem	*Azadirachta Indica*	
10	0.500	4.5	30-60	7		L	Mango	*Mangifera Indica*	
11	0.510	4	0-30	6		L	Mango	*Mangifera Indica*	
12	0.515	4.5	0-30	5		L	Jamun	*Syzygium cumini*	
13	0.520	5.5	30-60	7		L	Sagoun	*Tectona grandis*	
14	0.521	5.5	30-60	7		L	Sagoun	*Tectona grandis*	
15	0.522	5.5	30-60	6		L	Neem	*Azadirachta Indica*	
16	0.523	5	0-30	6		L	Shubabul	*Leucaena leucocephala*	
17	0.524	5	0-30	6		L	Shubabul	*Leucaena leucocephala*	
18	0.525	5.5	0-30	7		L	Shubabul	*Leucaena leucocephala*	
19	0.526	5	30-60	7		L	Shubabul	*Leucaena leucocephala*	
20	0.527	5	30-60	7		L	Shubabul	*Leucaena leucocephala*	
21	0.528	5	30-60	7		L	Shubabul	*Leucaena leucocephala*	
22	0.529	5	30-60	7		L	Shubabul	*Leucaena leucocephala*	
23	0.530	5	0-30	7		L	Shubabul	*Leucaena leucocephala*	
24	0.800	5	30-60	8	R		Shubabul	*Leucaena leucocephala*	
25	1.100	5.5	30-60	8		L	sheesham	*Dalbergia sissoo*	
26	1.400	5	60-90	7	R		Shubabul	*Leucaena leucocephala*	
27	1.420	4.5	30-60	6	R		sheesham	*Dalbergia sissoo*	
28	1.500	4.5	30-60	6		L	sheesham	*Dalbergia sissoo*	
29	1.510	6	90-120	6		L	Shubabul	*Leucaena leucocephala*	
30	1.515	6	30-60	5		L	Neem	*Azadirachta indica*	

S. No.	Chainage	Distance from centre of existing road*	Girth (0-30cm , 30-60cm , 60-90,90-120, >120cm	Approx Ht.(M)	Left *	Right *	Local Name	Botanical Name	Remarks
31	1.530	5.5	30-60	4		L	Shubabul	*Leucaena leucocephala*	
32	1.540	5.5	30-60	5		L	Eucklipuls	*Eucalyptus Radiata*	
33	3.200	5.5	30-60	5		L	Berry	*Zizyphus mauritiana*	
34	3.300	5	0-30	2	R		kadam	*Neolamarckia cadamba*	
35	3.320	5	0-30	4	R		kadam	*Neolamarckia cadamba*	
36	3.500	5.5	0-30	4	R		Mahua	*Madhuca longifolia*	
37	3.510	5.5	30-60	7	R		Eucklipuls	*Eucalyptus Radiata*	
38	3.520	5	0-30	6	R		Shubabul	*Leucaena leucocephala*	
39	5.900	5.5	0-30	6		L	Shubabul	*Leucaena leucocephala*	
40	5.910	5.5	0-30	5		L	Shubabul	*Leucaena leucocephala*	
41	5.915	5.5	0-30	5		L	Shubabul	*Leucaena leucocephala*	
42	5.920	5.5	0-30	5		L	Shubabul	*Leucaena leucocephala*	
43	5.925	5	0-30	6		L	Eucklipuls	*Eucalyptus Radiata*	
44	5.930	5.5	0-30	6		L	Eucklipuls	*Eucalyptus Radiata*	
45	7.300	5	0-30	5		L	Palash	*Butea monosperma*	
46	7.310	5	0-30	4		L	Palash	*Butea monosperma*	
47	7.315	4.5	30-60	4.5		L	Palash	*Butea monosperma*	
48	7.320	5	30-60	5		L	Palash	*Butea monosperma*	
49	7.325	5.5	30-60	6		L	Palash	*Butea monosperma*	
50	7.330	5	0-30	5		L	Palash	*Butea monosperma*	
51	7.315	5	0-30	5		L	Palash	*Butea monosperma*	
52	7.500	4.5	30-60	4	R		Bargad	*Ficus bengalensis*	
53	8.500	4.5	0-30	4	R		Neem	*Azadirachta Indica*	
54	8.510	5	0-30	5	R		Mango	*Mangifera Indica*	
55	8.900	5.75	0-30	6	R		Eucklipuls	*Eucalyptus Radiata*	
56	8.910	5.5	60-90	7	R		Eucklipuls	*Eucalyptus Radiata*	
57	8.920	5	>120	8	R		Palash	*Butea monosperma*	
58	10.400	5	>121	9	R		Peepal	*Phycus Relogiasa*	
59	12.600	5.5	>122	9		L	Peepal	*Phycus Relogiasa*	
60	12.620	5	30-60	10		L	Bargad	*Ficus benghalensis*	
61	13.200	5	30-60	6	R		Eucklipuls	*Eucalyptus Radiata*	
62	13.210	4.75	30-60	5	R		sheesham	*Dalbergia sissoo*	
63	13.220	5	30-60	4	R		Eucklipuls	*Eucalyptus Radiata*	
64	13.225	4.75	30-60	5	R		Eucklipuls	*Eucalyptus Radiata*	
65	13.230	5.5	0-30	6	R		Eucklipuls	*Eucalyptus Radiata*	
66	13.235	5.5	0-30	5	R		Shubabul	*Leucaena leucocephala*	
67	13.240	5.5	0-30	4	R		Shubabul	*Leucaena leucocephala*	
68	13.245	5.5	0-30	6	R		Shubabul	*Leucaena leucocephala*	
69	13.250	5	0-30	5	R		Shubabul	*Leucaena leucocephala*	
70	13.255	5	60-90	5	R		Neem	*Azadirachta Indica*	
71	15.000	5.5	30-60	6		L	Palash	*Butea monosperma*	
72	15.010	5.5	30-60	5		L	Palash	*Butea monosperma*	
73	15.020	5.5	30-60	6		L	Palash	*Butea monosperma*	
74	15.030	5	60-90	6		L	Palash	*Butea monosperma*	
75	15.040	5	60-90	7		L	Bargad	*Ficus bengalensis*	
76	15.300	5	30-60	2	R		Palash	*Butea monosperma*	
77	15.320	5.5	0-30	1.5		L	Palash	*Butea monosperma*	

S. No.	Chainage	Distance from centre of existing road*	Girth (0-30cm , 30-60cm , 60-90,90-120, >120cm	Approx Ht.(M)	Left *	Right *	Local Name	Botanical Name	Remarks
78	15.600	5	>120	6		L	Mahua	*Madhuca longifolia*	
79	15.700	5.5	60-90	5		L	Bargad	*Ficus benghalensis*	
80	15.750	5.5	60-90	5	R		Bargad	*Ficus benghalensis*	
81	15.800	5	30-60	5	R		Palash	*Butea monosperma*	
82	15.820	5	30-60	5.5	R		Palash	*Butea monosperma*	
83	15.830	5.5	30-60	5		L	Palash	*Butea monosperma*	
84	15.850	5.5	30-60	5	R		Palash	*Butea monosperma*	
85	16.600	5.5	0-30	5		L	Palash	*Butea monosperma*	
86	16.610	5	0-30	6		L	Palash	*Butea monosperma*	
87	16.620	5.5	30-60	5	R		Palash	*Butea monosperma*	
88	16.630	5.5	30-60	5	R		Palash	*Butea monosperma*	
89	16.640	5	0-30	5		L	Palash	*Butea monosperma*	
90	16.650	5	0-30	5		L	Palash	*Butea monosperma*	
91	16.700	5	30-60	3		L	Tendu	*Diospyros melanoxylon*	
92	16.900	5	30-60	4	R		sedhu	*Terminalia Tomentosa*	
93	16.930	5	30-60	3	R		sedhu	*Terminalia Tomentosa*	
94	16.950	5	30-60	6	R		sedhu	*Terminalia Tomentosa*	
95	16.970	5	30-60	5	R		sedhu	*Terminalia Tomentosa*	
96	16.980	5	30-60	4		L	Tendu	*Diospyros melanoxylon*	
97	17.200	5.5	30-60	4	R		Tendu	*Diospyros melanoxylon*	
98	17.210	5.5	30-60	5	R		Palash	*Butea monosperma*	
99	17.400	5	30-60	5		L	Palash	*Butea monosperma*	
100	17.700	5	60-90	4		L	Tendu	*Terminalia Tomentosa*	
101	17.750	5	60-90	5		L	Tendu	*Diospyros melanoxylon*	
102	17.800	5	60-90	6		L	Tendu	*Diospyros melanoxylon*	
103	17.810	5.5	60-90	5	R		sedha	*Terminalia Tomentosa*	
104	17.820	5.5	30-60	6	R		sedha	*Terminalia Tomentosa*	
105	17.840	5.5	30-60	4	R		sedha	*Terminalia Tomentosa*	
106	17.900	5.5	90-120	5		L	Tendu	*Diospyros melanoxylon*	
107	17.920	5	30-60	3		L	sedha	*Terminalia Tomentosa*	
108	17.930	5.5	30-60	3		L	sedha	*Terminalia Tomentosa*	
109	17.940	5	60-90	4		L	Palash	*Butea monosperma*	
110	18.100	4.5	>120	6	R		Palash	*Butea monosperma*	
111	18.110	4	30-60	5		L	sedha	*Terminalia Tomentosa*	
112	18.120	4.5	30-60	5		L	Palash	*Butea monosperma*	
113	18.150	5	30-60	4	R		sedha	*Terminalia Tomentosa*	
114	18.170	5	30-60	5	R		sedha	*Terminalia Tomentosa*	
115	18.200	5	60-90	6		L	Palash	*Butea monosperma*	
116	18.300	5	60-90	5	R		semra	*Bombax ciba*	
117	18.310	5	60-90	5		L	semra	*Bombax ciba*	

S. No.	Chainage	Distance from centre of existing road*	Girth (0-30cm , 30-60cm , 60-90,90-120, >120cm	Approx Ht.(M)	Left *	Right *	Local Name	Botanical Name	Remarks
118	18.400	4.5	60-90	5		L	Palash	*Butea monosperma*	
119	18.410	4.5	30-60	5		L	semra	*Bombax ciba*	
120	18.430	4.5	30-60	5	R		semra	*Bombax ciba*	
121	18.500	4.5	0-30	4	R		Palash	*Butea monosperma*	
122	18.510	5	0-30	2	R		Tendu	*Diospyros melanoxylon*	
123	18.600	4.5	0-30	2	R		Tendu	*Diospyros melanoxylon*	
124	18.650	5	>120	6		L	Imali	*Tamarindus indica*	
125	18.700	5	>121	7	R		sedhu	*Terminalia Tomentosa*	
126	18.720	5.5	0-30	4	R		sedhu	*Terminalia Tomentosa*	
127	18.800	5	30-60	6		L	Tendu	*Diospyros melanoxylon*	
128	18.820	6	>121	7	R		Arjun	*Terminalia arjuna*	
129	18.840	5.5	30-60	6		L	Tendu	*Diospyros melanoxylon*	
130	19.000	4.5	90-120	7		L	semra	*Bombix ciba*	
131	19.010	5.5	30-60	5	R		Tendu	*Diospyros melanoxylon*	
132	19.100	5	>121	6		L	sedhu	*Terminalia Tomentosa*	
133	19.110	5.5	0-30	4	R		Tendu	*Diospyros melanoxylon*	
134	19.200	5.5	90-120	6	R		semra	*Bombix ciba*	
135	19.300	5	90-120	7		L	Arjun	*Terminalia arjuna*	
136	19.320	5.5	>120	6		L	Tendu	*Diospyros melanoxylon*	
137	19.330	5	0-30	4	R		Tendu	*Diospyros melanoxylon*	
138	19.400	5	30-60	3.5	R		Tendu	*Diospyros melanoxylon*	
139	19.500	5.5	60-90	4		L	Tendu	*Diospyros melanoxylon*	
140	19.550	5.5	30-60	3.5		L	Tendu	*Diospyros melanoxylon*	
141	19.600	5.5	>120	7		L	semra	*Bombix ciba*	
142	19.700	5	0-30	5	R		sedha	*Terminalia Tomentosa*	
143	19.720	5.5	0-30	5	R		sedha	*Terminalia Tomentosa*	
144	19.950	5	>120	8	R		Imali	*Tamarindus indica*	
145	20.300	5	30-60	5		L	Tendu	*Diospyros melanoxylon*	
146	20.320	5	0-30	4		L	Tendu	*Diospyros melanoxylon*	
147	20.350	4.5	30-60	5		L	dudhiya	*Wrightia tinctoria*	
148	20.400	4	0-30	4		L	amaltas	*Cassia fistula*	
149	20.420	4.5	30-60	5	R		amaltas	*Cassia fistula*	
150	20.530	4	60-90	6	R		Mahua	*Madhuca longifolia*	
151	20.450	4	0-30	5	R		Tendu	*Diospyros melanoxylon*	
152	20.500	4	0-30	4	R		Tendu	*Diospyros melanoxylon*	
153	20.510	4	0-30	5	R		Tendu	*Diospyros melanoxylon*	
154	20.520	4.5	30-60	4.5	R		Tendu	*Diospyros melanoxylon*	
155	20.530	5	0-30	4	R		Tendu	*Diospyros melanoxylon*	
156	20.550	4	>120	4.5		L	amaltas	*Cassia fistula*	
157	20.600	4.5	>120	7		L	amaltas	*Cassia fistula*	
158	20.620	4.5	30-60	6	R		Tendu	*Diospyros melanoxylon*	
159	20.640	5	30-60	5		L	Tendu	*Diospyros melanoxylon*	
160	20.700	5.5	30-60	5		L	Tendu	*Diospyros melanoxylon*	
161	21.000	5	30-60	5	R		Khar	*Acacia catechu*	
162	21.100	4.5	0-30	4	R		Palash	*Butea monosperma*	
163	21.110	5	30-60	6	R		hardi	*T. Chubala*	
164	21.600	6	60-90	7		L	semra	*Bombax malabaricum*	
165	21.620	5.5	30-60	6		L	abhijeet	*Nyctanthes arbor-tristis*	
166	22.100	5.5	90-120	7		L	Arjun	*Terminalia arjuna*	

S. No.	Chainage	Distance from centre of existing road*	Girth (0-30cm , 30-60cm , 60-90,90-120, >120cm	Approx Ht.(M)	Left *	Right *	Local Name	Botanical Name	Remarks
167	22.150	5	60-90	6		L	hardi	*T. Chubala*	
168	22.200	5	30-60	6		L	dudhiya	*Wrightia tinctoria*	
169	22.210	5	30-60	5	R		Palash	*Butea monosperma*	
170	22.500	5.5	60-90	5		L	Arjun	*Terminalia arjuna*	
171	22.700	5.5	30-60	4		L	Palash	*Butea monosperma*	
172	22.800	4.5	0-30	4	R		Palash	*Butea monosperma*	
173	23.100	4	30-60	5	R		Khar	*Acacia catechu*	
174	23.300	4.5	90-120	6	R		Khar	*Acacia catechu*	
175	23.320	5	60-90	5		L	Arjun	*Terminalia arjuna*	
176	23.400	4	60-90	7	R		Arjun	*Terminalia arjuna*	
177	23.500	4.5	30-60	6	R		Arjun	*Terminalia arjuna*	
178	23.800	5	30-60	5		L	Palash	*Butea monosperma*	
179	23.810	5	30-60	5		L	Palash	*Butea monosperma*	
180	23.820	4.5	30-60	6		L	Palash	*Butea monosperma*	
181	23.840	5	30-60	5		L	Palash	*Butea monosperma*	
182	23.900	5	30-60	7		L	Palash	*Butea monosperma*	
183	24.000	3	>120	8	R		Bell	*Aegle marmelos*	
184	24.300	4.5	>120	3	R		Bell	*Aegle marmelos*	
185	24.600	4.5	30-60	6		L	Palash	*Butea monosperma*	
186	26.670	4.5	60-90	5		L	Palash	*Butea monosperma*	
187	24.900	5	60-90	2	R		Palash	*Butea monosperma*	
188	25.100	5.5	0-30	2		L	Palash	*Butea monosperma*	
189	25.200	5.5	0-30	6		L	Palash	*Butea monosperma*	
190	26.000	2.5	>120	5		L	Palash	*Butea monosperma*	
191	26.010	5	>120	9		L	Palash	*Butea monosperma*	
192	26.020	4.5	30-60	8		L	Palash	*Butea monosperma*	
193	26.050	4	90-60	7		L	Palash	*Butea monosperma*	
194	26.500	5.5	>120	7		L	Mahua	*Madhuca longifolia*	
195	26.600	5	90-120	6	R		Peepal	*Butea monosperma*	
196	28.300	4.5	60-90	8	R		Neem	*Azadirachta Indica*	
197	28.330	5	60-90	4	R		Eucklipuls	*Eucalyptus Radiata*	
198	28.500	5.5	30-60	5		L	Berry	*Zizyphus zigapa*	
199	28.510	5.5	30-60	5	R		Mahua	*Madhuca longifolia*	
200	28.700	5.5	60-90	4		L	sheesham	*Sesamun indicum*	
201	28.720	5.5	0-30	6		L	awala	*Emblica officinalis*	
202	28.900	4	>120	7	R		Neem	*Azadirachta Indica*	
203	28.920	4	>120	8	R		Neem	*Azadirachta Indica*	
204	28.940	4.5	30-60	9	R		Berry	*Zizyphus mauritiana*	
205	28.960	4.5	>120	7		L	kaitha	*Feronia limonida*	
206	29.400	4.5	>120	8		L	Mango	*Magnifera indica*	

S. No.	Chainage	Distance from centre of existing road*	Girth (0-30cm , 30-60cm , 60-90,90-120, >120cm	Approx Ht.(M)	Left *	Right *	Local Name	Botanical Name	Remarks
207	30.400	4.5	>120		R		Peepal	*Butea monosperma*	
208	30.500	4	0-30			L	Shubabul	*Leucaena leucocephala*	
209	30.510	4.5	0-30			L	Neem	*Azadirachta Indica*	
210	30.520	4	0-30			L	Neem	*Azadirachta Indica*	
211	30.050	5.5	>120	8	R		Peepal	*Butea monosperma*	
212	31.900	5	30-60	3	R		Neem	*Azadirachta Indica*	
213	31.920	5	60-90	4	R		Neem	*Azadirachta Indica*	
214	31.940	4.5	30-60	5		L	Sagoun	*Tectona grandis*	
215	31.960	5	30-60	5		L	Sagoun	*Tectona grandis*	
216	31.980	5.5	30-60	5		L	Sagoun	*Tectona grandis*	
217	32.000	4	30-60	5		L	Sagoun	*Tectona grandis*	
218	32.020	4.5	30-60	5		L	Sagoun	*Tectona grandis*	
219	32.400	4.5	90-120	6	R		Neem	*Azadirachta Indica*	
220	32.410	5	60-90	6	R		Neem	*Azadirachta Indica*	
221	32.430	4.5	60-90	5		L	Mango	*Mangifera Indica*	
222	32.440	5	60-90	4		L	Mango	*Mangifera Indica*	
223	33.900	5	30-60	4		L	Tendu	*Diospyros melanoxylon*	
224	33.910	5	30-60	4		L	Tendu	*Diospyros melanoxylon*	
225	33.920	4.5	30-60	4		L	Tendu	*Diospyros melanoxylon*	
226	33.950	5.5	30-60	4		L	Tendu	*Diospyros melanoxylon*	
227	33.940	5	30-60	4		L	Tendu	*Diospyros melanoxylon*	
228	33.950	5.5	30-60	5		L	Tendu	*Diospyros melanoxylon*	
229	33.960	4.75	30-60	5		L	Tendu	*Diospyros melanoxylon*	
230	33.975	4.75	30-60	4		L	Tendu	*Diospyros melanoxylon*	
231	33.980	4	30-60	5		L	Tendu	*Diospyros melanoxylon*	
232	33.990	5	30-60	4		L	Tendu	*Diospyros melanoxylon*	
233	34.100	5	0-30	4	R		Tendu	*Diospyros melanoxylon*	
234	34.110	5	0-30	4	R		Tendu	*Diospyros melanoxylon*	
235	34.120	5.25	30-60	4	R		Tendu	*Diospyros melanoxylon*	
236	34.130	5	30-60	5	R		Tendu	*Diospyros melanoxylon*	
237	34.600	5	60-90	5		L	Tendu	*Diospyros melanoxylon*	
238	34.700	5.5	0-30	4		L	Neem	*Azadirachta Indica*	
239	35.400	6	60-90	6		L	Neem	*Azadirachta Indica*	
240	35.500	5.5	0-30	4		L	Neem	*Azadirachta Indica*	
241	35.520	5.5	60-90	5		L	Neem	*Azadirachta Indica*	
242	35.600	5.5	30-60	6		L	Neem	*Azadirachta Indica*	
243	35.620	5.5	60-90	6		L	Neem	*Azadirachta Indica*	
244	36.100	5	30-60	4		L	Tendu	*Diospyros melanoxylon*	
245	36.110	5	30-60	4		L	Tendu	*Diospyros melanoxylon*	
246	36.120	5.5	0-30	4		L	Tendu	*Diospyros melanoxylon*	

S. No.	Chainage	Distance from centre of existing road*	Girth (0-30cm , 30-60cm , 60-90,90-120, >120cm	Approx Ht.(M)	Left *	Right *	Local Name	Botanical Name	Remarks
247	36.130	5	0-30	5		L	Tendu	*Diospyros melanoxylon*	
248	36.140	5.5	30-60	3		L	Tendu	*Diospyros melanoxylon*	
249	36.150	5	30-60	4		L	Tendu	*Diospyros melanoxylon*	
250	36.160	5	30-60	5		L	Tendu	*Diospyros melanoxylon*	
251	36.170	5.5	30-60	4	R		Tendu	*Diospyros melanoxylon*	
252	36.300	4.5	0-30	4		L	Tendu	*Diospyros melanoxylon*	
253	36.310	5.5	30-60	3		L	Tendu	*Diospyros melanoxylon*	
254	36.320	5	30-60	4		L	Tendu	*Diospyros melanoxylon*	
255	36.330	5	30-60	3		L	Tendu	*Diospyros melanoxylon*	
256	36.340	5	0-30	5		L	Tendu	*Diospyros melanoxylon*	
257	36.350	5	0-30	4		L	Tendu	*Diospyros melanoxylon*	
258	36.360	5	30-60	3		L	Tendu	*Diospyros melanoxylon*	
259	36.400	5.5	0-30	4	R		Tendu	*Diospyros melanoxylon*	
260	36.420	5	0-30	4.5	R		Tendu	*Diospyros melanoxylon*	
261	36.440	5.5	0-30	5	R		Tendu	*Diospyros melanoxylon*	
262	36.900	4.5	30-60	4		L	amaltas	*Cassia fistula*	
263	37.600	5.5	30-60	5		L	Palash	*Butea monosperma*	
264	37.620	5	30-60	5		L	Palash	*Butea monosperma*	
265	37.640	5	0-30	5		L	Neem	*Azadirachta Indica*	
266	37.900	5.5	90-120	7		L	Palash	*Butea monosperma*	
267	37.930	5	30-60	6		L	Palash	*Butea monosperma*	
268	38.300	4.5	30-60	6	R		Palash	*Butea monosperma*	
269	38.600	5.5	0-30	4		L	Neem	*Azadirachta Indica*	
270	38.700	5.5	0-30	5		L	Neem	*Azadirachta Indica*	
271	39.500	5	30-60	5	R		Neem	*Azadirachta Indica*	
272	39.510	5	30-60	5	R		Neem	*Azadirachta Indica*	
273	39.530	5.5	60-90	6	R		Neem	*Azadirachta Indica*	
274	39.550	5.5	>120	6	R		Neem	*Azadirachta Indica*	
275	40.000	5	90-120	7		L	Neem	*Azadirachta Indica*	
276	4.010	5.5	90-120	6	R		Neem	*Azadirachta Indica*	
277	40.020	5.5	90-120	7	R		Neem	*Azadirachta Indica*	
278	40.030	5.5	60-90	6	R		Neem	*Azadirachta Indica*	
279	40.100	5.5	90-120	7	R		Neem	*Azadirachta Indica*	
280	40.150	5.5	>120	7	R		Peepal	*Butea monosperma*	
281	40.200	5	60-90	6	R		Neem	*Azadirachta Indica*	
282	40.500	5	30-60	7	R		Shubabul	*Leucaena leucocephala*	
283	40.510	5.5	60-90	6		L	Shubabul	*Leucaena leucocephala*	
284	40.520	5.5	0-30	5	R		Ashok	*Saraca indica*	
285	40.530	5.25	0-30	5	R		Ashok	*Saraca indica*	
286	40.540	5	0-30	5	R		Ashok	*Saraca indica*	

S. No.	Chainage	Distance from centre of existing road*	Girth (0-30cm , 30-60cm , 60-90,90-120, >120cm	Approx Ht.(M)	Left *	Right *	Local Name	Botanical Name	Remarks
287	40.550	5.25	60-90	6	R		Neem	*Azadirachta Indica*	
288	40.560	5.5	30-60	4	R		awala	*Emblica officinalis*	
289	40.600	4.5	60-90	7	R		Neem	*Azadirachta Indica*	
290	40.700	5.5	60-90	6		L	Neem	*Azadirachta Indica*	
291	40.720	5.5	60-90	8		L	Eucklipuls	*Eucalyptus Radiata*	
292	40.730	5	60-90	7		L	Neem	*Azadirachta Indica*	
293	40.800	5.5	60-90	7		L	Neem	*Azadirachta Indica*	
294	40.810	5.5	30-60	6		L	Neem	*Azadirachta Indica*	
295	40.820	5.5	60-90	7		L	Neem	*Azadirachta Indica*	
296	40.840	5.5	30-60	6		L	Neem	*Azadirachta Indica*	
297	40.850	6	60-90	4		L	awala	*Emblica officinalis*	
298	40.860	5.75	30-60	5		L	awala	*Emblica officinalis*	
299	40.870	6	30-60	6		L	Neem	*Azadirachta Indica*	
300	40.900	5.75	30-60	6		L	Neem	*Azadirachta Indica*	
301	41.000	5.5	>120	8	R		Mahua	*Madhuca longifolia*	
302	41.010	5	30-60	6		L	Berry	*Zizyphus mauritiana*	
303	41.020	4.5	60-90	5	R		Berry	*Zizyphus mauritiana*	
304	41.030	4.5	30-60	6	R		Berry	*Zizyphus mauritiana*	
305	41.040	4.5	30-60	6	R		Berry	*Zizyphus mauritiana*	
306	41.050	4.5	>120	7		L	Mango	*Mangifera Indica*	
307	41.100	5	>121	8	R		Mango	*Mangifera Indica*	
308	41.120	5.25	>122	6	R		Mango	*Mangifera Indica*	
309	41.130	5	60-90	6		L	Berry	*Zizyphus mauritiana*	
310	42.200	5	60-90	5.5		L	Neem	*Azadirachta Indica*	
311	42.220	5.5	60-90	5		L	Neem	*Azadirachta Indica*	
312	41.600	5	0-30	6		L	Shubabul	*Leucaena leucocephala*	
313	41.620	5.5	0-30	7		L	Shubabul	*Leucaena leucocephala*	
314	41.630	4.75	30-60	6		L	Shubabul	*Leucaena leucocephala*	
315	41.640	5	30-60	7		L	Shubabul	*Leucaena leucocephala*	
316	41.800	5.5	60-90	7		L	Neem	*Azadirachta Indica*	
317	41.820	5.5	0-30	6		L	Neem	*Azadirachta Indica*	
318	41.840	5.5	60-90	7		L	Neem	*Azadirachta Indica*	
319	41.900	5.5	30-60	8		L	Neem	*Azadirachta Indica*	
320	41.910	5.5	30-60	7		L	Shubabul	*Leucaena leucocephala*	
321	41.920	5.5	0-30	7		L	Shubabul	*Leucaena leucocephala*	
322	41.930	5.5	0-30	6		L	Shubabul	*Leucaena leucocephala*	
323	41.940	5.5	30-60	6	R		Neem	*Azadirachta Indica*	
324	41.950	5.75	90-120	5	R		Eucklipuls	*Eucalyptus Radiata*	
325	41.960	5.75	>120	6	R		Neem	*Azadirachta Indica*	
326	42.000	5.75	90-120	7	R		Neem	*Azadirachta Indica*	

S. No.	Chainage	Distance from centre of existing road*	Girth (0-30cm , 30-60cm , 60-90,90-120, >120cm	Approx Ht.(M)	Left *	Right *	Local Name	Botanical Name	Remarks
327	42.300	5	>120	10		L	Bargad	*Phycus bagalancis*	
328	42.400	5.5	30-60	5	R		Belll	*Eagal marmilos*	
329	42.500	5	30-60	5	R		Neem	*Azadirachta Indica*	
330	42.520	5.75	60-90	8		L	Shubabul	*Leucaena leucocephala*	
331	42.540	5.5	90-120	7		L	Shubabul	*Leucaena leucocephala*	
332	42.600	5	>120	8		L	Eucklipuls	*Eucalyptus Radiata*	
333	42.610	5	>120	9		L	Eucklipuls	*Eucalyptus Radiata*	
334	42.620	5.5	>120	10		L	Peepal	*Phycus relogiasa*	
335	42.700	5	0-30	7		L	Berry	*Zizyphus mauritiana*	
336	42.720	5.5	60-90	6		L	Berry	*Zizyphus mauritiana*	
337	42.740	5	60-90	8		L	Neem	*Azadirachta Indica*	
338	42.800	4.5	60-90	7	R		Berry	*Zizyphus mauritiana*	
339	42.900	6	>120	9	R		Mahua	*Mangifera Indica*	
340	43.100	5	>120	8	R		Neem	*Azadirachta Indica*	
341	43.300	5.5	30-60	7		L	Neem	*Azadirachta Indica*	
342	43.320	5.75	0-30	6		L	Neem	*Azadirachta Indica*	
343	43.330	5.5	60-90	8		L	Neem	*Azadirachta Indica*	
344	43.350	5.5	>120	9		L	Peepal	*Butea monosperma*	
345	43.500	5	>120	7		L	Mango	*Mangifera Indica*	
346	43.510	5	>120	6		L	Mango	*Mangifera Indica*	
347	43.520	6	>120	7	R		Mango	*Mangifera Indica*	
348	43.530	6	>121	7	R		Mango	*Mangifera Indica*	
349	43.540	6	>122	7	R		Mango	*Mangifera Indica*	
350	43.600	5	>123	10		L	Khirni	*Manilkara hexandra*	
351	43.610	5.5	>124	8		L	Khirni	*Manilkara hexandra*	
352	43.620	5.5	90-120	7		L	Mango	*Mangifera Indica*	
353	43.630	6	90-120	6	R		Mango	*Mangifera Indica*	
354	43.640	6	90-121	6		L	Mango	*Mangifera Indica*	
355	43.700	5.5	>120	8		L	Peepal	*Phycus relogiasa*	
356	43.900	6	>121	10		L	Eucklipuls	*Eucalyptus Radiata*	
357	43.910	6	>122	9*		L	Eucklipuls	*Eucalyptus Radiata*	
358	43.920	6	>123	9		L	Eucklipuls	*Eucalyptus Radiata*	
359	43.930	6	>124	11		L	Eucklipuls	*Eucalyptus Radiata*	
360	43.940	6	>125	10		L	Eucklipuls	*Eucalyptus Radiata*	
361	43.950	6	>126	9		L	Eucklipuls	*Eucalyptus Radiata*	
362	43.960	6	>127	8		L	Eucklipuls	*Eucalyptus Radiata*	
363	44.400	5.75	60-90	7		L	Neem	*Azadirachta Indica*	
364	44.430	5.75	60-90	8		L	Neem	*Azadirachta Indica*	
365	44.600	5.5	30-60	7	R		Shubabul	*Leucaena leucocephala*	
366	44.610	5.5	0-30	6	R		Shubabul	*Leucaena leucocephala*	

S. No.	Chainage	Distance from centre of existing road*	Girth (0-30cm , 30-60cm , 60-90,90-120, >120cm	Approx Ht.(M)	Left *	Right *	Local Name	Botanical Name	Remarks
367	44.630	5.5	30-60	7	R		Shubabul	*Leucaena leucocephala*	
368	44.700	5	60-90	6	R		Neem	*Azadirachta Indica*	
369	44.720	5.5	0-30	5	R		Neem	*Azadirachta Indica*	
370	45.200	5.5	30-60	6	R		Neem	*Azadirachta Indica*	
371	45.300	5.5	60-90	6		L	Neem	*Azadirachta Indica*	
372	45.320	5.5	0-30	5		L	Neem	*Azadirachta Indica*	
373	45.340	5	0-30	7		L	Neem	*Azadirachta Indica*	
374	45.350	5	60-90	7	R		Shubabul	*Leucaena leucocephala*	
375	45.600	5.75	30-60	6		L	Neem	*Azadirachta Indica*	
376	45.700	5	60-90	5		L	Neem	*Azadirachta Indica*	
377	45.710	5.75	60-90	6	L		Neem	*Azadirachta Indica*	
378	45.720	5	60-90	7		L	kaitha	*Feronia limonida*	
379	45.730	5	30-60	4		L	Berry	*Zizyphus mauritiana*	
380	45.740	5.5	0-30	5		L	Berry	*Zizyphus mauritiana*	
381	45.750	5	0-30	6		L	Berry	*Zizyphus mauritiana*	
382	46.300	5.5	60-90	7	R		Neem	*Azadirachta Indica*	
383	46.600	5.5	60-90	8	R		Neem	*Azadirachta Indica*	
384	47.100	4.5	60-90	6	R		Neem	*Azadirachta Indica*	
385	47.120	4.5	>120	12	R		Neem	*Azadirachta Indica*	
386	47.140	5	60-90	6	R		Mango	*Mangifera Indica*	
387	47.150	5.5	0-30	6	R		Bell	*Eagal marmilos*	
388	47.300	5	>120	4	R		Imali	*Tremendus indica*	
389	47.400	5	30-90	5	R		Neem	*Azadirachta Indica*	
390	47.500	5	60-90	4		L	Neem	*Azadirachta Indica*	
391	48.000	5.5	30-60	5	R		Neem	*Azadirachta Indica*	
392	48.010	5	>120	6		L	Neem	*Azadirachta Indica*	
393	48.020	5.5	>120	7		L	Shubabul	*Leucaena leucocephala*	
394	48.400	5.5	30-60	4		L	Jamun	*Syzygium cumini*	
395	48.600	5	60-90	9	R		Mango	*Mangifera Indica*	
396	48.640	6	>120	7		L	Neem	*Azadirachta Indica*	
397	49.200	6	>120	10	R		Neem	*Azadirachta Indica*	
398	49.500	5.5	90-120	10		L	Neem	*Azadirachta Indica*	
399	49.550	5.5	>120	9		L	Neem	*Azadirachta Indica*	
400	49.700	5.5	60-90	8		L	Neem	*Azadirachta Indica*	
401	50.200	5	30-60	9		L	Shubabul	*Leucaena leucocephala*	
402	50.210	5	30-60	7		L	Shubabul	*Leucaena leucocephala*	
403	50.220	5	30-60	7		L	Shubabul	*Leucaena leucocephala*	
404	50.230	5	>120	6		L	Shubabul	*Leucaena leucocephala*	
405	50.300	5.5	90-120	10	R		kinni	*Manilkara hexandra*	
406	50.500	5	30-60	7		L	Peepal	*Butea monosperma*	
407	51.800	4.5	30-60	6		L	Neem	*Azadirachta Indica*	
408	51.520	5.5	30-60	5		L	Berry	*Zizyphus mauritiana*	

S. No.	Chainage	Distance from centre of existing road*	Girth (0-30cm , 30-60cm , 60-90,90-120, >120cm	Approx Ht.(M)	Left *	Right *	Local Name	Botanical Name	Remarks
409	51.830	5	>120	6		L	Neem	*Azadirachta Indica*	
410	51.900	5.5	>120	9	R		Mahua	*Madhuca longifolia*	
411	51.920	6	30-60	10		L	Mahua	*Madhuca longifolia*	
412	53.300	5.5	60-90	6		L	Neem	*Azadirachta Indica*	
413	53.400	5.5	30-60	6		L	Ashok	*Sarica indica*	
414	53.520	5.75	30-60	5		L	Neem	*Azadirachta Indica*	
415	53.600	5.5	30-60	6	R		Neem	*Azadirachta Indica*	
416	54.000	5.75	>120	10	R		Peepal	*Butea monosperma*	
417	54.200	5.75	>120	9	R		Peepal	*Butea monosperma*	
418	54.220	5.5	>121	7		L	Neem	*Azadirachta Indica*	
419	54.600	5	>122	10		L	Peepal	*Butea monosperma*	
420	54.800	5	>123	9			Peepal	*Butea monosperma*	
421	54.850	5.5	90-120	7			Neem	*Azadirachta Indica*	
422	54.900	5	>120	10			Peepal	*Butea monosperma*	
423	55.300	5.5	>121	8	R		Peepal	*Butea monosperma*	
424	55.320	5	>122	7		L	Neem	*Azadirachta Indica*	
425	55.350	5.5	30-60	8		L	Neem	*Azadirachta Indica*	
426	55.900	5.75	60-90	8		L	Mango	*Mangifera Indica*	
427	56.300	5	>120	10	R		Peepal	*Butea monosperma*	
428	56.500	5.5	>121	10	R		Mango	*Mangifera Indica*	
429	56.510	4.5	>122	10		L	Peepal	*Butea monosperma*	
430	56.520	5	>123	9		L	Mango	*Mangifera Indica*	
431	56.530	5	>124	8		L	Peepal	*Butea monosperma*	
432	56.540	5	90-120	7		L	Neem	*Azadirachta Indica*	
433	57.200	5	>120	7		L	Bargad	*Ficus bengalensis*	
434	57.900	5	>121	8	R		Mango	*Mangifera Indica*	
435	57.920	5	60-90	6	R		kathal	*Limonia acidissima*	
436	58.500	5.5	30-60	5		L	kathal	*Limonia acidissima*	
437	59.200	5.5	>120	11	R		Peepal	*Butea monosperma*	
438	59.300	5	60-90	7	R		Peepal	*Butea monosperma*	
439	59.500	5.75	>120	10	R		Peepal	*Butea monosperma*	
440	59.550	5.5	>120	7	R		Peepal	*Butea monosperma*	
441	59.600	5.5	90-120	8	R		Bargad	*Ficus bengalensis*	
442	59.700	5.5	>120	7	R		Jamun	*Syzygium cumini*	
443	60.100	6	>120	8	R		Neem	*Azadirachta Indica*	
444	60.110	5.5	60-90	8	R		Peepal	*Butea monosperma*	
445	60.200	5.5	60-90	6	R		Neem	*Azadirachta Indica*	
446	60.210	5.5	30-60	6		L	Peepal	*Butea monosperma*	
447	60.800	5.5	30-60	7	R		Neem	*Azadirachta Indica*	
448	61.100	5.5	60-90	6	R		Neem	*Azadirachta Indica*	
449	61.300	5.5	>120	6	R		Neem	*Azadirachta Indica*	

S. No.	Chainage	Distance from centre of existing road*	Girth (0-30cm , 30-60cm , 60-90,90-120, >120cm	Approx Ht.(M)	Left *	Right *	Local Name	Botanical Name	Remarks
450	61.400	4.5	>120	8	R		Neem	*Azadirachta Indica*	
451	61.500	5.5	>120	9	R		kadam	*Neolamarckia cadamba*	
452	61.510	5.5	>120	8	R		umar	*Phycus glumerat*	
453	41.600	6	>120	9	R		Neem	*Azadirachta Indica*	
454	61.650	5.5	90-120	8	R		Neem	*Azadirachta Indica*	
455	61.800	55.5	>120	10		L	Peepal	*Butea monosperma*	
456	62.000	5.5	>120	8		L	Neem	*Azadirachta Indica*	
457	62.010	5	60-90	7		L	Neem	*Azadirachta Indica*	
458	62.020	5	30-60	6	R		Neem	*Azadirachta Indica*	
459	62.100	5	90-120	7		L	umar	*Phycus glumerat*	
460	62.120	5.5	90-120	8		L	Shubabul	*Leucaena leucocephala*	
461	62.300	5.5	60-90	6	R		Neem	*Azadirachta Indica*	
462	63.330	5.5	>120	10		L	Mahua	*Madhuca longifolia*	
463	63.200	5.5	>120	9		L	Mango	*Mangifera Indica*	
464	63.210	6	>120	7		L	Mango	*Mangifera Indica*	
465	63.220	5	>120	9		L	Peepal	*Butea monosperma*	
466	63.500	5.5	60-90	8	R		awala	*Emblica officinalis*	
467	63.510	6	60-90	7		L	umar	*Phycus glumerat*	
468	63.540	5	0-30	6		L	Neem	*Azadirachta Indica*	
469	63.600	5.5	>120	8		L	Mahua	*Madhuca longifolia*	
470	63.800	5	60-90	6		L	Berry	*Zizyphus mauritiana*	
471	63.810	5.5	60-90	7		L	Neem	*Azadirachta Indica*	
472	64.000	5.75	>120	6	R		Jamun	*Syzygium cumini*	
473	64.010	5.75	>120	6		L	Neem	*Azadirachta Indica*	
474	64.040	5	90-120	9	R		Palash	*Butea monosperma*	
475	64.050	5	60-90	6		L	Mango	*Mangifera Indica*	
476	64.100	5	>120	8		L	Mango	*Mangifera Indica*	
477	64.500	5.5	>120	10	R		Peepal	*Phycus relogiasa*	
478	64.700	5	>120	8	R		Bargad	*Ficus bengalensis*	
479	64.710	5.5	60-90	8		L	Berry	*Zizyphus mauritiana*	
480	64.720	5	90-120	9		L	semra	*Bombix ciba*	
481	64.730	5.5	>120	8		L	Palash	*Butea monosperma*	
482	64.740	4.5	90-120	9		L	semra	*Bombix ciba*	
483	64.750	5.5	90-120	7		L	Palash	*Butea monosperma*	
484	64.760	5	>120	7		L	semra	*Bombix ciba*	
485	64.770	4.5	90-120	10		L	semra	*Bombix ciba*	
486	64.780	4.5	90-120	11		L	semra	*Bombix ciba*	
487	64.790	5	60-90	8	R		Mango	*Mangifera Indica*	
488	64.795	5.5	>120	6	R		Mango	*Mangifera Indica*	
489	64.800	5.5	90-120	9	R		Mango	*Mangifera Indica*	

S. No.	Chainage	Distance from centre of existing road*	Girth (0-30cm , 30-60cm , 60-90,90-120, >120cm	Approx Ht.(M)	Left *	Right *	Local Name	Botanical Name	Remarks
490	64.810	5	60-90	7	R		Mango	*Mangifera Indica*	
491	64.820	5.5	60-90	7	R		Mango	*Mangifera Indica*	
492	64.830	5.5	90-120	8	R		Jamun	*Syzygium cumini*	
493	64.900	5	>120	9	R		Peepal	*Butea monosperma*	
494	65.000	5.5	>120	10		L	Peepal	*Butea monosperma*	
495	65.200	5	90-120	10		L	Neem	*Azadirachta Indica*	
496	65.210	5.5	>120	9		L	Bargad	*Phycus bagalancis*	
497	65.300	5.5	90-120	8		L	Neem	*Azadirachta Indica*	
498	65.500	5.5	>120	9	R		Neem	*Azadirachta Indica*	
499	65.530	5	>120	8	R		Peepal	*Butea monosperma*	
500	65.700	6	>120	8		L	Peepal	*Butea monosperma*	
501	65.800	6	>120	9		L	Peepal	*Butea monosperma*	
502	66.000	5.5	>120	6		L	Bargad	*Ficus bengalensis*	
503	66.010	5.5	30-60	5		L	Neem	*Azadirachta Indica*	
504	66.300	5.5	60-90	6		L	Neem	*Azadirachta Indica*	
505	66.310	5	60-90	7		L	Neem	*Azadirachta Indica*	
506	66.320	5.5	60-90	8		L	Neem	*Azadirachta Indica*	
507	66.400	6	>120	7	R		Peepal	*Butea monosperma*	
508	66.450	5.5	>121	10		L	Mahua	*Madhuca longifolia*	
509	66.700	5.5	>122	9		L	Peepal	*Butea monosperma*	
510	66.800	5.5	>123	9	R		Mango	*Mangifera Indica*	
511	67.300	5.5	90-120	7		L	Neem	*Azadirachta Indica*	
512	67.400	5.5	60-90	7		L	Palash	*Butea monosperma*	
513	67.600	5	60-90	6	R		Neem	*Azadirachta Indica*	
514	67.700	5	90-120	7		L	semra	*Bombix ciba*	
515	67.720	5.5	90-120	6	R		semra	*Bombix ciba*	
516	67.740	5	>120	7		L	Mango	*Mangifera Indica*	
517	67.760	5.5	90-120	8	R		Mango	*Mangifera Indica*	
518	68.100	5	>120	9	R		Neem	*Azadirachta Indica*	
519	68.120	5	>120	10	R		Neem	*Azadirachta Indica*	
520	68.400	5	90-120	8		L	Neem	*Azadirachta Indica*	
521	68.410	5.5	60-90	2		L	Neem	*Azadirachta Indica*	
522	68.420	5	90-120	8		L	Neem	*Azadirachta Indica*	
523	68.430	5.5	90-120	7		L	Neem	*Azadirachta Indica*	
524	68.440	5	60-90	7		L	Neem	*Azadirachta Indica*	
525	68.450	5	60-90	8		L	Neem	*Azadirachta Indica*	
526	68.460	5.5	90-120	7		L	Neem	*Azadirachta Indica*	
527	68.530	5.5	>120	10		L	Mahua	*Madhuca longifolia*	
528	68.800	5	>120	9	R		kadam	*Neolamarckia cadamba*	
529	68.840	5.5	>120	10		L	Peepal	*Butea monosperma*	

S. No.	Chainage	Distance from centre of existing road*	Girth (0-30cm , 30-60cm , 60-90,90-120, >120cm	Approx Ht.(M)	Left *	Right *	Local Name	Botanical Name	Remarks
530	68.900	5	90-120	8		L	Palash	*Butea monosperma*	
531	68.910	5.5	>120	9		L	Peepal	*Phycus relogiasa*	
532	68.920	5	>120	8	R		Bargad	*Ficus bengalensis*	
533	69.200	5.5	60-90	8	R		semra	*Bombix ciba*	
534	69.210	5	30-60	6	R		Mango	*Mangifera Indica*	
535	69.220	5	60-90	5	R		Berry	*Zizyphus mauritiana*	
536	69.230	5.5	60-90	6	R		Berry	*Zizyphus mauritiana*	
537	69.240	5	90-120	7	R		Mango	*Mangifera Indica*	
538	69.300	5	30-60	6	R		Mango	*Mangifera Indica*	
539	69.310	5.5	0-30	5	R		Mango	*Mangifera Indica*	
540	69.800	5.5	30-60	6		L	Berry	*Zizyphus mauritiana*	
541	70.000	5	60-90	7		L	Neem	*Azadirachta Indica*	
542	70.010	5.5	60-90	8		L	Eucklipuls	*E.officilanice*	
543	70.020	5	60-90	6		L	Mango	*M.indica*	
544	70.030	5	60-90	7		L	Jamun	*Syzygium cumini*	
545	70.400	5.5	90-120	8		L	Neem	*Azadirachta Indica*	
546	70.500	5.5	90-120	8	R		Neem	*Azadirachta Indica*	
547	70.510	5.5	90-120	7	R		Neem	*Azadirachta Indica*	
548	70.600	5.5	>120	9		L	Berry	*Zizyphus mauritiana*	
549	70.610	5.5	>121	8		L	Berry	*Zizyphus mauritiana*	
550	70.700	5	>122	8		L	Neem	*Azadirachta Indica*	
551	70.720	5.5	>123	7	R		Neem	*Azadirachta Indica*	
552	70.730	5	>120	9	R		Neem	*Azadirachta Indica*	
553	70.900	5.5	90-120	9		L	Neem	*Azadirachta Indica*	
554	70.980	5.5	60-90	7	R		Neem	*Azadirachta Indica*	
555	71.300	5.5	>120	10		L	Bargad	*Ficus bengalensis*	
556	71.330	5.5	>120	10		L	Neem	*Azadirachta Indica*	
557	71.500	4	>120	9	R		Neem	*Azadirachta Indica*	
558	71.600	5.5	60-90	8	R		Neem	*Azadirachta Indica*	
559	71.900	5	>120	7		L	Peepal	*Butea monosperma*	
560	71.990	5	90-120	10		L	Jamun	*Syzygium cumini*	
561	72.000	5.5	60-90	5		L	semra	*Bombix ciba*	
562	72.010	5	60-90	6		L	Neem	*Azadirachta Indica*	
563	72.020	5	30-60	6		L	Neem	*Azadirachta Indica*	
564	72.030	5	60-90	7	R		Mango	*Mangifera Indica*	
565	72.040	5.5	90-120	7	R		Mango	*Mangifera Indica*	
566	72.050	5	30-60	8	R		Mango	*Mangifera Indica*	
567	73.700	5.5	60-90	6		L	Mango	*Mangifera Indica*	
568	74.200	5.5	30-60	5		L	Jamun	*Syzygium cumini*	
569	74.400	5.5	30-60	5	R		Neem	*Azadirachta Indica*	

S. No.	Chainage	Distance from centre of existing road*	Girth (0-30cm , 30-60cm , 60-90,90-120, >120cm	Approx Ht.(M)	Left *	Right *	Local Name	Botanical Name	Remarks
570	74.420	5	60-90	6	R		Neem	*Azadirachta Indica*	
571	74.430	5.5	60-90	7	R		Neem	*Azadirachta Indica*	
572	74.500	5	30-60	6		L	Neem	*Azadirachta Indica*	
573	74.800	5	60-90	7	R		Bargad	*Ficus bengalensis*	
574	75.000	5	60-90	7	R		Palash	*Butea monosperma*	
575	75.010	5.5	30-60	7	R		Ashok	*Sarica indica*	
576	75.400	5	>120	6	R		Neem	*Azadirachta Indica*	
577	75.600	5	30-60	7	R		Ashok	*sarica indica*	
578	75.620	5	30-60	7	R		Ashok	*sarica indica*	
579	75.700	5	>120	10		L	Peepal	*Phycus relogiasa*	
580	75.720	5	>120	4		L	Peepal	*Phycus relogiasa*	
581	75.800	5	>120	9	R		Neem	*Azadirachta Indica*	
582	76.500	5	>120	8		L	Neem	*Azadirachta Indica*	
583	76.510	5	90-120	7		L	Neem	*Azadirachta Indica*	
584	76.520	4.5	>120	8		L	Bargad	*Ficus bengalensis*	
585	76.600	5	>120	12	R		Imali	*Tamarindus indica*	
586	76.700	5	90-120	8		L	Neem	*Azadirachta Indica*	
587	76.710	5.5	90-120	9		L	Neem	*Azadirachta Indica*	
588	76.720	5.5	30-60	7		L	Berry	*Zizyphus mauritiana*	
589	76.800	5.75	60-90	7	R		Neem	*Azadirachta Indica*	
590	77.000	5.5	60-90	8		L	Neem	*Azadirachta Indica*	
591	77.010	5	30-60	6	R		Berry	*Zizyphus mauritiana*	
592	77.000	5.5	30-602	5	R		awala	*E.officilanice*	
593	77.110	5	30-60	5	R		awala	*e.officilanice*	
594	77.200	5	30-60	7	R		Neem	*Azadirachta Indica*	
595	77.230	5.75	60-90	6		L	Mango	*Mangifera Indica*	
596	77.240	5.5	60-90	7	R		Neem	*Azadirachta Indica*	
597	77.250	5	60-90	8	R		Neem	*Azadirachta Indica*	
598	77.400	5.5	>120	10		L	semra	*Bombix ciba*	
599	77.500	5.5	>120	9		L	kadam	*Neolamarckia cadamba*	
600	77.700	5.5	90-120	7		L	Neem	*Azadirachta Indica*	
601	77.720	5	60-90	7		L	Mango	*Mangifera Indica*	
602	77.740	5.5	>120	8	R		Neem	*Azadirachta Indica*	
603	77.900	5.5	90-120	7		L	Neem	*Azadirachta Indica*	
604	77.910	5	90-120	8		L	Neem	*Azadirachta Indica*	
605	77.920	5	>120	7		L	Neem	*Azadirachta Indica*	
606	77.930	5.5	90-120	8		L	Neem	*Azadirachta Indica*	
607	77.940	5	>120	7		L	sheesham	*Sesamun indicum*	
608	78.100	5.5	90-120	4		L	Neem	*Azadirachta Indica*	
609	78.400	5.5	60-90	10		L	Bell	*Eagal marmilos*	
610	78.420	5.5	>120	8		L	Peepal	*Butea monosperma*	
611	78.700	5	90-120	6		L	Palash	*Butea monosperma*	
612	78.710	5	30-60	7		L	Palash	*Butea monosperma*	

S. No.	Chainage	Distance from centre of existing road*	Girth (0-30cm , 30-60cm , 60-90,90-120, >120cm	Approx Ht.(M)	Left *	Right *	Local Name	Botanical Name	Remarks
613	78.720	5	30-60	8		L	Palash	*Butea monosperma*	
614	78.730	5.5	60-90	10		L	Palash	*Butea monosperma*	
615	78.780	5.5	>120	7		L	Neem	*Azadirachta Indica*	
616	78.800	5	90-120	8		L	Neem	*Azadirachta Indica*	
617	78.810	5.75	60-90	6		L	Palash	*Butea monosperma*	
618	78.820	5	30-60	7		L	Berry	*Zizyphus mauritiana*	
619	78.830	5.75	60-90	7		L	Berry	*Zizyphus mauritiana*	
620	78.840	5	60-90	6		L	Neem	*Azadirachta Indica*	
621	78.850	5	30-60	6		L	Neem	*Azadirachta Indica*	
622	78.860	5.5	30-60	7		L	Mango	*Mangifera Indica*	
623	78.870	5.5	>120	7	R		Palash	*Butea monosperma*	
624	78.900	5	>120	10		L	Neem	*Azadirachta Indica*	
625	79.000	5	30-60			L	Peepal	*Phycus relogiasa*	
626	79.010	5.5	30-60			L	Neem	*Azadirachta Indica*	
627	79.200	5.5	>120	10		L	Peepal	*Butea monosperma*	
628	79.300	5	>120	8	R		Peepal	*Butea monosperma*	
629	79.900	5.5	90-120	8		L	Neem	*Azadirachta Indica*	
630	79.900	5	>120	9		L	Neem	*Azadirachta Indica*	
631	82.300	5.5	90-120	7	R		Neem	*Azadirachta Indica*	
632	82.320	5	90-120	8	R		Neem	*Azadirachta Indica*	
633	82.400	5	>120	7		L	Peepal	*Butea monosperma*	
634	82.500	4	90-120	8	R		Neem	*Azadirachta Indica*	
635	82.900	5.5	90-120	7		L	Neem	*Azadirachta Indica*	
636	82.920	5	60-90	5		L	Neem	*Azadirachta Indica*	
637	83.200	5.5	>120	7	R		Peepal	*Butea monosperma*	
638	83.210	5	90-120	6		L	Neem	*Azadirachta Indica*	
639	83.250	5	60-90	7		L	Neem	*Azadirachta Indica*	
640	83.900	5.5	>120	8		L	Peepal	*Butea monosperma*	
641	83.920	5.75	90-120	7		L	Neem	*Azadirachta Indica*	
642	86.200	5.5	>120	11		L	kadam	*Neolamarckia cadamba*	
643	87.100	5.5	90-120	7		L	Neem	*Azadirachta Indica*	
644	87.290	5.5	>120	8		L	Peepal	*Butea monosperma*	
645	87.500	5.5	>120	9		L	Peepal	*Butea monosperma*	
646	90.600	5.5	>120	10		L	Neem	*Azadirachta Indica*	
647	90.800	6	>120	10	R		Neem	*Azadirachta Indica*	
648	91.300	4.5	>120	7		L	Peepal	*Phycus relogiasa*	
649	91.310	5.75	60-90	6	R		Peepal	*Phycus relogiasa*	
650	93.300	5.75	60-90	7		L	sheesham	*Sesamun indicum*	
651	93.320	5.75	60-90	7	R		sheesham	*Sesamun indicum*	
652	93.350	5	90-120	6	R		Peepal	*Butea monosperma*	
653	93.370	5.5	0-30	7	R		Neem	*Azadirachta Indica*	
654	93.600	5.5	>120	6	R		Neem	*Azadirachta Indica*	
655	93.800	5.5	90-120	8		L	Neem	*Azadirachta Indica*	
656	93.900	5	30-60	8		L	Eucklipuls	*Eucalyptus Radiata*	
657	94.700	5	>120	10		L	Neem	*Azadirachta Indica*	
658	94.900	5.75	90-120	9		L	Jamun	*Syzygium cumini*	
659	95.100	5.5	60-90	7		L	Neem	*Azadirachta Indica*	
660	95.150	5.75	>120	8		L	Neem	*Azadirachta Indica*	
661	95.200	5	60-90	6		L	kadam	*Neolamarckia cadamba*	

S. No.	Chainage	Distance from centre of existing road*	Girth (0-30cm , 30-60cm , 60-90,90-120, >120cm	Approx Ht.(M)	Left *	Right *	Local Name	Botanical Name	Remarks
662	95.3	5.5	90-120	7		L	Neem	*Azadirachta Indica*	
663	95.6	5.75	>120	10	R		Neem	*Azadirachta Indica*	
664	95.95	5.5	>121	10	R		Neem	*Azadirachta Indica*	
665	95.9	5.5	>122	11	R		Neem	*Azadirachta Indica*	
666	96	5.75	>123	10	R		Peepal	*Butea monosperma*	
667	96.9	5.5	90-120	8		L	Shubabul	*Leucaena leucocephala*	
668	96.93	5.5	90-120	9		L	Shubabul	*Leucaena leucocephala*	

4. Rare or Endangered Species

80. No rare or endangered species found in corridor of impact along the project road.

5. Wild life

81. The project road traverses mainly through agricultural fields and during field survey no wild animals were spotted. However in discussion with the Forestry Department and during the public consultations, it was found that common fauna in the study area are Neelgai /Nilgai (Boselaphus tragocamelus); chital or Indian Spotted Deer (Axis axis); monkey (Rhesus macaque), and hare (Lepus nigricolis) are listed as least concern by the IUCN based on the wide range of occurrence. Also documented to occur in the project area are threthened species of Jackal (Canis aureus indicus); jungle cat (Felix chaus), fox (Vulpes bengalensis),and king cobra (Binocellate cobra).

C. Madhya Pradesh Economy[1]

82. The state economy's GDP has registered a growth rate of 9.07 percent CAGR between 2006 and 2012(Advance Estimates), while the national GDP grew at 7.8 percent during the same period. This indicates a gradual shift in the economy from primary to secondary and tertiary sectors. In 2011-12, the primary sector contributed to one-fifth of the total GSDP, while contribution from the secondary sector had remained almost constant at a little less than one third of the total economy between 2009-10 and 2011-12. Tertiary sector has shown the maximum growth amongst the segments with a contribution of 46.96 percent in 2011-12.

83. While the state per capita income (Estimated at constant prices 2004-05 base) has increased from INR 17,013 to INR 24,132 between 2006-07 and 2011-12, it is still lower than the national level average of INR 38,005 during 2011-12. Per capita income at current prices has grown at the rate of 7.29% and 12.04 % per annum for Madhya Pradesh and All India level respectively during 1999-2000 to 2009-10. In terms of contribution of individual districts to the overall state economy, urban districts of Indore, Bhopal, and Jabalpur predominantly dominated by services sector account for a major share. Fifteen key districts in Madhya Pradesh contribute to about 55% of the total state economy.

84. **Agriculture**: Madhya Pradesh is predominantly an agrarian economy with agriculture, animal husbandry and fisheries being the nucleus of the primary sector in the state. The state has greater dependence on agriculture, both from an economic as well as employment perspective. Between 2006-07 and 2010-11, the sector's contribution to GSDP at current prices

[1]District wise skill gap study for the state of MP, 2013 by National Skill Development Corporation.

grew at 13.5%. While the absolute growth of the sector at current prices shows an increasing trend, the rate of growth across different years has been highly fluctuating. Further, between 2006-07 and 2010-11, secondary and tertiary sectors grew at a higher pace than agriculture - consequently, the relative contribution of agriculture sector to the state economy, reduced from 23.85% to 20.93%.

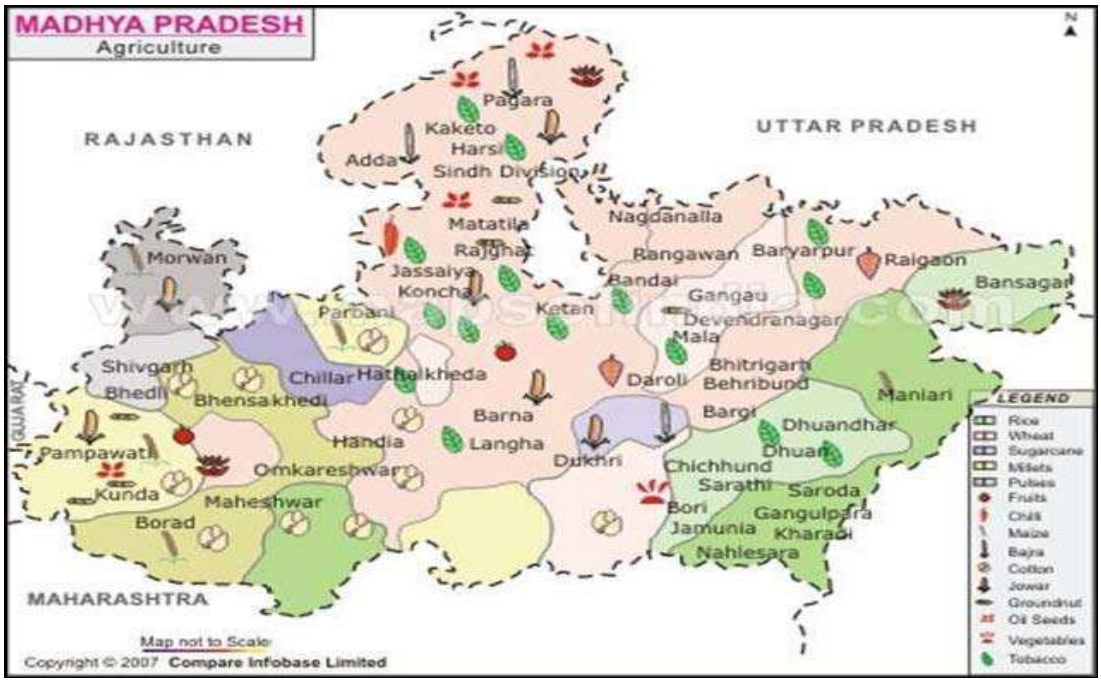


Figure 10: Agriculture Map of Madhya Pradesh

85. **Secondary Sector:** Madhya Pradesh is endowed with rich mineral deposits and other natural resources, providing tremendous potential for industrial growth. Secondary sector in the state grew at a compounded growth rate of 17.0930 percent between 2006-07 and 2011-12, though its contribution to state GDP continued to remain almost constant at around 29 percent during the same period.

86. **Minerals Mining and Processing:** Madhya Pradesh is one of the key mineral production states India. The state has rich deposits of coal, limestone and manganese, also the only source of diamond mining in India. Bauxite, Copper, Dolomite, Fire Clay and Granite/Marble stones are the other mineral resources available in the state. Balaghat, Singrauli, Panna, Katni, Satna and Sagar are among the mineral rich districts of Madhya Pradesh. Presence of rich mineral base has resulted in the growth of mineral based industries like cement, power, steel and stone processing in the mineral clusters.

87. **Tertiary Sector:** Tertiary sector is the largest contributor to the state economy, contributing 46.94% to GSDP in 2011-12, with a 5 year CAGR of 17.36%. Key components of tertiary sector include hospitality sector, ownership of dwelling, business services, banking and insurance and public administration.

1. Labour Force Distribution in the State

88. As per NSSO (National Sample Survey Organization) 66th Round Employment Survey, Worker Participation Ratio (WPR) per 1000 persons in the 15-59 age group based on current daily status is 551 in comparison to the national average of 509. The Labour Force Participation Rate (LFPR) per 1000 persons in the 15-59 age group based on current daily status for rural Madhya Pradesh is 628 as compared to 471 in urban regions. This significant difference arises from better participation of rural people in agriculture. Though the participation rate in rural regions is high, seasonal nature of agricultural work would mean underemployment for a significant section of agricultural labour force in the state. Subsequently, Madhya Pradesh has a low unemployment rate of 38 per 1000 persons in the 15-59 age group based on current daily status of 38 in comparison to the country's average of 67.

89. Madhya Pradesh has 68.8 percent of its worker population involved in agriculture and allied activities as of 2004 indicating the agrarian nature of the state workforce. Around 16 percent of the worker population is involved in secondary and tertiary activities each, which are low in comparison to the country's average of around 21 percent for both. The distribution of workers in the secondary and tertiary sectors for both the country and the state is dominated by the manufacturing, construction and trade segments.

90. Madhya Pradesh Labour force and Workforce for 2012, 2017 and 2022, are estimated considering the LFPR, WPR from NSSO 66th Round Employment Survey and applying it over the estimated population in the 15-59 age group for these periods. Overall labour force and workforce would change because of the change in working age group population (15-59 age groups). Projected labour force and workforce for the overall state are presented in the table.

2. Demographical profile of Rewa District

91. Rewa district is divided into 9 administrative blocks with Rewa town as the administrative headquarters. As of 2011, Rewa has a population of 23.63 Lakhs, with significant high proportion of the population living in rural area (83.3%), Rewa is a density population district with a population density of 372 people per square Km, in comparison to state average of 236.Gender ratio of the district standing at 929 females per 1,000 male populations is similar to the state average of 930 females per 1000 males. However gender ratio 0 to 6 year population standing 883 girls per 1000 boys is significantly lower than the state of 912 girls per 1,000 boys.The district has a comparable proportion of backward caste population to that of the state with Scheduled Castes & scheduled Tribes accounting for 15.75% and 12.87% of the total population respectively.

92. **Population Growth Rate:** There was change of 19.86 % in the population compared to population as per 2001. In the previous census of India 2001, Rewa District recorded increase of 26.90% to its population compared to 1991.

93. **Density 2011:** The initial provisional data released by census India 2011, shows that density of Rewa district for 2011 is 375 people per sq. km. In 2001, Rewa district density was at 313 people per sq. km. Rewa district administers 6,314 square kilometers of areas.

94. **Literacy Rate, 2011:** As, per the census of 2011, Rewa has a literacy rate (69.2%) Comparable to the state average (70.06%). Gender disparity in the literacy rate is significant, with male literacy rate 80.9% and the female literacy rate at 56.7%.The district has a total of 3,643 primary schools, 895 middle schools 115 high schools and 95 higher secondary schools.

The number of enrollments in Class VII when compare to class I is significantly low in Rewa. Government schools play a major role in Rewa as the percentage of students enrolled in government school are 62.375%. This shows that there is a slightly skewed share of students studying in government schools via-a-vis private schools in Rewa. The transition rate from primary to upper primary (81.56%), is significantly higher than the transition rate from upper primary to secondary (61.40%). Further, Current enrollments in higher secondary education is only 10,408 (Class XI) in comparison to secondary enrollment of 34,372 (Class IX), indicating the need to enhance secondary and higher secondary capacities to cope with increasing demand.

95. **Sex Ratio, 2011:** With regards to Sex Ratio in Rewa, it stood at 931 per 1000 male compared to 2001 census figure of 941. The average national sex ratio in India is 940 as per latest reports of Census 2011 Directorate. In 2011 census, child sex ratio is 885 girls per 1000 boys compared to figure of 926 girls per 1000 boys of 2001 census data.

96. **Child Population, 2011:** In census enumeration, data regarding child under 0-6 age were also collected for all districts including Rewa. There were total 351,983 children under age of 0-6 against 374,637 of 2001 census. Of total 351,983 male and female were 186,697 and 165,286 respectively. Child Sex Ratio as per census 2011 was 885 compared to 926 of census 2001. In 2011, Children under 0-6 formed 14.88 percent of Rewa District compared to 18.99 percent of 2001. There was net change of -4.11 percent in this compared to previous census of India.

3. Rewa District Economy

97. The Economy of Rewa has been growing at a CAGR of 12.58% during the period 2003 to 2009. The growth rate of the secondary sector has been the maximum, at 19.72% in the period from 2003 to 2009. Following it, has been the tertiary sector, with a growth rate of 12.98%. The agriculture sector has been the slowest growing sector, with a growth rate of 6.33%. The per capita income of Rewa is Rs. 16,132, with is below the state average of Rs. 25,175. The per capita income has been growing at a CAGR of 9.86% during the period 2003 to 2009. The district of Rewa is rich in natural resources, especially marble mines, bauxite and Coal. The Gross district Domestic product shows the maximum contribution by the tertiary sector, over the last decade.

98. **Agriculture and Allied Sector:** The total contribution of the primary sector to the GDDP has been 899 crores in 2008-09. It grew at 6.33% CAGR in the period 2003 to 2009. The main crops of the Rewa district are paddy, wheat and maize. The major soil type is mixed-red and black soil. Ground water has an important role in irrigation in the district. During the period of June 2011to September 2011, the rainfall received in Rewa district was 1035mm, which was 10% more than the average expected rainfall of 944mm. The percentage irrigated area of the land under cultivation is 26.1%, and increased by 2.03% during the period 2005-09. The percentage area under cultivation is 56.19% and has seen a decrease of 2.31% during the period 2005-09. There has been almost no change in percentage of double-cropped land, and it has remained at 35.92% during the period 2008-2009. The GDDP of Agriculture sector in 2008-09 was INR 73,121 lakhs and that of forestry and logging was INR 7,915 lakhs. The contribution of fishing to GDDP was INR 1860 lakhs. College of Agriculture in Rewa is a key educational institute which offers various courses in the field of agriculture. In the Horticulture sector, Rewa districts soil and rainfall are suitable for cultivation of fruit crops like Mango, Guava, Jack-Fruit,

Custard apple, Jamun and Chironji and also cultivation of vegetables like sweet potato and Green peas, spices like Chilli and Coriander.

99. **Industry:** The industrial sector of Rewa is a growing sector with a GDDP contribution of 93,984 lakhs in 2008-09, the secondary sector in Rewa district grew at a CAGR of 19.72% during the period 2009 to 2009. The contribution of manufacturing sector has been INR 17,791 lakhs and that of mining and quarrying has been INR 22,871 lakhs. The share of construction sector has been INR 36,699 lakhs. The Non-Metallic Minerals & Chemical & Chemical products constitute a major chunk of investments made in Rewa district. This is due to the presence of flourishing Cement Industry in the district. The " JapeeRewa Plant" is one of the largest cement and power producers of the district. The group has invested over Rs. 1,800 Crores and employed over 2000 workers. "Vindhya Tele Links Ltd" has invested Rs 121 Crores employing 500 workers. Also, "Birla Ericsson Optical Ltd."Has invested Rs. 960 Crores in Rewa while employing 300 Workers. The small-scale industries of the Rewa district have shown an uneven trend of investment and employment in recent years. The small scale industries are constituted mainly with Brick Kilns and food processing units. Also stone crushers, Beedi manufactures, handicrafts, bamboo furniture works etc. contribute towards the small scale industry sector of the district. Mineral based industries - At present three major cement plants are working in Rewa district, two at Naubasta and another at Bela and approx. 35 stone crusher industries are also working in the area near Rewa town.

100. Mineral based industries of RewaDistt. are summarized below :

Table 18: Mineral-based Industries

No.	Name of industries	Mineral used	Remark
1.	JaypeeRewa Cement Ltd., Unit-I, Naubasta District Rewa	Limestone	Working
2.	JaypeeRewa Cement Ltd., Unit-II, Naubasta District Rewa	Limestone	Working
3.	JaypeeRewa Cement Ltd., Bela District Satna	Limestone	Working
4.	Stone crushers (35 No's) Village Bankuiya District Rewa	Stone	Working

101. **Service Sector:** Services sector has been the driver of the district economy with contribution of about 50% to GDDP. The sector grew at 12.98% between 2003-09, driven by hospitality, public administration and other services. Trade Hotels and Restaurants, which are mostly unorganized, account for 28.83% of the GDDP. In the financial services space, between 2006-07 to 2010-11 bank branches in the district have increased from 103 to 140, also recording a 27.73% compounded growth in deposits, to Rs. 4100 Crores. High growth rate in bank deposits is expected to further the growth of NBFCs in the district. The district has 28 primary Health Centers (availability per lakh population is 1.18), and 268 Secondary Health centers (availability per lakh people is 12.34). The availability is comparatively lower than the surrounding districts. Also, the district is well connected by a busy railway line connectingShahdol, Katni, Damog, Sagar& Bhopal with Rewa district. Rewa is also connected by the roads such as the NH 7 Highway; this highway connects several important India cities such as Varanasi, Rewa, Jabalpur, Nagpur, Hyderabad, Bangalor, Salem, Virudhunagar, Tirunelveli, Dindigul, and Madurai. Also National Highway 27 and 75 pass through Rewa. The nearest bit towns to Rewa are Allahabad in UP (130Km) and Jabalpur (204Km).

102. **Workforce Distribution in the District.** Current Employment Scenario in Rewa: The Worker's participation rate stands at 43.7% and is relatively higher than the state average of 42.7%, and that of agricultural laborers is 30.5%. 5.2% of the workers are employed by

household manufacturing industries, which indicate a very low employment generation through industries and services sector in the line with economic activity in the district. In the skilled and semi-skilled youth category, migration occurs either because certain education opportunities do no exit in the home district, or because the youth seen brighter employment prospects by migrating to other industrial clusters in surrounding districts. The migration of labour from Rewa is primarily to area such as Bhopal, Satna, Sidhi and Jabalpur. Availability of passenger trains at regular intervals allows peoples to work in other districts while continue living in Rewa. Rewa also has a lot of inward migration from surrounding districts for employment in the cement industry of Rewa. The main districts from which people migration to Rewa, are Damoh, Panna, Satna, Katni, Chattarpur and also from some parts of southern Uttar Pradesh.

103. **Incremental Manpower Requirement in the District**: Incremental manpower requirement in the district has been estimated based on several parameters such as investments into various sectors in the district for the past 5 year, national level benchmarks on industrial growth across sectors, national inclusion targets for sectors such as banking and healthcare, employment generation potential of various sectors based on labour elasticity and market based insights from discussions with industries in the district. Estimated manpower requirement during 2012-22 for the potential sectors is presented in the table. As per the estimates, district is expected to witness an incremental employment of 1.86 lakhs against the addition of 205 lakhs to labor force. Low growth of employment opportunities within the district and willingness of district youth for employment related migration would provide opportunities for sourcing trained youth to locations like Bhopal, Satna, Sidhi and Jabalpur. Among the potential employment generating sectors in the district, Construction and Real Estate are prominent.

104. **Sensitive receptors**. During the environmental and social screening survey, it was observed that many small religious structures, school etc are located along the project road. However, no important religious structures will be directly affected during widening of the project road except few small temple which need to be shifted. Details of sensitive 53 receptors/community structure along the project road are shown in following table.

Table 19: Sensitive receptors(Harda To Chakghat)

Sr. No.	Chainage	Length of structure along the road	Distance from center of existing road	Left of right	Type-Temple, school, hospital, community building etc.	Remarks
1	1.6	20	6	RHS	Primary School	Majhiyar
2	7.5	10	15	LHS	Primary School	Majhiyar
3	7.3	15	6	LHS	Shiksha Gurantee	Khokha
4	10.5	6	10	RHS	Shiksha Gurantee	Rangoli
5	12.6	6	6	RHS	Temple	Bamni Ajmer
6	14.3	8	20	LHS	Primary School	Joginiha
7	14.5	20	7	LHS	Community Holl	Jaduwa
8	24.3	10	20	RHS	Temple	Kuraili
9	27.5	8	12	LHS	Primary School	Gonghata
10	27.5	10	10	RHS	Temple	Gonghata
11	29.5	6	10	LHS	School	Deokhar
12	40.5	10	6.5	RHS	Primary School	Atraila
13	43.6	8	6	RHS	School	Teduni
14	44.2	8	5	RHS	Aaganwadi	Chokhandi

Sr. No.	Chainage	Length of structure along the road	Distance from center of existing road	Left of right	Type-Temple, school, hospital, community building etc.	Remarks
15	45.5	4	4	RHS	Temple	Chokhandi
16	46.1	20	6	RHS	School	Chokhandi
17	46.2	3	3	RHS	Temple	Chokhandi
18	48.4	40	6	LHS	School	Rambagh
19	48.4	3	4	LHS	Temple	Rambagh
20	52.1	4	4	LHS	Temple	Khamhriya
21	55.1	2	8	LHS	Temple	Kirhaimod
22	56.8	6	7	RHS	School	Sitlaha
23	59.7	2	5	RHS	Temple	Jawa
24	59.8	2	6	RHS	Temple	Jawa
25	59.9	2	10	RHS	Temple	Near Police Station Jawa
26	60.1	2	10	RHS	Temple	Jawa
27	60.2	2	10	RHS	Temple	Jawa
28	64.2	20	20	RHS	Temple/ School	Jawa
29	64.5	20	10	RHS	Coperativ socity	Chandi
30	65	3	15	RHS	Temple	Chandi
31	65.3	15	10	RHS	Primary School	Chandi
32	65.8	8	8	LHS	Temple	Chandi
33	67.7	3	6	LHS	Temple	Chandi
34	68.2	3	8	LHS	Temple	Chandi
35	68.4	10	15	LHS	Aaganwadi	Chandi
36	70	11	15	LHS	Temple	Kusmaidha
37	70.8	17	10	LHS	Middle School	Koniya Kala
38	73.10	3	13	RHS	Temple	Kuthila
39	75.50	2	8	LHS	Temple	Chilla
40	75.60	2	8	RHS	Temple	Chilla
41	76.80	3	5	LHS	Temple	Chilla
42	76.90	4	10	LHS	Temple	Chilla
43	78.30	6	8	RHS	Temple	Kotra
44	82.30	12	10	RHS	School	Chandela
45	82.80	6	10	LHS	School	Chandela
46	83.50	4	8	LHS	Temple	Chandpur
47	86.80	3	6	LHS	Temple	Panasi
48	88.10	3	7	RHS	Temple	Papouara
49	89.30	40	7	LHS	School	Lunipar (U.P)
50	91.50	40	8	RHS	School	Deora (U.P)
51	95.50	4	8	RHS	Temple	Chakghat
52	96.00	2	3.5	RHS	Temple	Chakghat
53	96.00	17	15	RHS	Temple	Chakghat

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

105. Impact identification, screening for significance, and recommended mitigation measures for HC Road was guided by the use of ADB Rapid Environmental Assessment (REA) Checklist for Roads and Highways as provided in Appendix 1. The environmental screening of HC Road revealed the following the entire alignment is located inside or near a cultural heritage site, protected area, wetland, mangrove, estuarine, buffer zone of protected area or special area for protecting biodiversity.

106. The potential impacts of the proposed upgrading includes: removal of avenue trees, increase in ambient dust concentration, increase in noise, generation of construction debris and camp wastes, and loss of community structures

A. Impact on Physical Environment Design Stage

1. Natural Hazard

107. The entire Madhya Pradesh falls under zone least active to moderate zone as per seismic map of India and therefore the risk of damage to the project road due to earthquake is minimal. Nonetheless, relevant IS codes were adopted in the design the civil structures

a. Road Widening, Utilities shifting and Safety Planning

108. The entire road section has enough available ROW to accommodate the proposed road improvement works and will be undertaken along the existing alignment. Road widening will result to shifting of utilities and encroaching structures. Poor coordination with local authorities and communities will increase the risk of accidental damage to drainage canals and temporary disruption of water and electric supplies along active construction fronts. The further contraction of the useable carriageway during construction will exacerbate traffic and will hinder direct access across the road by residents along the road. Temporary detention of sewage on depressed areas during the reconstruction of drainage canals may occur.

109. Road formation widening will be made on the basis of minimizing tree cutting, utility shifting, and damage to community properties. Road design has incorporates the drainage system to avoid accumulation of sewage and surface run-off. Temporary pits will constructed side-and cross drains to collect sewage from demolished or damage drainage canals which will either be hauled for off-site treatment through septic tanks prior to disposal or land application.

110. Adequate safety provisions like crash barriers on accident prone areas, rumble strips in community areas to regulate speed, retro-reflective warning sign boards near school, hospital, and religious places are incorporated in the design. All utilities requiring shifting shall be largely made before start of construction. Prior to shifting, the Contractor will coordinate with the concerned agencies regarding the time and extent of shifting and community affected will be informed of potential service disruption at least 1 week in advance.

2. Terrestrial Ecology

111. There is no national park, wildlife sanctuaries or any other similar eco-sensitive areas within 10 km distance of the project area. However, six trees are likely to be affected. The impact and mitigation due to tree cutting has been discussed in following paragraphs. The road

has direct bearing on tree resources. Road widening option is made to minimize the cutting of tree. However efforts have been made in designing to reduce the tree cutting to only six. Compensatory plantation of 1:10 has been planned under the project to address this impact.

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B. Construction Stage

1. Air Quality

113. The potential sources of air emission during the construction phase of the project are:
- (i) dust re-suspension from earthworks including materials loading and unloading;
- (ii) quarrying and rock crushing;
- (iii) operation of construction equipment and machines;
- (iv) fugitive emissions from unpaved road travel; and
- (v) combustion of fuels from equipment, machineries, and vehicles.

114. Particulate matter, comprising the majority from road construction, Particle size distribution from road construction is dominantly large, with 85.5% > 10um and 55% > 20 um[2] which can settle within close proximity of the source. Hot mix plant will generate carbon monoxide (CO), un-burnt hydrocarbon, sulphur dioxide, particulate matters, and nitrogen oxides (NOx) emissions. This may affect the air quality of nearby areas especially due to emission discharge from low height stack. The deterioration of the air quality within the immediate vicinity of the road construction activities will be significant but temporary.

115. **Mitigation Measures**. Following measures are proposed to minimize the dust and emission generation:

i. Vehicles delivering loose and fine materials like sand and aggregates shall be covered.
ii. Loading and unloading of construction materials in project area or provisions of water fogging around these locations.
iii. Storage areas should be located downwind of the habitation area.
iv. Water shall be sprayed on earthworks and unpaved haulage roads regularly.
v. Regular maintenance of machinery and equipment. Vehicular pollution check shall be made mandatory.
vi. Explore the potential for using ready made asphalt and crushed rocks to avoid or minimize the use of hot mix and rock crushing plants
vii. Mixing plants and asphalt (hot mix) plants shall be located at least 1 km downwind of the human settlements. The asphalt plants, crushers and the batching plants shall be sited at least 500m in the downwind direction from the nearest settlement and after securing a No-Objection Certificate (NOC) from the SPCB. Hot mix plant shall be fitted with stack of adequate height as may be prescribed by SPCB to ensure enough dispersion of exit gases.

[2] (undated) W.R. Reed and J.A. Organiscak. Evaluation of dust exposure to truck drivers following the lead haul truck. http://www.cdc.gov/niosh/mining/userfiles/works/pdfs/eodet.pdf

viii. Only crushers licensed by PCB shall be used.
ix. LPG should be used as fuel source in construction camps instead of wood. Tree cutting shall be restricted.
x. Mask and other PPE shall be provided to the construction workers.
xi. Diesel Generating (DG) sets shall be fitted with adequate height as per regulations (Height of stack = height of the building + 0.2 KVA.
xii. Low sulphur diesel shall be used in DG sets as well as machineries.
xiii. Air quality monitoring should be carried out during construction phase. If monitored parameters are above the prescribed limit, suitable control measures must be taken

2. Noise

116. The scale of the construction necessary to upgrade the road and the corresponding slight increase in traffic are not expected to generate adverse impacts. Ambient noise level may increase temporarily in the close vicinity of various construction activities, maintenance workshops and vehicles and earthmoving equipment. These construction activities are expected to generate noise levels in the range of 80 – 95 dB(A) at a distance of about 5 m from the source.

117. Although this level of noise is higher than the permissible limit for ambient noise level for residential/commercial levels but will occur only intermittently and temporary. This noise level will attenuate with increase in distance from noise source, decreasing by 10dB at a distance of about 55m and 20 dB at 180 meters. Impact due to noise during construction activities will be minimal to communities as construction camps are located at least 50 meters from community areas.

118. Along the project road, a number of noise sensitive places are located which includes schools and temples. Noise impacts during project construction will be significant and temporary.

119. **Mitigation Measures.** Since the baseline noise levels already exceed prescribed standards the target for the operational stage monitoring will be to ensure that the noise levels do not exceed baseline levels.

120. All equipment shall be fitted with silencers and will be properly maintained to minimize its operational noise. Noise level will be one of the considerations in equipment selection, which will favor lower sound power levels. Stationary noise making equipment shall be placed along uninhabited stretches.

121. In addition to preferring less noise generating equipment, the timing of operation can be scheduled to avoid disruption of activities like school and prayer times. Finally, provision of temporary noise barriers will be made near identified sensitive locations or near the noise source during construction.

122. To protect workers operating in noisy environment, ear plugs or ear muffs will be provided by the Contractor to the workers and occupational exposure limits will be strictly implemented

3. Impact on Land and Soil

123. Borrow areas may lose its productivity if top soil is not preserved. Similarly, land area used for locating construction camp may lose its productivity, if it is not restored to its original stage after disbanding the construction camp.

124. **Mitigation Measures**. The top soil from the productive land 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. It shall be ensured that the land taken on lease for access road and construction camp is restored back to its original land use before handing it over back

a. Soil Erosion

125. Soil erosion may take place at locations of sharp bend near bridge construction locations, along steep and uncompact embankment slope, and wherever vegetation is cleared. Soil erosion may have cumulative effect viz. siltation, embankment damage, and drainage problem. Loss of soil due to run off from earth stock-piles may also lead to siltation of nearby water bodies. The intensity of soil erosion at different locations will be influenced by the lithology, topography, soil type and climatic condition (mainly rainfall) and drainage pattern.

126. **Mitigation measures.** Following mitigation measures are proposed for prevention of soil erosion:

i. Bank protection measures shall be taken at erosion prone areas. The protection measures may include use of geo-textiles matting, bio (vegetative) – turfing
ii. Provision of side drain to guide the water to natural outfalls.
iii. Stone pitching wherever necessary.
iv. When soil is spread on slopes for permanent disposal, it shall be buttressed at the toe by retaining walls.
v. Side slopes of the embankment shall not be steeper than 2H:1V. Turfing of embankment slopes shall be done along the stretch.
vi. Shrubs shall be planted in loose soil area.
vii. In rural stretches, longitudinal side drains shall be intercepted by drains serving as outlet channels to reduce the erosion
viii. IRC: 56 -1974 recommended practice for treatment of embankment slopes for erosion control shall be taken into consideration.
ix. Soil erosion shall be visually checked on slopes and high embankment areas. In case soil erosion is found, suitable measures shall be taken to control the soil erosion further including bio-turfing.
x. While planning or executing excavations, the Contractor will take all adequate precautions against soil erosion as per MoRTH 306.
xi. The earth stockpiles to be located downwind and provided with gentle slopes to prevent oil erosion

b. Borrow Areas and Quarries

127. The project area is flat terrain. Farmers are willing to provide earth from their field up to certain depth on adequate compensation, it is recommended that borrowing from agricultural land shall be minimized to the extent possible.

128. Borrow areas if left un-rehabilitated may pose risk to people, particularly children and animals of accidentally falling into it as well as become potential breeding ground for mosquitoes and vector born disease

129. Illegal quarrying may lead to unstable soil condition; destroy the landscape of the terrain, air and noise pollution. Opening of new quarries is not envisaged due to the proposed project. Quarry material will be sourced from existing nearby quarries.

130. **Mitigation measures**. Borrow pits shall be selected from barren land/wasteland to the extent possible. Borrow areas should not be located on cultivable lands except in the situations where land owners desires to level the land. The top soil shall be preserved and depth shall be restricted to the desired level.

131. Borrow areas should be excavated as per the intended end use by the owner. The Indian Road Congress (IRC):10-1961 guideline should be used for selection of borrow pits and amount that can be borrowed.

132. The depths in borrow pits to be regulated so that the sides shall not be steeper than 25%. To the extent possible, borrow areas shall be sited away from inhabited areas. Borrow areas shall be leveled with salvaged material or other filling materials which do not pose contamination of soil. In addition, it shall be converted into fishpond in consultation with fishery department and if desired by land owner/community. The borrow shall be

133. Rehabilitated following the broad guidelines given at Appendix 2.

134. Aggregates will be sourced from existing licensed quarries. Copies of consent/ approval / rehabilitation plan for a new quarry or use of existing source will be submitted to EO, PIU. The contractor will develop a Quarry Redevelopment plan, as per the Mining Rules of the state and submit a copy of the approval to EA if new quarries are opened.

c. Compaction and Contamination of Soil

135. 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 and equipment, and due to sitting of construction camps and workshops. Approach road either paved or unpaved is available for most the bridge approaches. However, for some bridges approach road has to be constructed.

136. Soil may be 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. Soil may be contaminated due to inappropriate disposal of domestic solid waste and sewage from construction camps.

137. **Mitigation Measures.** Fuel and lubricants shall be stored at the predefined storage location and away from drainage channels. The storage area shall be paved with gentle slope to a corner and connected with a chamber to collect any spills of the oils. Construction vehicles and equipment will be maintained and refueled in such a fashion that oil/diesel spillage does not contaminate the soil.

138. All efforts shall be made to minimize 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 labeled containers (Labeled: WASTE OIL; and hazardous sign be displayed) and sold off to SPCB/ MoEF authorized Waste Oil Recycler.

139. 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.

i. Approach roads shall be designed along the barren and hard soil area to reduce the compaction induced impact on soil.
ii. The productive land shall be reclaimed after construction activity.
iii. Septic tank or mobile toilets fitted with anaerobic treatment facility shall be provided at construction camp.
iv. 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.
v. Efforts shall be made that biodegradable waste shall be composted in the mechanized and movable composter by the contractor. Non bio-degradable and non-saleable waste shall be disposed off to authorized land fill site. Non-bituminous wastes to be dumped in borrow pits with the concurrence of landowner and covered with a layer of topsoil conserved from opening the pit.
vi. Bituminous wastes will be disposed off in an identified dumping site approved by the State Pollution Control Board
a. Construction waste constitutes debris, which are generated due to dismantling of pavement (though involved only for few kilometer in DBH Road), quarry dust and unused iron bars or damaged support structures. Uncontrolled disposal of these wastes may affect soil and even receiving water bodies may cause contamination of soil, and landscape of the area.

d. Groundwater

140. Contamination of groundwater is not envisaged since construction camps will have septic tanks or mobile toilets depending on the number of workers in each camp.

141. **Mitigation Measures.** Requisite permission as applicable shall be obtained for abstraction of groundwater. The contractor shall make arrangements for water required for construction in such a way that the water availability and supply to nearby communities remain unaffected. Water intensive activities shall not be undertaken during summer season.

e. Surface Water Bodies

142. Temporary pollution of water bodies may occur due to spillage of chemicals and oil at construction sites and disposal of waste from construction camps. Installation of a haul road or temporary access across the river/nala maybe required while construction work is ongoing in the existing minor bridges and culverts. This may cause sedimentation and other disturbances to the water body.

143. Mitigation Measures. To prevent siltation of road side ponds, provision of retaining wall is made along the road for the ponds located next to the road. As enhancement measures, efforts shall be made to increase the water holding capacity of the ponds (other than those affected) in the region by using the bed material as borrow earth. Following measures shall be followed additionally:

i. Bridge construction activity including piling is recommended during non-monsoon (October to End of May) period.
ii. Check dams must be created during construction to catch the silt or debris generated from construction activities across the water channels
iii. All chemicals and oil shall be stored away from water and concreted platform with catchment pit for spills collection.
iv. All equipment operators, drivers, and warehouse personnel will be trained in immediate response for spill containment and eventual clean-up.
v. Readily available, simple to understand and preferably written in the local language emergency response procedure, including reporting, will be provided by the contractors.
vi. Silt fencing and/or brush barrier shall be installed along drainage path, erosion prone areas for collecting sediments before letting them into the water body. Silt/sediment should be collected and stockpiled for possible reuse as surfacing of slopes where they have to be re-vegetated.
vii. All wastes arising from the construction should be disposed in an environmentally accepted manner so as not to block the flow of water in the channels. The wastes should be collected, stored and transported to the approved disposal sites.
viii. No vehicles or equipment should be parked or refueled near water bodies, so as to avoid contamination from fuel and lubricants
ix. Substructure construction should be limited to the dry season.
x. Construction camps shall be located away from habitation (at least 1 Km Away) and water bodies. Sewage from labour camps will be treated through septic tanks. No untreated/treated sanitary wastewater shall be discharged into surface water bodies as these are used for bathing and washing purpose.
xi. The borrow areas may also be converted into ponds with the concurrence of the land owners. Fisheries activity can be encouraged in such ponds through institutional support from concerned department

f. Hydrology and Drainage

144. Construction material and waste may contaminate or clog the small drains if stored or disposed close to water body.

145. **Mitigation Measures**. Adequate cross drainage structures shall be provided. Additional balancing culverts shall be provided in flood prone areas. The embankment height shall be designed consistent with the existing topography of the region and shall be higher than the HFL. 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.

146. The design of drainage system such as surface and sub-surface drainage shall be carried out as per IRC: SP: 42 and IRC: SP: 50. Surface runoff from the main highway,

embankment slopes and the service roads shall be discharged through longitudinal drains, designed for adequate cross section, bed slopes, invert levels and the outfalls. If necessary, the walls of the drains shall be designed to retain the adjoining earth.

147. IRC: 34-1970: Recommendations for road construction in waterlogged area and IRC: 75 and MORT&H guidelines for Design of High Embankments shall be referred.

148. No construction material will be stored or disposed near any water body except for reusing it for enhancement measures such as embankment raising.

4. Impact on Biological Environment

a. Terrestrial Ecology

149. There is no national park, wildlife sanctuaries or any other similar eco-sensitive areas within 10 km distance of the project area. However, some trees are likely to be affected. The impact and mitigation due to tree cutting has been discussed in following paragraphs.

150. One month before the construction starts, clearing and grubbing will be performed by the contractor. All trees within the ROW with 300 mm diameter at 1m above the ground will be cut, including the removal of stumps. A total of 664 trees are likely to be affected due to the proposed project. The cutting of trees will have minor to negligible impact on local environment.

151. **Mitigation Measures.** Requisite permission from Forest Department shall be obtained for cutting of roadside trees located in forest land otherwise; permission will be taken from district commissioner.

152. One month before the construction starts, clearing and grubbing will be performed by the contractor. All trees within the ROW with 300 mm diameter at 1m above the ground will be cut, including the removal of stumps. A total of 586 trees are likely to be affected due to the proposed project. The cutting of trees will have minor to negligible impact on local environment.

153. **Mitigation Measures**. Requisite permission from Forest Department shall be obtained for cutting of roadside trees located in forest land otherwise; permission will be taken from district commissioner.

154. The project envisages plantation of approximately 6640 trees along both sides of road as per IRC SP: 21 specifications. This will include the compensatory plantation as per prevailing guidelines of States forest department on 1:10 basis replacement rate or as per permission granted by district authorities for cutting of tree located on non-forest land, which vary from 1:3 to 1;10. Besides, additional plantation shall be done on banks of water bodies near bridge sites to enhance the aesthetics and check soil erosion. All tree plantations will be carried out through forest department, local community or the civil works contractor. Tree species selected for plantation must be suitable for local climatic conditions and be equal to or better in sequestering carbon than the the trees removed/be good for sequestering carbon (only for roads where there is no tree cutting). Necessary advise maybe sought from the local Forestry office in the selection of tree species.

155. A range of 10-15 m Centre-to-Centre is recommended for spacing of trees (parallel to the road). Setback distance of trees in different situations shall be based on IRC: SP: 21 and IRC: 66. The distance between the kerb, if any, and the nearest edge of tree trunk shall be at

least 2 m. The plantation in median shall comprise shrubs whose height would normally not exceed 1 -1.5 m and shall be as per IRC SP: 21.

156. For safe traffic operation, vertical clearance between the crown of the carriageway and lowest part of overhang of the tree available across the roadway shall conform to the standards laid down in IRC: SP: 21. The pit size, fencing, watering, and manuring requirements shall also conform to the above standard. The use of pesticides shall be avoided or minimized to the extent possible. Planting shall be such that it does not obstruct the visibility of traffic from any side and shall be pleasing in appearance.

b. Aquatic Ecology

157. Temporary sedimentation and water quality deterioration is expected from the project during the construction stage. Accidental spill of materials, chemicals, and fuels may also deteriorate receiving water quality and hence the aquatic ecology.

158. **Mitigation measures**. It is proposed to undertake construction activities near water bodies during summer season when most of water bodies are practically dry. Best construction practices shall be adopted to prevent increase in siltation level of the water. All precautionary efforts shall be taken as given under surface water section to prevent accidental damage of water quality.

C. Socio-Economic Impact

159. Hardua to Chakghat Road project will have both positive and negative impact on socioeconomic aspects as narrated below.

1. Positive Impacts

160. Economic activities supporting transport like fuel stations, automotive repair shops, lodging, and restaurants are expected to increase with increase of traffic and induced development of the area. The improved road will provide better connectivity which will result in (i) Reduction in travel time (ii) better mode and frequency of transport (iii) access to quality health care facilities, educational and other infrastructural facilities (iv) enhanced tourism activities in the area and state which in many terms will boost the local economy (v) better investment climate for industries creating more employment opportunities to local people.

2. Anticipated Negative Impacts

161. The other impacts are expected due to sitting and operation of construction camp during construction.

162. Construction workers expected to be about 150 per day per package are likely to be employed during construction. Most of the workers will be employed locally. However, some may be from nearby areas. This will cause additional burden on local resources. However, this impact will be temporary and will not have the potential for changes in the demographic scenarios of the area. The outside workers will be housed at the construction camp, which is expected to one per package. Poor sitting and improper management of construction camp may lead to several adverse impacts on environment viz. (i) loss of vegetation due to use of wood as fuel source for cooking (ii) deterioration in nearby surface water bodies" quality (iii) compaction and contamination of soil due to uncontrolled disposal of solid waste (iv) Poor sanitation may

result to transmission of communicable diseases among the workers and the host communities. This includes the possible spread of sexually transmitted disease, diseases from improper handling and supply of foodstuffs, poor water supply, and insect-borne diseases.

163. Mitigation Measures. Construction camp shall be sited at such locations so as to utilize the existing infrastructure. No productive land should be utilized for construction camp. All sites must be graded, ditched and rendered free from depressions to avoid water stagnation. Accommodation and ancillary facilities including recreational facility for workers shall be erected and maintained to standards and scales approved by the resident engineer. All camps should maintain minimum distance of 1000 m from habitation and water bodies.

164. All construction camps shall be provided sanitary latrines and urinals with provision of septic tanks attached with soak pits or mobile toilets fitted with anaerobic digestion system. Storm water drains shall be provided for the flow of used water outside the camp. Drains and ditches shall be treated with bleaching powder on a regular basis. Garbage bins must be provided in the camp and regularly emptied and disposed of in a hygienic manner. LPG cylinders shall be provided as fuel source for cooking to avoid any tree cutting.

165. The Contractor will ensure the following:

i. The good health and hygiene of all workers to prevent sickness and epidemics. These include the HIV/AIDS prevention program to reduce the risk and transfer of HIV virus between and among the workers and community, promote early diagnosis and assist affected individuals. Activities under the program include monthly information, education, and consultation communication campaigns to workers, drivers, delivery crew, and communities on the risk, dangers, and impacts of STD and HIV/AIDS. Contractor will also provide first aid facilities at the camp and organize regular health check-up camps as well.
ii. Availability of safe drinking water and sufficient supply of suitable and hygienically prepared food at reasonable price is available to the workers.
iii. Adoption of all precautions to protect the workers from insect and pest to reduce the risk to health. This includes the use of insecticides, which should comply with local regulations.
iv. Prohibition on supply or availability of alcoholic liquor or prohibited drugs at the camp.
v. Regular health check-up and immunization camps shall also be organized for the workers and nearby population.

3. Safety

166. The road construction activities may create various unsafe situations. This will require attention to the following safety aspects viz. (i) safety of construction workers, (ii) safety of road users including pedestrians and cyclists (iii) safety to cattle; (iv) safety of local community (iv) unsafe/ hazardous traffic conditions due to construction vehicle movement need to be considered during design and construction stage and (v) conduct of safety audit.

167. Mitigation measures. During the construction phase, contractors shall be required to adopt and maintain safe working practices. Internationally accepted and widely used safety procedures should be followed during (i) road works (ii) handling of large construction equipment and machineries, (iii) handling of chemicals and hazardous materials and

inflammable substances (iii) welding and (iv) electrical works. Contractor shall also arrange required PPEs for workers, first aid and firefighting equipment at construction sites. Contractor will also prepare an emergency preparedness plan, which shall be duly approved by EA to respond to any emergency and unsafe conditions. To avoid disruption of the existing traffic due to construction activities, comprehensive traffic management plan shall be drawn up by the contractor. Retro

168. Reflectorized traffic caution signs shall be used during construction. Regular safety audit or periodic review shall be made to assess the effectiveness of safety measures adopted during construction.

169. Adequate caution signage near school, sensitive locations, speed control, caution notes shall be fixed at appropriate locations. These shall be preferably of PCC with Retroreflective paints. Steel base signage shall be avoided to prevent theft of the same. Crash barrier shall also be installed at appropriate locations particularly near school to provide safety to school children. Provision of sped breakers shall be made near schools and religious places.

4. Impacts during operation stage

170. The subproject road is located in vast open agricultural land, which will provide adequate dispersion of gaseous emission from vehicle. Further, proposed plantation will ameliorate/enhance the micro climate. No adverse climatic changes/impacts are anticipated during operation stage other than GHG (CO2) emission due to increased traffic, which would be largely offset with better fuel efficiency and reduced vehicle idling due to improved road conditions.

a. Air Quality

171. Vehicular emissions will be the principle source of pollution during operation stage. The subproject road is mostly located in vast open agricultural land, which will provide adequate dispersion dynamics of gaseous pollutants. Moreover, majority of the traffic on the subproject will be diverted traffic from the existing highways.

172. Mitigation Measures. Plantation is one of the preferred solutions to check air pollution. Plants serve as a sink for pollutants, reduce the spread of dust. Tree plantation along roadsides and other places shall include pollution absorbent species. Awareness signboards shall be installed at prominent location to educate drivers for good driving and vehicle maintenance practices.

b. Noise

173. During the operational Stage, 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 nearby schools and religious places.

174. Mitigation Measures. Effective traffic management and good riding conditions shall be maintained to reduce the noise level throughout the stretch. Speed limitation and honking restrictions may be enforced near sensitive locations. Increased plantation along the road and boundary wall will also work as noise barrier. Since most of the schools buildings are away from the road, therefore impact of noise is expected to be insignificant. Since improved road

conditions and multi-layered plantation will be helpful in attenuation of noise levels, the effectiveness of these measures shall be monitored. If noise levels are still found higher than the prescribed ambient noise standards at these sensitive receptors, adequate noise barrier shall be fixed.

c. Land and Soil

175. The better access can lead to conversion of agriculture land for residential and commercial purposes close to roads and especially in rural and urban area.

176. **Mitigation Measures**. The EA may explore the feasibility of restricting about 30 m area either side of the road as no development zone on the line restriction are imposed for National Highways authority of India.

d. Soil Erosion

177. No impact on soil is anticipated during operation phase of the project except bridge approaches where unexpected rainfall may erode the embankment formation and deterioration of borrow areas if not rehabilitated properly.

178. **Mitigation measures**. Embankment stabilization shall be check periodically during operation stage and suitable stabilization measures shall be taken wherever any erosion is identified. Borrow areas will also be rehabilitated following the guidelines given at Appendix 2.

e. Groundwater

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

f. Surface Water Bodies

180. No major or long-term impact is anticipated during the operation phase on the surface water bodies due to the project implementation activities. Oil contaminated runoff from the road during monsoon will have minimal impacts considering their low concentration.

g. Hydrology and Drainage

181. 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 will be regularly conducted.

5. Impact on Biological Environment

a. Terrestrial ecology

182. Positive impacts on terrestrial ecology are expected during the project operation stage due to the increase in vegetation and landscaping along the road. The project will coordinate with the local communities to maintain and enhance the trees planted along the state road. ”No adverse impact is anticipated during operation stage except accidental damages or absence of proper tree management.

183. **Mitigation Measures**. Arrangement shall be made to ensure survivability of the tree plantation. The tree survivability audit shall also be conducted at least once in a year to assess the effectiveness of the programme.

b. Aquatic Ecology

184. No impact is envisaged during operation phase of the project and hence no mitigation proposed. However, periodic surveillance shall be conducted to check erosion and siltation in major water bodies.

c. Community Health and Safety

185. During operation phase, the projected increase in the number of motorized road users traveling at higher speeds also increases the chances of injuries and fatalities from road crashes.

186. **Mitigation Measures**. Adequate caution signage near school, sensitive locations, speed control, caution notes shall be fixed at appropriate locations. These shall be preferably of PCC with Retro-reflective paints. Steel base signage shall be avoided to prevent theft of the same. Crash barrier shall also be installed at appropriate locations particularly near school to provide safety to school children. Provision of speed breakers shall be made near schools and religious places.

D. Climate Change Impacts and Risks

1. Climate Change Mitigation

187. The Transport Emissions Evaluation Model for Projects (TEEMP)3 developed by Clean Air Asia4 was utilized to assess the CO2 gross emissions with and without the project improvements. The main improvement from the project that was considered for the model is better surface roughness which was translated into impacts on traffic speed and hence fuel consumption. The model also allows for the inclusion of impacts related to traffic congestion with and without project through provisions for inserting data on the traffic numbers, lane width, number of lanes and volume/capacity saturation limit.

188. Information that was fed into the model for projecting the CO2 emissions were:

(i) The road will rehabilitate 92.25 km of major district roads;
(ii) The existing road having 2 lane with a 3.5 m carriageway width will be improved intained to the same number of lanes and carriageway width with asphalt concrete surface;
(iii) Road roughness will decrease from the general condition of 16 m/km to 2.5 m/km;
(iv) Construction will take place over a period of 12 months in 2015 and road operations will begin in 2016.
(v) The design life of the road is 20 years. Hence the midpoint of the design life is after 10 years or 2025.
(vi) Other improvements include the repair or reconstruction of damaged culverts, introduction of lined longitudinal and cross drains for the road and removal of irregularities on the existing vertical profile and road safety appurtenances.

189. The traffic forecast data was taken from the traffic studies and economic analysis for the road disaggregated into vehicle types and annual average daily traffic. Key vehicle categories considered for the road and the annual average daily traffic in 2014 (baseline scenario) without project and in 2025 with the project is given in the table below.

Table 20: Annual Average Daily Traffic for different vehicle categories

Vehicle category	2016 (without the project)	with project)
2-wheeler	222	458
3-wheeler/autorickshaw	30	58
Car/jeep/taxi/van	166	343
Light Commercial Vehicle	41	86
Minibus and standard bus	7	15
Heavy commercial vehicle	6	12
TOTAL	**472**	**972**

190. The volume/capacity saturation limit was taken at 2.0 or twice the designed road capacity and beyond which traffic congestion will result to less than optimum travel speed and increase in fuel consumption. Emission factors were taken from the CBCP/MOEF (2008) Draft Report on Emission Factor Development for Indian Vehicles, the Automotive Research Association of India, and C. Reynolds et.al (2011) Climate and Health Relevant Emissions from in-Use Indian for three-wheelers rickshaw as follows:

CO2 Emission Factors

Vehicle Type	Gas/Petrol	Diesel
2-Wheel	2.28 kg/l	
3-Wheel		2.63 kg/l
Cars/bus/bus	2.59 kg/l	2.68 kg/l
LCV		3.21 kg/l
Bus		3.61
HCV		3.50

191.

192. Emissions from road construction were also calculated using estimates of the total quantity of materials that will be used to rehabilitate the road which is 961 tons of steel, 8088 tons of cement and 9858 tons of bitumen.

193. Estimated carbon emissions. The proposed road upgrading resulting to surface roughness and road capacity improvements have implications in CO2 emissions. Improved roughness results to higher speed and lesser emissions while increase road users increases emissions. These factors are further affected by traffic congestion once the volume/capacity saturation limit.

194. CO2 emissions will also result from the processing and manufacturing of raw materials needed to upgrade the road and in the case of Ujjain-Maksi, a total of 8088 tons of cement, 961 tons of steel, and 9858 tons of bitumen will be needed. These construction materials will produce an estimated 10700 tons of CO2.

195. The Figure below presents the impacts on emissions due to road improvements. Total CO2 emission at business-as-usual scenario was estimated at 4188 tons for the entire project life and without-and with-induced traffic are 42153 and 42451 tons respectively. These values are below the 100,000 tons per year threshold set in the ADB SPS 2009. Therefore it is not necessary to implement options to reduce or offset CO2 emissions under the project.

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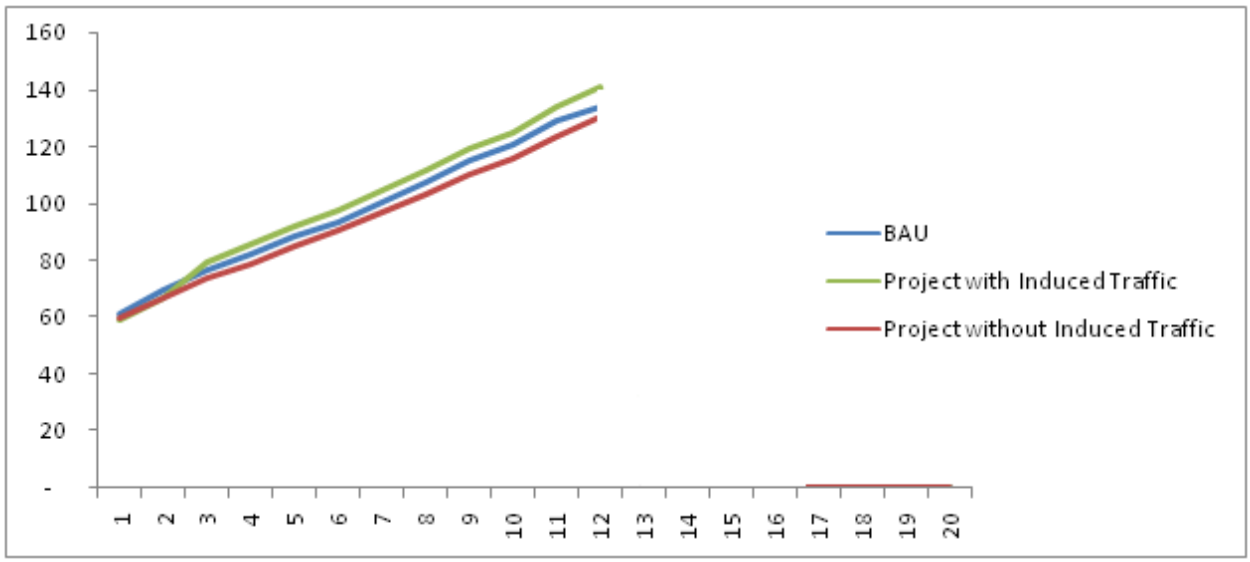


Figure 11: Plot of CO2 Emissions Considering Improvement in Surface Roughness and Road Capacity

196. The design life of the roads is 20 years. The project's CO2 emission intensity indicators are provided in the succeeding Table 21

197. **Table 21: Project CO2 Emissions Intensity Indicators**

Details	Business-As-Usual	Project (without Induced Traffic)	Project (with Induced Traffic)
tons/km	45.40	456.91	460.14
tons/year	97.98	986.16	993.14
tons/km/year	3.78	38.08	38.35
g/pkm	107.16	1,078.52	1,011.62
g/tkm	108.75	1,094.565	1,026.26

198.

2. Climate Risks and Adaptation needs

199. Climate risks were identified following both top down and bottom up approaches. Under the top down approach changes of key climate parameters, mainly temperature and precipitation were projected for 2050 using an ensemble of Global Climate Models (GCMs). Given the projected variations of temperature and precipitation the project roads were screened for 9 types of climate risks:

- Landslide triggered by increased precipitation
- Fire

- Flood
- Drought
- Tsunami
- Cyclone wind
- Cyclone surge
- Sea level rise
- Coastal erosion

200. Climate risk maps based on information from the GCMs were created for the project area using Geographic Information System (GIS) maps. After overlaying the road locations on the climate risk maps low to medium risks identified for the project roads were flooding, landslides triggered by precipitation, coastal erosion and tsunami.

201. The overall climate change risk level identified from the above exercise is low. The key risk identified is flooding (increased storminess). Bridges and road embankments are the main project components that will be prone to flooding. Increase in temperature may also affect road safety.

202. Under the bottom up approach the flood prone areas in the project road were identified based on field surveys for the engineering design.

203. Key engineering measures taken to address the risk of flooding in the design are: increase in road embankment height in flood prone areas/sections, improvement and provision of lined longitudinal and cross drains and new culverts, improvement and new construction of minor and major bridges. Bridge heights have been designed to have a height of 0.6m above HFL for minor bridges and 0.9m above HFL for major bridges. Flood return period of 50 years for minor bridges and 100 years for major bridges have been considered.

E. Cumulative and Induced Impacts

204. According to the ADB Environment Safeguards Sourcebook [3] cumulative impact is described as: “The combination of multiple impacts from existing projects, the proposed project, and anticipated future projects that may result in significant adverse and/or beneficial impacts that cannot be expected in the case of a stand-alone project.” The sourcebook also describes induced impacts as: “Adverse and/or beneficial impacts on areas and communities from unintended but predictable developments caused by a project, which may occur at later or at a different location.

205. Economic activities supporting transport like fuel stations, automotive repair shops, lodging, and restaurants are expected to increase with increase of traffic and induce development in the project area. The improved road will provide better connectivity and result in (i) Reduction in travel time (ii) better mode and frequency of transport (iii) access to quality health care facilities, educational and other infrastructural facilities (iv) enhanced tourism activities in the area and state which in many terms will boost the local economy (v) better investment climate for industries creating more employment opportunities to local people.

206. In terms of environment safeguard issues the improved road surface is expected to result in less dust and noise due to traffic plying on the damaged roads. However, the increased traffic due to the improved road will generate more air pollution due to vehicle exhaust and noise. The smoother road conditions will also result in increase of traffic speeds, hence creating more risks for accidents amongst traffic users as well as the local communities in the project area.

207. For addressing the impacts of air pollution and noise, regular maintenance of the road surface, maintenance and monitoring of newly planted trees and installation of noise barriers where necessary have been included in the EMP for implementation during operation stage. For addressing safety related impacts, regular maintenance of the road furniture include safety related furniture, enforcing rules against encroachment of structures and sensitive structures (schools, temples etc.) inside the ROW and implementation of the emergency response system has been included in the EMP for implementation during operation stage,

208. Information on future development projects along the project road was not available. Hence, it is difficult to assess cumulative impacts from other projects which may get implemented in the project area.

[3] Environment Safeguards, A Good Practice Sourcebook, Draft Working Document, December 2012

VI. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

209. Meaningful consultations were held early and throughout the project development stage to allow the incorporation of relevant views of the stakeholders in the final project design, mitigation measures, implementation issues, and enhance the distribution of benefits. All the five principles of information dissemination, information solicitation, integration, co-ordination, and engagement into dialogue were incorporated in the consultation process. The analysis of 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. The requirement of public consultation during the implementation of the project has been proposed as part of the mitigation plan.

A. Methodology for Consultations

210. Consultation with the stakeholders, beneficiaries, and community leaders were carried out using standard structured questionnaires as well as unstructured questionnaires. Questionnaire survey/ discussions were designed to obtain background information and details of general environmental issues that concern people in the project area. In addition, environmental issues were discussed with relevant organizations, government officials, beneficiaries, community leaders and experts. In addition, personal discussions with officials, on site discussion with affected stakeholders, and reconnaissance visits have also been made to the project area. Public consultation have been carried out at seven locations during initial surveys as shown in table 21. The total numbers of participants in the consultations are 85 out of which 24 or 30% are women.

Table 21: List of Public consultation and Date

S .No	Village	Date	Chanage	No of Participants
1	Hardua	21/7/2014	0+800	12
2	Rangoli	21/7/2014	7+000	15
3	Atrala	20/7/2014	38+000	12
4	Rambag	21/7/2014	39+700	15
5	Jawa	20/7/2014	57+500	10
6	Chilla	20/7/2014	73+000	11
7	Chakghat	20/7/2014	92+000	10

B. Project Stakeholders

211. All types of stakeholders were identified to ensure as wide coverage as possible.

i. Residents, shopkeepers and businesspeople who live and work along the road. Specially the project affected persons
ii. All type of road users/commuters
iii. Executing Agency, Construction Supervision Consultant and Implementing NGOs,
iv. Other government institutions whose remit includes areas or issues affected by the project (state environment and forest department, Pollution Control Board (PCB), Irrigation Department, Public Health Engineering (PHED) Department
v. The beneficiary community in general

a. Consultation with Government Departments

212. Various officials consulted during IEE preparation included PWD Officials, DFO & Ranger Forest Deptt State pollution control board for Air, Noise and Water quality information, IMD for the climatic data, statistical officer for Population and demographic profile, Panchyat department for village level information, Survey of India for the toposheet requirement, Revenue department for the land record information, PHQ officers for hand pump relocation and quality assessment, MPSEB offices for electric pole shifting etc.

213. These departments helped to provide various project related data and information which helped preparation of reports and data analysis.

b. Consultation with Local People and Beneficiaries

214. The informal consultation generally started with explaining the project, followed by an explanation to potential impacts. Participant's views were gathered with regard to all aspects of the environment which may have direct or indirect impact on local people. Key Issues discussed are:

i. Awareness and extent of the project and development components;
ii. Benefits of the project for the economic and social upliftment of community;
iii. Labour availability in the project area or requirement of outside labour involvement;
iv. Local disturbances due to project construction work;
v. Necessity of tree felling etc. at project sites;
vi. Impact on water bodies, water logging and drainage problem if any;
vii. Environment and health
viii. Flora and fauna of the project area
ix. Socio-economic standing of the local people and

215. The project has immense acceptability among the local people. They perceive that in addition to providing all weather connectivity, the subproject road will bring positive socioeconomic changes in the area. Local people mainly discussed on the issues related to flooding, rehabilitation, resettlement, and road safety issues. The list of participants views, and outcome of the consultations have been summarised in Table 36. The Details of Participants and Public Consultation photographs are attached in Appendix 8. In addition information on the GRM procedures and formats in local language in.Hindi was shared with the local people as provided in Appendix-9.

216. The project has immense acceptability among the local people. They perceive that in addition to providing all weather connectivity, the subproject road will bring positive socioeconomic changes in the area. Local people mainly discussed on the issues related to flooding, rehabilitation, resettlement, and road safety issues. The list of participants views, and outcome of the consultations have been summarised in Table 22.

217. The Details of Participants and Public Consultation photographs are attached in Appendix 8. In addition information on the GRM procedures and formats in local language i.e. Hindi was shared with the local people as provided in Appendix-9.

Table 22: Outcome of the Consultations

Sr. No.	Date and Location	Issues Discussed	Measures Taken	Participants
1	Date: 21/07/14 Village: Hardua	• Dust control measures like water sprinkling shouldbe done during construction phase. • Speed breakers should be provided near Settlements to control the speed of vehicles. • Tree shall be planted along the road. • Road . • Safety measures should be taken for Pedestrian. • Drain andculverts • Should be provided to avoid accumulationof rain water on the road. • The road should be wide as compare to existing road. • All the resident and official will help during the construction phase. Width of the road should not be less than 8 m even in market area • The villagers were very happy to listen that the MPRDC is going to construct a road in the village.	• Proposed widening and strengthening of the road will provide better level of services in terms of improved riding quality and smooth traffic flow. • There will be considerable reduction in the number of accident and level of pollution. • Accessibility to social health and educational infrastructure will increase through all-weather road. • Generation of employment during construction phase of the road. • The discussion generate considerable awareness of the project • As the proposed road shall be an widened one, it shall provide an efficient public transportation system besides ensuring reduction in congestion level • The non -title holders shall also be compensated as per ADB guidelines. • Drainage system is mention in built-up area and drainage for rural area. • • Road safety features like traffic signs, Overhead Sign Boards, Road Illumination, Delineators, pavement marking, pedestrian path and rumble strips has been included in the design . • Proper Rehabilitation measures will be taken and compensation will be as per market rate.	Total Participants-12
2	Date: 21/7/14 Village: Rangoli			Total Participants-15
3	Date: 20/07/14 Village: Atrala			Total Participants-12
4 ,5 6 7.	Date 21/7/14 ,village Rambag Jawa 20/7/14 Chilla20/7/14 Chakghat 20/7/14			Total participant -15 Total Participant 10 Total Participant 11 Total Participant 10

218. Most of the people interviewed were well aware of the environmental conditions in and around their villages. A major percentage was ignorant about any deterioration in the air and noise quality due to expansion of existing highway. However, their major concern was related to the loss of fertile agricultural land. The villagers are quite enthusiastic about the proposed project as it will give fillip to rural economy and present them many employment opportunities during construction of project road. Overall positive approach towards the project is observed.

C. Results of Consultation with Local People

219. Most of the people interviewed strongly support the project. The people living in the entire project area expect the different project elements to facilitate transport, employment, tourism, boost economic development and thereby provide direct, or indirect, benefits to them. In order to access the existing environment and likely impacts on surrounding population, an interview survey was carried out. A sample of the population was interviewed through a designed questionnaire. Precaution has been exercised during the survey to ensure that the sample interviewed is truly representative of the affected groups and the questions are worded so as not to generate a bias response.

220. It is observed from the interview survey that there is increased environmental awareness among the people. It can also be seen from Table 38 that about most of the persons are in the opinion that an environmental condition of the area is not good due to bad conditions of road specifically for air & noise.. Poor road condition and vehicular emissions are the major sources they feel responsible for this. People are not fully aware about presence of archaeological, historical and cultural sites. There is no major history of natural disasters in the region and local people have mixed response about natural disasters. Overall, the general environmental awareness in the region is good and people have increased environmental awareness. Table 23 shows the result of public opinion survey carried out in the region.

Table 23 : Peoples' Perception about Environmental Scenario

Sr. No.	Question asked about	No. of people interviewed	Positive response (%)	Negative response (%)	No response (%)
1	Water quality of rivers, ponds, wells, and canals	85	85	10	5
2	Noise quality of the area	85	60	30	10
3	Air quality of the area	85	55	40	5
4	Archaeological sites	85	5	85	5
5	Natural disaster	85	10	70	20
6	Rare species of animals and birds found	85	10	75	15
7	Cultural sites i.e. market, melas	85	80	10	10

Note: Positive response shows that the people have awareness regarding environmental scenario.

D. Conclusion and Recommendation

221. Overall, most of the people interviewed strongly support the project. The people living in the entire project area expect the different project elements to facilitate transport, employment, tourism, boost economic development and thereby provide direct, or indirect, benefits to them.

Construction camps may, however, put stress on local resources and the infrastructure in nearby communities. In addition, local people raised construction-process related grievances with the workers. This sometimes leads to aggression between residents and migrant workers. To prevent such problems, the contractor should provide the construction camps with facilities such as proper housing, health care clinics, proper drinking water and timely payment. The use of local laborers during the construction will, of course, increase benefits to local peoples and minimise these problems. Wherever possible, such people should be employed.

222. The following are the Consultants' initial findings in regard to likely positive and negative impacts.

1. Positive Impacts:

- The improved road: will reduce travel times, fuel consumption and emissions from base traffic volumes
- Drainage conditions will be considerably improved: this because of the provision of improved side drains, culverts and causeways;
- Economic development and access will be stimulated
- Health, Agricultural and Education facility will improve.

2. Negative Impacts

- Few tree loss which reduce the green cover but simultaneously plantation will take place to improve the green cover.
- Minor deteriorations in the present minimum levels of air, water and noise quality may be expected during construction- but this should be short-term and localised – in order to minimise the impacts, the mitigation measures recommended
- During construction the traffic will slow and messy.
- On the basis of available information, field visits over the entire length of the project road, discussions with the project authorities; other discussions amongst the project team, NGOs, local people and various governmental officials, it has been concluded that overall:
- All elements of the projects will be beneficial;
- All negative impacts, during and post construction, including those deemed "significant" can be properly mitigated; and
- No comprehensive, broad, diverse or irreversible adverse impacts have been identified.

VII. ENVIRONMENTAL MANAGEMENT PLAN AND GRIEVANCE REDRESS MECHANISM

223. The environmental impacts associated with any development project are eliminated or minimized to an acceptable level through development of appropriate mitigation measures based on most suitable techno-economic options. The Environmental Management Plan (EMP) is a well-established tool to ensure effective implementation of the recommended mitigations measures throughout the subsequent project development stages. The EMP also ensures that the positive impacts are conserved and enhanced. An EMP provides location and time specific actions to be taken with defined responsibility. It also provides measures for institutional strengthening and effectiveness assessment through defined monitoring plan, reporting and corrective & preventive action planning.

A. Environmental Management Plan

224. The H-C Road specific Environment Management Plan has been formulated which consists of a set of mitigation; monitoring and institutional measures applicable to design, construction and operation stages of the project (Appendix 3). The components of this EMP includes (i) mitigation of potentially adverse impacts (ii) monitoring of impacts and mitigation measures during project implementation and operation (iii) institutional capacity building and training (iii) compliance to statutory requirements (iv) integration of EMP with project planning, design, construction and operation.

B. EMP Implementation Schedule

225. The EMP provided in Appendix 3 provides measures. However, specific mention is made for location specific measures. The package specific EMP costs are separately assessed. These EMP will form part of bidding document as well. The construction period for MC Road is considered as 24 months from the date of start of construction.

C. Emergency Response Plan

226. Assessment of nature, type and extent of project activities establishes that this project may have only one environmental emergency i.e. accidents on paved roads and consequent spillage due to damage of oil tank of the vehicle. It is suggested to develop a communication and response system to minimize the response time. The project authorities shall be prepared to counteract against such emergency either by developing in-house capabilities or by associating with any competent agency.

D. Environmental Monitoring Plan (EMoP)

227. The purpose of the environmental monitoring program is to ensure that the envisaged objectives of the project are achieved and result in desired benefits. To ensure the effective implementation of the mitigation measures and Environmental Management Plan (EMP), it is essential that an effective monitoring program be designed and carried out. The board objectives of environmental monitoring plan are:

i. To evaluate the performance of mitigation measure proposed in the EMP,
ii. To evaluate the adequacy of Environmental Assessment
iii. To suggest improvements in management plan, if required,

iv. To assess change in environmental quality,

228. A comprehensive monitoring plan has been prepared for all stages of the project and provided as Appendix 4. This includes parameters to be measured, methods to be used, sampling locations, frequency of measurements, detection limits, cost and responsibility for implementation and supervision. The monitoring programme is designed for monitoring during construction and operation stages with details on budget and responsible agencies:

- Construction Stage: (three years of construction period)
- Monitoring to be carried out by construction supervision consultant (CSC). The costs to form part of CSC budget.
- Six Monthly monitoring by external agency to be arranged by PIU ADB from Project cost budget. This report will be directly submitted by agency to MPRDC.

229. Monitoring Programme and schedule for Key Performance Indicators (Physical, biological and environmental management components identified as of particular significance) are given in the following section:

1. Ambient Air Quality (AAQ) Monitoring

230. Ambient air quality parameters recommended for road transportation developments are Fine Particular Matter (PM2.5), Respirable Particular Matter (PM10), Carbon Monoxide (CO), Oxide of Nitrogen (NOx) and Sulphur Dioxide (SO2). These are to be monitored at designated locations starting from the commencement of construction activities. Data should be generated twice in a week at all identified locations in accordance to the National Ambient Air Quantity Standards (Appendix 5). The locations and environmental parameters to be monitored are detailed out in the Environmental Monitoring Plan (Appendix 4).

2. Water Quality Monitoring

231. The physical and chemical parameters recommended for analysis of water quality relevant to road development project are pH, total solids, total dissolved solids, total suspended solids, and oil & grease. The monitoring of the water quality is to be carried out at all identified locations in accordance to the Indian Standard Drinking Water Specification – IS 10500 (Appendix 6). The locations, duration and the pollution parameters to be monitored are detailed in the Environmental Monitoring Plan (Appendix 4).

3. Noise Levels Monitoring

232. The measurements for monitoring noise levels would be carried out at designated locations in accordance to the ambient Noise Standards formulated by Ministry of Environment and Forests (MoEF) as given (Appendix 7). Noise level would be monitored on a twenty-four hours basis. Noise should be recorded at “A” weighted frequency using a slow time response mode of the measuring instrument. The measurement location, duration and the noise pollution parameters to be monitored and the responsible institutional arrangements are detailed in the Environmental Monitoring Plan (Appendix 4).

4. Tree Plantation

233. The 75% survival rate of re-plantation shall be monitored on the first year of the operation phase. If the survival rate is found below 75%, additional compensatory plantation shall be carried out by agency responsible for plantation and maintenance. The survival rate monitoring shall be again taken up after 1 year again. This cycle should continue until the 75% survival rate is achieved. Since tree plantation would be made through forest department, monitoring would be carried out through MPRDC.

5. Soil Erosion and Drainage Congestion

234. No significant soil erosion problem is anticipated due to the project either in the construction phase or in the operation phase. However, in the construction phase, some localized soil erosion may be noticed owing to construction activities. However, if soil erosion is noticed during construction and operation phase, the corrective action shall be initiated and frequency of check be increased to assess the tendency of occurrence.

E. Institutional Setting and Proposed Implementation Arrangement

235. The Executing Agency for the project will be GoMP through MPRDC. MPRDC is wholly owned by GoMP and has been equipped with adequate capacity to implement the project. The implementation arrangements basically follow the ongoing MPSRSP-II. A General Manager (GM) at MPRDC headquarter has been designated as person in charge for project implementation. The Environmental and Social cell (ESC) at MPRDC headquarters, reporting to the General Manager, will be responsible for ensuring compliance with environmental and social safeguards of project roads. This cell currently has only one officer to cover both social and environment safeguards. To support this officer, two more social safeguard officers and one environmental safeguard officer will be appointed or recruited. This will allow the ESC to have a total of four officers, 2 for social safeguards and 2 for environment safeguards.

236. MPRDC has ten division offices (Bhopal, Jabalpur, Sagar, Gwalior, Ujjain I, Ujjain II, Indore I, Indore II, Rewa I, and Rewa II) acting as Project Implementation Units (PIUs). Each PIU headed by a Divisional Manager (Tech.) will be responsible for project road implementation in the field. Each PIU will be responsible for one to two contracts depending on the location of the sub projects, and one project manager will be assigned for each contract package. The project manager will be delegated adequate technical and administrative authority for expeditious project implementation. In each PIU one of the Assistant Engineers or Managers under the Divisional Manager will be appointed as the social and environment safeguards focal person. MPRDC will engage Construction Supervision Consultants to act as the engineer for the construction contracts.. An environmental specialist from the CSC will provide technical support to MPRDC and the PIU for implementation of environment safeguards under the project. Environmental awareness and EMP implementation training will be held for MPRDC staff, contractors and CSC.

237. Six monthly monitoring reports will be prepared by the CSC environmental specialist to report on compliance with construction contracts, effectiveness of mitigation measures, and complaints (also known as project performance monitoring), and the state and health of nearby environmental resources (also known as ambient environmental monitoring).

238. Monitoring during operation shall be conducted for five years (once a year basis) as part of CSC contract and budget as this project will have a five year performance based

maintenance works to be implemented by the contractor. Thereafter it will be done on an as-needed basis depending on the design or change in project activity.

F. Institutional Capacity Building

239. .To ensure that all parties clearly understand their role and responsibilities for implementing environment safeguards under the project, the following training and awareness programme is proposed:

- Awareness programme on environmental issues associated with construction and improvement of road projects and legislative compliance requirements.

  Target audience: designated engineers from field units, contractor's
  Faculty: Environmental Expert and Environment Expert of CSC.
  No of Programmes: Minimum one per contract package

- EMP and EMoP implementation requirements, its benefits and roles of different level and functions.

  Target audience: designated engineers from field units, contractor's officials, and key workers, other officials of MPRDC associated for the project.
  Faculty: EE and Environment Expert of CSC.
  No of Programmes : Minimum one per contract package

G. Grievance Redress Mechanism

240. Grievances related to the implementation of the project, particularly regarding the environmental management plan will be acknowledged, evaluated, and responded to the complainant with corrective action proposed. The outcome shall also form part of six monthly compliances report to ADB. Grievance Redress Committee (GRCs) should be established at the MPRDC state level and PIU level to assure accessibility for APs .The GRCs are expected to resolve the grievances of the eligible persons within a stipulated time. The decision of the GRCs is binding, unless vacated by the court of law. The GRC will be constituted at MPRDC level and at the PIU level

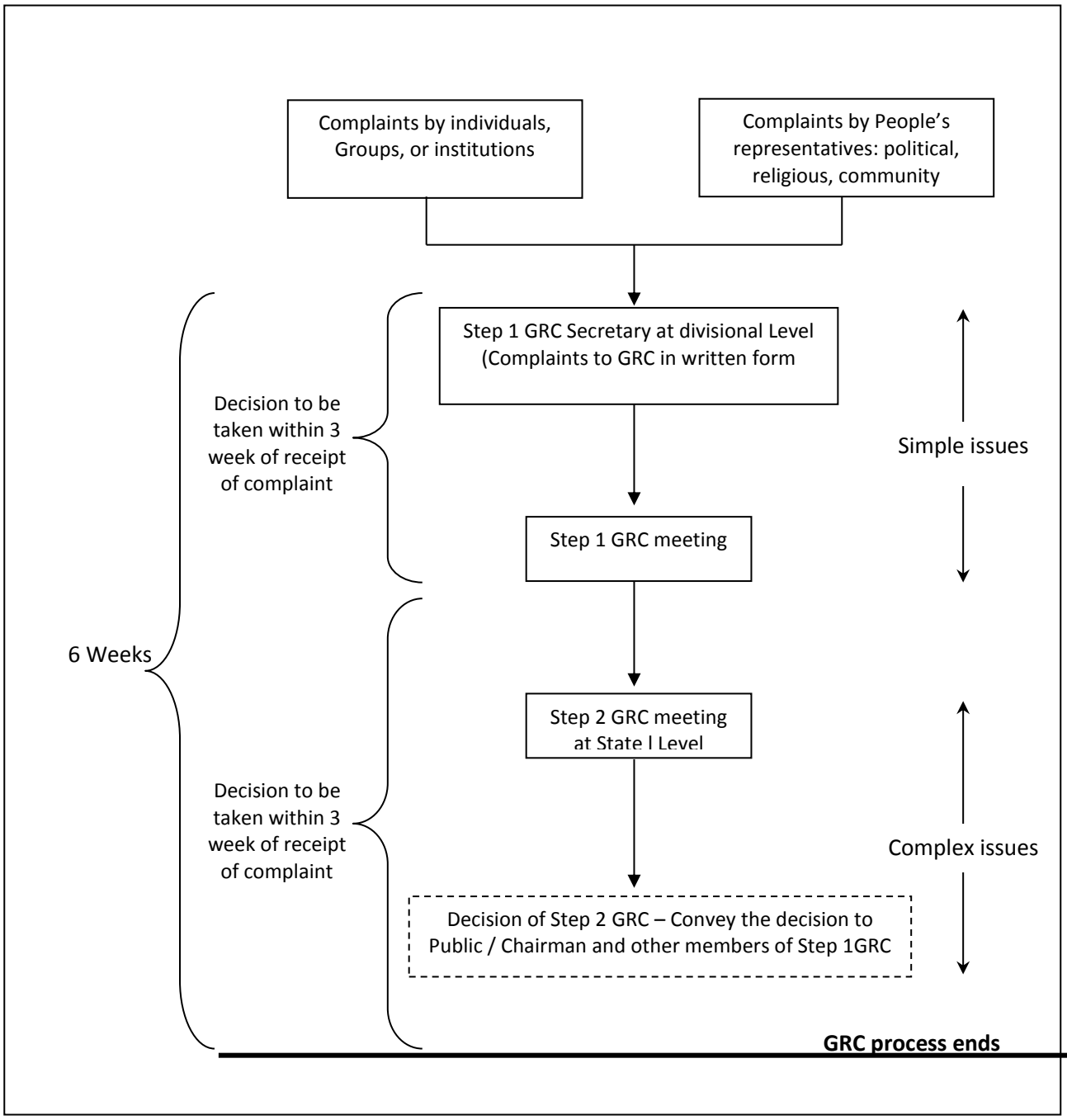
241. The State level GRC will comprise of the :-

i. General Manager, MPRDC, Bhopal
ii. Superintended Engineer, PWD, Bhopal
iii. DGM, MPRDC, Bhopal
iv. Manager (Environment & Social) , MPRDC, Bhopal

242. The PIU level GRC will comprise of the:-

i. Divisional Manager
ii. A representative from local NGOs or a local person of repute and standing in the society, elected representative from ZilaParisad /District Council.
iii. Two representatives of affected persons including vulnerable groups and women in the committee.

243. The GRC will continue to function, for the benefit of the APs, during the entire life of the project including the five year maintenance period. The following flow chart defines the process of GRM.The details of GRM, procedures and formats in local language i.e. Hindi are provided in Appendix-9.



H. Cost for Environmental Management Plan, Training and Environmental Monitoring

244. The cost of environment management, monitoring & Training programme is given in Table 24.

Table: 24: Environment Management, Monitoring and Training Cost

	Parameters / Components	Parameter to be monitored	Guidelines	Unit Cost (Rs)	Total Cost (Rs)
1	Ambient Air Monitoring: 3 times in a year for 3 years or construction period at 4 sites & Five years during operation/ defect liability period ,once in a year at 4 sites	PM10, PM2.5, SO2, NOx& CO	High Volume samplers to be used and located 50 m from the construction site	9000	504000
2	Water Monitoring: 3 times in a year for 3 years or construction period at 4 locations	pH, BOD, COD, TDS, TSS, DO, Total coliform, Conductivity, Oil & Grease	Analyse as per the standard methods for examination of water and waste water	5000	180000
3	Noise Monitoring: 3 times in a year for 3 years or construction period , 4 locations&Five years during operation/ defect liability period ,once in a year at 4 sites	Noise levels on dB (A) scale	Using an integrated noise level meter kept at a distance of 15 m from the construction site	3000	168000
	Total Monitoring Cost				**852000**
4.	Opening, running and restoration of stone quarry/sand extraction pits along the entire project length		IRC Code of Practice and MoSRT&H manual	LS	Engineering cost
5.	Gabion walls (above height 4 m) along elevated embankment		IRC Code of Practice and MoSRT&H manual	LS	Engineering cost
6.	Dust Suppression along the entire project length Four tankers in a days for 240 Days		IRC Code of Practice and MoSRT&H manual	Rs2000/- per day per tanker	1920000/--
7.	Solid Waste management during entire project period		As per MoEF guidelines	3000/ month	108000/-

	Parameters / Components	Parameter to be monitored	Guidelines	Unit Cost (Rs)	Total Cost (Rs)
8.	Erosion Control Measures (Turfing / Pitching / Seeding & Mulching) Provision of Cross drainage & side drainage structures General Borrow area management and maintenance of haul roads related to borrow areas Air/noise pollution control measures in construction equipment Management and disposal of scarified waste bituminous material Provision of Informatory Signs Bus shelters Construction of Speed Humps Management of quarries Redevelopment of Borrow Areas Construction Camp Management Costs Safety measures for workers		As per IRC Guidelines	Shall be included in contractor's quoted rates	Engineering cost
	Total Mitigation Cost (B)				**2028000/-**
8.	Training. Three training sessions during construction period.		As per modules developed by MPRDC	50000 per session	150000
	Total Training Cost (C)				**150000/-**
	Total Environmental Cost (A+B+C)				**3030000/-**

VIII. CONCLUSIONS AND RECOMMENDATIONS

245. The assessment of environment impacts for the sub-project shows that there are no significant, long term impacts. Most impacts are short term and limited to the construction stage. Key conclusions on the environmental implications of the project are given in the paras below.

A. Environmental Gains Due to Proposed Work Justifying Implementation

246. The project entails various impacts on the project setting. There are many impacts bearing benefits to the area against the limited number and magnitude of negative impacts. These include the following: (i) the project will substantially improve the transport efficiency on the roads. (iii) the project once implemented will improve the overall environmental conditions with better roads, fuel efficiency and environmental protection measures (iv) will reduce traffic congestion particularly at junctions hence, air pollution due to idling of the vehicles.

B. Potential Impacts and Mitigation

247. The finding of IEE indicates that project is unlikely to cause any significant adverse 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 and are temporary in nature. Anticipated minor impacts will be mitigated through the implementation of mitigation measures summarized in the Environmental Management Plan.

248. Factors contributing to minimal impacts include, widening of the project road confined within the available RoW, presence of no sensitive environmental issue like wildlife sanctuary, national park, bio reserve, with 10 km from the project road and most of water body crossed by the road are non-perennial in nature except one which is already bridged. However, some of the impacts are unavoidable. These impacts with mitigation measures are indicated below:

- About 6 trees will need be cut with prior permission of district or forest authorities. Compensatory Tree plantation on the basis of 1:10 will be made to compensate this loss. Preventive measures shall be taken into consideration during construction phase especially in rainy months, to prevent soil erosion because of tree cutting and alteration of ground flora.
- Air Pollution due to construction activities and operation of hot mix plant will be controlled through adoption of dust suppression measures and provision of high stack for good dispersion of gaseous emission from hot mix plant.
- Noise levels may increase during the construction phase due to operation of construction machineries. All the construction equipment and DG set will be well maintained and fitted with silencers.
- Waste materials generated during construction phase may contaminate soil, surface and ground water resources. Waste shall be segregated and reused or disposed off in environmentally acceptable manner.
- Along the project stretch, few religious structures are located. Appropriate design options are exercised to minimize the loss of such structures.
- The social issues are addressed through Social Safeguards, Due Diligence reports prepared as per SPS of ADB.

C. Irreplaceable Resources

249. The project does not pass through any protected areas, or eco sensitive areas. The construction material will also be sourced from identified and approved sources. As such, there

are no environmental sensitive resources found in the project area, which is likely to be affected due to the project.

D. Post IEE Surveillance and Monitoring

250. While an IEE is meant to provide a comprehensive understanding of the environment status of the area under the study, post IEE surveillance is the means to ensure that the significant impacts identified are adequately mitigated as per the proposed mitigation plan. A detailed monitoring plan has been provided as part of the Environmental Management Plan. Air, water quality, noise, soil erosion, and tree survival rate monitoring and reporting along with the follow up actions in case of deviation from the norms have been detailed out. The frequency has been set in consideration of the likely impacts.

E. Public Consultations

251. The project received support and consent from most of local people. The local people did not perceive any adverse impact due to the proposed project. Environmental awareness and likewise concern were found generally moderate. People, however expressed the desire of minimising the tree cutting.

F. Recommendations

252. Effective EMP implementation is essential for elimination or minimization of the identified impacts. The MPRDC shall ensure that EMP and EMoP is included in Bill of Quantity (BOQ) and forms part of bid document and civil works contract. The same shall be revised if necessary during project implementation or if there is any change in the project design.

253. MPRDC needs capacity building and practical exposure. Adequate training shall be imparted as proposed under environmental management plan to enhance the capability of concerned EA officials.

APPENDIX-1: RAPID ENVIRONMENTAL ASSESSMENT CHECKLIST

ROADS AND HIGHWAYS

Instructions

(i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Environment and Safeguards Division (RSES), for endorsement by Director, RSES and for approval by the Chief Compliance Officer.

(ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.

(iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country / Project Title: ***India: Madhya Pradesh District Connectivity Sector Project: Subproject : Hardua-Chakghat Road***

Sector Division: ***Transport Sector***

Screening questions	Yes	No	Remarks
A. Project Siting Is the project area adjacent to or within any of the following environmentally sensitive areas?			
Cultural heritage site			No archaeologically protected monument or cultural heritage site in located within the road,
Protected Area	X		Forest area is located close to the roads, Total 4.0 km road passing through the forest area. widening will be done within ROW
Wetland		X	No protected or classified wet land is located close to the
Mangrove		X	Project road is not located in Coastal areas.
Estuarine		X	No Estuarine is located in the Project area.
Buffer zone of protected area		X	No such area is located in the Project vicinity.
Special area for protecting biodiversity		X	No such area is located in the project vicinity.
B. Potential Environmental Impacts			
Screening questions	**Yes**	**No**	**Remarks**
Encroachment on historical/cultural areas; disfiguration of landscape by road embankments cuts, fills, and quarries?		X	The topography of project road is mainly plain & rolling. There is no encroachment of historical places. However, some small temples exist along the project road which are not get impacted.

Screening questions	Yes	No	Remarks
			Since road widening will be confined to available ROW, no change in landscape is expected. Opening of new Quarries is not envisaged. Only operational and licensed quarry will be used for road construction. Earth material will be sourced from pre identified areas (located within 5 to 10 Km from the road) and with the consent of landowner. All borrow areas will be suitably rehabilitated.
Encroachment on precious ecology (e.g. Sensitive or protected areas)?		X	There is no National Parks, Wild Life Sanctuaries or any other similar eco-sensitive areas in and around the project area. Only six tree need to be cut.
Alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by increased soil erosion at construction site.		X	The proposed alignment is crossing only small natural drains. All drainage courses will be maintained to avoid alteration in surface water hydrology so that watercourses are not affected. The temporary soil stockpiles will be designed so that runoff will not induce sedimentation of waterways. Silt fencing during construction will be provided.
Deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?			Adequate sanitary facilities including soak pits treatment facilities will be provided at construction camps which will be set-up away from habitat and water bodies. No harmful ingredients are likely to be used in the construction activities. Surface water quality is not impacted due to construction. Measures like embankment slop stabilisation, RCC retaining walls are proposed to prevent siltation of ponds located next to the road due to surface runoff.
Increased local air pollution due to rock crushing, cutting and filling works and chemicals from asphalt processing?	X		Localised air pollution level is likely to increase for shortduration during construction period due to construction vehicle movement and asphalt processing. The asphalt mixing plant (hot mix plant) will be located away from habitat areas with adequately high stack for effective dispersion of likely emissions.

Screening questions	Yes	No	Remarks
			Dust separation measures like spraying water on unpaved vehicle movement areas are proposed to minimise the dust generation.
Risks and vulnerabilities to occupational health and safety due to physical, chemical, biological and radiological hazards during project construction and operation?			Workers may get exposed to the dust and noise during construction activities. However exposure levels are likely to be short and insignificant. Workers will be provided requisite PPEs to minimise such exposure and associated harmful occupational health effects. Traffic on the road is expected to be low and as such, no occupational health hazard is anticipated during operation phase.
Noise and vibration due to blasting and other civil works?		X	No blasting is involved. No significant noise generation is expected during construction activities except normal construction equipment operational noise. These noise levels will be impulsive in nature and its impact will be confined within few meters of either side of the road. All stationary noise making sources equipment like DG set, compressors will be installed with acoustic enclosures. There are few noise sensitive locations especially schools close to the alignment where noise level may increase due to increased traffic during operation Stage. Provision of no horn zone will be made wherever noise level is likely to increase beyond the prescribed ambient noise levels.
Dislocation or involuntary resettlement of people			The project road will be widened within existing RoW. The project affected persons are also expected to be very less. This aspect will be addressed as per Govt. rules and ADB"s Social Safeguard Policies SPS2009) separately in a Resettlement Plan
Dislocation and compulsory			No displacement of people is involved.

Screening questions	Yes	No	Remarks
resettlement of people living in right-of-way?			
Disproportionate impacts on the por, women and children, Indigenous peoples ot other vulnerable groups?		X	No such impact is anticipated.
Other social concerns relating to inconveniences in living conditions in the project areas that may trigger cases of upper respiratory problems and stress?		X	No such social concern is Expected Concern may arise during construction stage due to increase in ambient air pollution level, which is expected to belocalised and temporary in nature. This aspect will be effectively controlled with the proposed dust suppression and other mitigation measures. As such people at large are supportive of project and areleast bothered about air pollution concerns as well.
Hazardous driving conditions where construction interferes with existing roads?	X		Hazardous driving condition may arise around bridge construction areas and at locations of road interface with non-project roads. To minimized the impact suitable traffic management plan will be designed and implement by the contractor to prevent any hazardous driving condition in above situations.
Poor sanitation and solid waste disposal in construction camps and work sites and possible transmission of communicable diseases from workers to local populations?		X	Proper provisions for sanitation (sewage treatment), health care, (drinking water supply and periodic health check ups and composting) facilities will be made at each construction camp. Awareness will be created amongst the worksers about hygiene and health protection.
Creation of temporary breeding habitats for mosquito vectors of disease?		X	No such condition is anticipated. Each borrow area will be rehabilitated as per pre agreed used and rehabilitation plan.
Accident risks associated with increased vehicular traffic, leading to accidental spills of toxic materials and loss of life ?			Adequate safety measures will be to avoid accidents during construction and during construction operation stages. Measures likesignage, speed control, crash barriers will be taken close to sensitive locations such as schools, temple or hospitals.
Increased noise and air pollution resulting from traffic volume?	X		Increase in noise and air pollution is expected during construction phase but is likely to be confined within few meters of either side of the road. Adequate mitigation measures will be adopted to minimise the same.

			During operation phase, vehicular traffic will be the main source of air and noise pollution. Improved road conditions, extensive plantation including multi-layered plantation along the road will reduce the noise and air pollution impact. Moreover, most of the road stretch passed through open agricultural land which will provide adequate dispersion to vehicular emissions.
Increased risk of water pollution from oil, grease and fuel spills, and other materials from vehicles using the road?	X		This possibility is minimal but cannot be ruled out. Controlled construction activities and proper drainage system will reduce this possibility. Provision is made for adequate signage and crash barriers near water bodies which will minimise the possibilities of accidental water pollution.
Social conflicts if workers from other regions or countries are hired?		X	Most of the workers will be hired locally.
Large population influx during project construction and operation that causes increased burden on social infrastructure and services(such as water supply and Sanitation systems)?		X	Most of the worksers will behired locally. One construction camp is proposed per package with expected workers population of only 60-70. This is unlikely tp cause any significant burden on social infrastructure and services.
Risks to community health and safety due to the transport storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		X	The construction material (aggregate from approved quarries, borrow earth, bitumen) will be sourced from nearby and approved sources. No explosive or chemicals are likely to be used. Bitumen waste if any generated during construction will either recycled or disposed off in controlled manner.
Community safety risks due to both accidental and natural causes especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation nad decommissioning.		X	No such impacts are anticipated. Adequate awareness will be created amongst peopoe and workers through information disclosure, safety signage anf public consultation about safety aspects.
Based on above assessment and the project is **categorized as 'B'**			

APPENDIX-2: GUIDELINES FOR BORROW AREAS MANAGEMENT

A. Selection of Borrow Areas

1. Location of borrow areas shall be finalized as per IRC: 10-1961 guidelines. 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.

- The borrow area should not be located in agriculture field unless unavoidable i.e. barren land is not available.
- The borrow pits preferably should not be located along the roads.
- The loss of productive and agriculture soil should be minimum.
- The loss of vegetation is almost nil or minimum.
- 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 programme 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;

(1) 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.

(2) 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.

(3) Where the excavation reveals a combination of acceptable and unacceptable 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.

(4) The Contractor shall ensure that he does not adversely affect the stability of excavation or fills by the methods of stockpiling materials, use of plants are siting of temporary buildings or structures.

C. Borrowing From Different Land-Forms

1. Borrow Areas located in Agricultural Lands

(i) The preservation of topsoil will be carried out in stockpile.

(ii) 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).

(iii) Borrowing of earth will be carried out up to a depth of 1.5m from the existing ground level.

(iv) Borrowing of earth will not be done continuously throughout the stretch.

(v) Ridges of not less than 8m widths will be left at intervals not exceeding 300m.

(vi) Small drains will be cut through the ridges, if necessary, to facilitate drainage.

(vii) The slope of the edges will be maintained not steeper than 1:4 (vertical: Horizontal).

(viii) 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

(i) The preservation of topsoil will be carried out in stockpile.

(ii) 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).

(iii) 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

(i) The preservation of topsoil will be carried out in stockpile.

(ii) 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).

(iii) 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

(i) The preservation of topsoil will be carried out in stockpile.

(ii) 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).

(iii) 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.

(iv) 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

(i) The preservation of topsoil will be carried out in stockpile.
(ii) 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).
(iii) Ridges of not less than 8m widths should be left at intervals not exceeding 300m.
(iv) Small drains shall be cut through the ridges of facilitate drainage.
(v) 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.
(vi) 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.

6. Rehabilitation of Borrow Areas

4. The objective of the rehabilitation programme is to return the borrow pit sites to a safe and secure area, which the general 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 in line with the owners will require and to the satisfaction of owner. The Borrow Areas shall be rehabilitated as per following;

6. 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.

7. 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.

8. 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 -3: ENVIRONMENTAL MANAGEMENT PLAN

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Time Frame	Mitigation Cost	Institutional Responsibility	
								Implementation	Supervision
A. Design and Preconstruction Stage									
1. Alignment									
Pavement damage and inadequate drainage provisions in habitat areas	• Selection of suitable pavement design in habitat reas considering alignment level and drainage • Raise road level above the nearby areas with provision of adequate side drains to evacuate the rain water and domestic discharges (drained by habitats occasionally) to prevent damage to road and rain water entry to habitats' houses. • Provision of adequate no of cross drainage structures based on drainage pattern around the alignment	Design requirement	All habitat areas throughout the alignment	Design of both cross & side drains ,no. of slab/box culverts ,no & size of Hume pipes	Review of detail design documents & drawings	During the design stage	Included in construction cost	Design Consultant	SQC/MPRDC

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Time Frame	Mitigation Cost	Institutional Responsibility	
								Implementation	Supervision
Safety along the proposed alignment	• Make provisions of crash barriers at accident prone areas • Provision of rumble strips in habitat areas to regulate speed. • Provision of retro-reflective warning signboards nears school, hospital, religious places and forests areas • Provision of walk area along the road near habitat areas, school, hospital, religious places and forests • Compliance with norms specified in IRC codes for state highway for curvature and grading • Provision of safety kerb at all bridges • The design should attempt to equalize • Minimize the cutting in hill areas. Incorporate slope stabilization measures to prevent any land slide situation.	Design requirement	places where height of embankment is more than 3.0 m.	No. of accident & Vehicle collision	Field observation ,interview of locals	During the design stage	Included in construction cost	Design Consultant	SQC/MPRDC
2. Natural Hazards									

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Time Frame	Mitigation Cost	Institutional Responsibility	
								Implementation	Supervision
Protection from damage from Earthquake	• Design considering the earthquake potential though the area falls under low earthquake intensity of 2/3	IRC:34 Recommendations for road construction in water logged area and IRC: 75 and MORT&H guidelines for Design of High Embankments	Throughout the stretch	Provision of emergency response plan	Accomplishment report	Design Stage	Project preparation Cost	Design Consultant	SQC/MPRDC
Protection of road embankment in Flood prone Areas	• Raise embankment height above the HFL levels in the flood prone areas. • Provision of adequate balancing culverts. • Improvement in existing culverts/ Bridges to increase their carrying capacity.	All the existing culverts/bridges.	Design of both cross & side drains ,no. of slab/box culverts ,no & size of Hume pipes	Review of detail design documents & drawings	Design and Construction Stage	Included	Design Consultant	SQC/MPRDC	
3. Weather Conditions									

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Time Frame	Mitigation Cost	Institutional Responsibility	
								Implementation	Supervision
Local Weather conditions	• Geometric adjustment to reduce tree cutting. • Compensatory tree Plantation (1:10) • Additional Plantation on river banks,	Kyoto Protocol, Environmental Protection Act, 1986; The Air (Prevention and Control of Pollution) Act, 1981 + IRC and	Throughout	No of tree cutting project corridor, mainly at level crossings, haulage roads, earthwork, construction sites, loading areas, storage areas, transport route	Data of planation & documentation	Design and Construction stage	Plantations cost is separate.	Design Consultant and Contractor	SQC /MPRDC
B. Construction Stage									
1. Air Quality									
Dust Generation due to construction activities and transport, storage and handling of construction materials	• Transport, loading and unloading of loose and fine materials through covered vehicles. • Paved approach roads. • Storage areas to be located downwind of the habitation area. • Water spraying on earthworks, unpaved haulage roads and other dust prone areas. • Provision of PPEs to workers.						Included in project cost	Design Consultant and Contractor	SQC/MPRDC SQC/MPRDC

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Time Frame	Mitigation Cost	Institutional Responsibility	
								Implementation	Supervision
Emission of air pollutants (HC, SO2, NOX, CO etc) from vehicles due to traffic congestion and use of equipment and machinery	• Regular maintenance of machinery and equipment. • Batching, asphalt mixing plants and crushers at downwind (1km) direction • Only crushers licensed by the PCB shall be used • DG sets with stacks of adequate height and use of low sulphur diesel as fuel. • Ambient air quality monitoring • Follow traffic management plan as given in Section 8.		Asphalt mixing plants, crushers, DG sets locations	Monitoring of ambient air quality & checking PUC certificates	Standards CPCB methods	During the Construction stage	Included in project cost	Contractor	SQC/MPRDC
2. Noise									
Noise from construction vehicle, equipment and machinery.	• All equipment to be timely serviced properly maintained. • Bottlenecks to be removed. • Construction equipment and machinery to be fitted with silencers and maintained properly. • Only IS approved equipments shall be used for construction activities.	Legal requirement Noise Pollution (Regulation and Control) Rules, 2000 and amendments thereof Clause No 501.8.6. MORT&H Specifications for	Throughout	Noise levels Measurements	As per Noise rule ,2000	During the Construction stage	Included in Project Cost	Contractor	SQC/MPRDC

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Time Frame	Mitigation Cost	Institutional Responsibility	
								Implementation	Supervision
	• Timing of noisy construction activities shall be done during night time and weekends near sensitive receptors suchas schools and temples, concurrent noisy operations may be separated to reduce the total noise generated, and if possible re-route traffic during construction to avoid the accumulation of noise beyond standards. Else provision of temporary noise barrier at sensitive locations or near sources. • Time regulation near residential and forest areas construction shall be restricted to daylight hours. • Initiation of multi layered plantation, to serve as mitigation option for operation phase • Honking restrictions near sensitive areas • PPEs to workers • Noise monitoring as per EMoP.	Road and Bridge works					Plantation cost is separate	Contractor	SQC
3. Land and Soil									

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Time Frame	Mitigation Cost	Institutional Responsibility	
								Implementation	Supervision
Land use Change and Loss of productive/ top soil	• For construction non-agricultural areas to be used as borrow areas. • If using agricultural land, top soil to be preserved and laid over either on the embankment slope for growing vegetation to protect soil erosion.	Project requirement	Throughout the project section and borrow areas	Quarry and borrow pit locations	Design documents & site observations	During design and construction Stage	Included in construction cost	Contractor	SQC/MPRDC
Slope protection and Soil erosion due to	• Bio-turfing of embankments to protect slopes. • Slope protection by providing	IRC: 56 - 1974 recommended practice for	Throughout the stretch especially along hilly areas	Bioengineering techniques & selection of species	Design documents & site observations	Design and construction stage	Included in Construction cost	Design consultant and Contractor,	SQC/MPRDC
Construction activities, earthwork, and cut and fill etc.	• frames, dry stonepitching, masonry retaining walls, planting of grass and trees. • The side slopes of all cut and fill areas will be graded and covered with stone pitching, grass and shrub as per design specifications. Care should be taken that the slope gradient shall not be greater than 2:1.	treatment of embankment slopes for erosion control Clause No. 306 and 305.2.2 MORT&H Specifications for Road and Bridge works Guidelines IX for Soil erosion							
Soil erosion at earth stockpiles	• The earth stockpiles to be provided with gentle slopes to prevent soil erosion.		At earth stockpiles	Bioengineering techniques & selection of species	Design documents & site observations	Design and construction stage	Included in Construction cost	Contractor	SQC/MPRDC

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Time Frame	Mitigation Cost	Institutional Responsibility	
								Implementation	Supervision
_ Borrow areas	• Non-productive, barren lands, upland shall be used for borrowing earth with the necessary permissions/consents. • Depths of borrow pits to be regulated and sides not steeper than 25%. • Topsoil to be stockpiled and protected for use at the rehabilitation stage. • Transportation of earth materials through covered vehicles. • IRC recommended practice for borrow pits (IRC 10: 1961). • Borrow areas not to be dug continuously. • To the extent borrow areas shall be sited away from habitated areas. Borrow areas shall be leveled with salvaged material or other filling materials which do not pose contamination of soil. Else, it shall be converted into fishpond in consultation with fishery department and land owner/community.	IRC Guidelines on borrow areas and for quarries (Environmental Protection Act and Rules, 1986; Water Act, Air Act) Clause No. 305.2.2 MORT&H Specifications for Road and Bridge works Guidelines V	Borrow sites location.	Borrow area locations	Design documents & site observations	During Design and construction Stage	Included in Construction cost	Contractor	SQC/MPRDC
	Rehabilitation of the borrow areas as per Guidelines for redevelopment of Borrow Areas.			Quarry area locations	Design documents & site observations				

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Time Frame	Mitigation Cost	Institutional Responsibility	
								Implementation	Supervision
Quarry Operations	• Aggregates will be sourced from existing licensed quarries. • Copies of consent/ approval / rehabilitation plan for a new quarry or use of existing source will be submitted to EO, MPRDC. • The contractor will develop a Quarry Redevelopment plan, as per the Mining Rules of the state and submit a copy of the approval to EA.	Clause No. 111.3 MORT&H Specifications							
Compaction of soil and impact on quarry haul roads due to movement of vehicles and equipment	• Construction vehicles, machinery, and equipment to be stationed in the designated ROW to avoid compaction. • Approach roads/haulage roads shall be designed along the barren and hard soil area to reduce the compaction. • Transportation of quarry material to the dumping site through heavy vehicles shall be done through existing major roads to the extent possible to restrict wear and tear to the village/minor roads. • Land taken for construction camp and other temporary facility shall be restored to its original conditions.	Design require ment	Parking areas, Haulage roads and constructi on yards.	Monitoring of ambient air quality & checking PUC certificates	Standards CPCB methods	Just before comme ncemen nt of constru ction	Included in constructi on cost	Contractor	SQC/MPR DC

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Time Frame	Mitigation Cost	Institutional Responsibility	
								Implementation	Supervision
Contamination of soil due to leakage/spillage of oil, bituminous and non	• Construction vehicles and equipment will be maintained and refueled in such a fashion that oil/diesel spillage does not contaminate the soil.	Design require ment	Fuelling station, constructi on sites, and constructi on camps and disposal location.	Soil quality monitoring near storage area	Standards methods	During constru ction stage.	Included in constructio n cost.	Contractor	SQC/MPR DC
bituminous debris generated from demolition and road construction	• Fuel storage and refueling sites to be kept away from drainage channels. • Unusable debris shall be dumped in ditches and low lying areas. • To avoid soil contamination, Oil-Interceptors shall be provided at wash down and refueling areas. • Waste oil and oil soaked cotton/ cloth shall be stored in containers labeled 'Waste Oil' and 'Hazardous' sold off to MoEF/SPCB authorized vendors • Non-bituminous wastes to be dumped in borrow pits with the concurrence of landowner and covered with a layer of topsoil conserved from opening the pit.								

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Time Frame	Mitigation Cost	Institutional Responsibility	
								Implementation	Supervision
	• Bituminous wastes will be disposed off in an identified dumping site approved by the State Pollution Control Board • Soil quality monitoring								
4. Water Resources									
Sourcing of water during Construction	• Requisite permission shall be obtained for abstraction of groundwater fromCentral Groundwater Authority • Arrangements shall be made by contractor that the water availability and supply to nearby communities remain	-	Throughout the Project section	Approval from competent authority	Documentation check	During Construction stage	Included i	Contractor	SQC/MPRDC
Disposal of water during Construction	• Provisions shall be made to connect road side drains with exiting nearby ponds otherwise make provision of water harvesting pits intermittently.	Clause No. 1010 EP Act 1986 MORT&H Specifications for Road and Bridge works	Throughout the Project section	Design of road side drains	Standards methods &,documentation	During Construction stage	Included i	Contractor	SQC/MPRDC
Alteration in surface water hydrology due to embankment	• Existing drainage system to be maintained and further enhanced. • Provision shall be made for adequate size and number of cross drainage structures esp. in the areas where land is sloping towards road alignment. Road shoulder shall be raised	Design requirement, Clause No 501.8.6. MORT&H Specifications	Near all drainage channels, river crossings etc.			During Construction stage	Included i	Contractor	SQC

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Time Frame	Mitigation Cost	Institutional Responsibility	
								Implementation	Supervision
Siltation in water bodies due to construction activities/ earthwork •	• Embankment slopes to be modified suitably to restrict the soil debris entering water bodies. • Provision of Silt fencing shall be made at water bodies. • Silt/sediment should be collected and stockpiled for possible reuse as surfacing of slopes where they have to be re-vegetated. • Earthworks and stone works to be prevented from impeding natural flow of rivers, streams and water canals or existing	Design requirement , Clause No 501.8.6. MORT&H Specifications for Road and Bridge works (CP and CP) and worldwide best practices	Near all river water bodies, river embankment slopes.	Design & planning for waste disposal ,	Water quality monitoring ,field observation	During Construction stage	Included in construction cost	Contractor	SQC
Deterioration in Surface water quality due to leakage from vehicles and equipments and waste from construction camps.	• No vehicles or equipment should be parked or refuelled near water-bodies, so as to avoid contamination from fuel and lubricants. • Oil and grease traps and fuelling platforms to be provided at re-fuelling locations. • All chemicals and oil shall be stored away from water and concreted platform with catchment pit for spills collection. • All equipment operators, drivers,	The Water (Prevention and Control of Pollution) Act, 1974 and amendments thereof.	Water bodies, refuelling stations, construction camps.	Design & planning for waste disposal ,Vehicle maintenance records , design of oil and grease traps	Water quality monitoring ,field observation	During Construction Stage	Included i	Contractor	SQC

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Time Frame	Mitigation Cost	Institutional Responsibility	
								Implementation	Supervision
	• and warehouse personnel will be trained in immediate response for spill containment and eventual clean-up. Readily available, simple to understand and preferably written in the local language emergency response procedure, including reporting, will be provided by the contractors • Construction camp to be sited away from water bodies. • Wastes must be collected, stored and taken to approve disposal site only. • Water quality shall be								
5. Flora and Fauna									

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Time Frame	Mitigation Cost	Institutional Responsibility	
								Implementation	Supervision
Vegetation loss due to site preparation and construction activities and Plantation Strategy	• Minimize tree cutting to the extent possible. • Roadside trees to be removed with prior approval of competent authority. • Compensatory plantation at 1:10 basis and additional plantation as per the IRC guidelines in consultation with Forest Department. • Regular maintenance of all trees planted. • Provision of LPG in construction camp as fuel source to avoid tree cutting, wherever possible. • Plantation of trees on both sides of the road. Integrate vegetation management (IVM) with the carriage way completely clear of vegetation. From the edge of the road to the boundary of ROW, vegetation structured with smaller plants near the line and larger trees further away to avoid costly and provide habitats for a wide variety of plants and animals. Additional plantation near river banks to check erosion as part of compensatory plantation.	Forest Conservation Act 1980 + IRC SP: 21 and IRC SP:66	Throughout project corridor	ROW width , no of tree felling ,compensatory plantation	Review of documents and records and observations	During the design and Construction stage	Road side plantation cost is separate.	MPRDC through competent authority	SQC

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Time Frame	Mitigation Cost	Institutional Responsibility	
								Implementation	Supervision
	• In the event of design changes during the construction stages additional assessments including the possibility to save trees shall be made by the EA. • Road side Plantation Strategy as per IRC specifications including manuring. • Control use of pesticides/ fertilizers								
6. Construction Camps									
Impact associated with location •	• All camps should maintain minimum distance from following: • # 500 m from habitation • # 1000 m from forest areas where possible • # 500 m from water bodies where possible • # 500 m from through traffic route where possible • The average distance between two camps should be 50 km	Design Requirement	All construction camps	Status of camp sites, interaction with workers ,check basic water & sanitation facilities	On site observation ,interaction with workers and local community	During Construction stage	Included in construction cost	Contractor and EO	SQC

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Time Frame	Mitigation Cost	Institutional Responsibility	
								Implementation	Supervision
• worker's Health in construction camp	• The location, layout and basic facility provision of each labor camp will be submitted to SQC prior to their construction. The construction shall commence only after approval of SQC. • The contractor will maintain necessary living accommodation and ancillary facilities in functional and hygienic manner as approved by the EA. • Adequate water and sanitary latrines with septic tanks attached to soak pits shall be provided. • Preventive medical care to be provided to workers including a First-Aid kit that must be available • Waste disposal facilities such as dust bins must be provided in the camps and regular disposal of waste must be carried out . in the camp. • The Contractor will take all precautions to protect the workers from insect and pest to reduce the risk to health. This includes the use of insecticides which should comply with local regulations.	The Building and Other Construction workers (Regulation of Employment and Conditions of Service) Act 1996 and The Water (Prevention and Control of Pollution) Act, 1974 and amendments thereof	All construction camps	Dr availability at camp ,health records	Records & site check	During construction stage	Part of the Contract	Contractor	SQC

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Time Frame	Mitigation Cost	Institutional Responsibility	
								Implementation	Supervision
•	• No alcoholic liquor or prohibited drugs will be imported to, sell, give, barter to the workers of host community. • Awareness raising to immigrant workers/local community on communicable and sexually transmitted diseases.								
7. Management of Construction Waste/Dismantled Debris									
Selection of Dumping Sites •	• Unproductive/wastelands shall be selected for dumping sites. • Away from residential areas and water bodies Dumping sites have adequate capacity equal to the amount of debris generated. • Public perception and consent from the village Panchayats has to be obtained before finalizing the location.	Design Requirement and MORT&H guidelines	At all Dumping Sites	Disposal on approved sites away from water bodies	Field survey and local people interaction	During Construction Stage	Included in construction cost.	Contractor.	SQC

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Time Frame	Mitigation Cost	Institutional Responsibility	
								Implementation	Supervision
• _ Reuse and disposal of construction and dismantled waste •	• The existing bitumen surface shall be utilized for paving of cross roads, access roads, and paving works in construction sites and camps, temporary traffic diversions, and haulage routes. • 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 landfill sites only in environmentally accepted manner. For removal of debris, wastes and its disposal MOSRTH guidelines should be followed. • Unusable and surplus materials, as determined by the Project Engineer, will be removed and disposed off-site.	MORT&H guidelines	Through out the project corridor	Selection of reuse sites	Field survey and local people interaction	During Construction Stage	Included in construction cost.	Contractor.	SQC
8. Accessibility, Traffic Management, Accident and Safety Risks									

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Time Frame	Mitigation Cost	Institutional Responsibility	
								Implementation	Supervision
Design requirement and Traffic Planning During Construction Stage •	• Temporary traffic diversion shall be planned by the contractor and approved by the 'Engineer'. • The traffic control plans shall contain details of diversions; traffic safety arrangements during construction; safety measures for nighttime traffic and precautions for transportation of hazardous materials. Traffic control plans shall be prepared in line with requirements of IRC's SP 55 document'. • The Contractor will ensure that the diversion/detour is always maintained in running condition, particularly during the monsoon to avoid disruption to traffic flow. • On stretches where it is not possible to pass the traffic on the part width of existing carriageway, temporary paved diversions will be constructed. • Restriction of construction activity to only one side of the existing road. • The contractor shall inform local community of changes to traffic routes, and pedestrian access arrangements with assistance from "Engineer". • Use of adequate	Design requirement and IRC SP:55	Throughout the project corridor especially at intersections.	Traffic management plan ,signage	Check availability of plan and on site checking of documents & site safety arrangements	During construction stage	Project preparation and construction cost	Contractor	SQC

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Time Frame	Mitigation Cost	Institutional Responsibility	
								Implementation	Supervision
Pedestrians, animal and Vehicular movement,	• All measures for the safety of traffic during construction viz. signs, markings, flags, lights and flagmen as proposed in the Traffic Control Plan/Drawings shall be taken. • Temporary access and diversion, with proper drainage facilities. • Access to the schools, temples and other public places must be maintained when construction takes place near them. • Fencing wherever cattle movement is expected. To avoid the need for cattle underpasses, some of the proposed culverts `near habitations may be widened to facilitate cattle movement.	Design requirement and IRC: SP: 27 1984 Report Containing Recommendation s of IRC Regional Workshops on Highway Safety IRC:SP: 32 - 1988 Road Safety for Children (5-12 Years Old) IRC:SP: 44 - 1994 Highway Safety Code IRC: SP: 55 -2001 Guidelines for The Building and other Construction workers Act 1996 and Cess Act of 1996 actories Act 1948	Near habitation on both sides of schools,temples, hospitals, graveyards constructi on sites, haulage roads, diversion sites.	Road signage & drainage as per IRC guideline	On site checking ,public and road users interaction	During Construct ion stage	Included in construction cost.	Contractor in consultation with Forest department and MPRDC	SQC

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Time Frame	Mitigation Cost	Institutional Responsibility	
								Implementation	Supervision
Safety of Workers and accident risk from construction activities •	• Contractors to adopt and maintain safe working practices. • Usage of fluorescent and retroflectory signage, in local language at the construction sites • Training to workers on safety procedures and precautions. • Mandatory appointment of safety officer. • All regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches and safe means of entry and egress shall be complied with. • Provision of PPEs to workers. • Provision of a readily available first aid unit including an adequate supply of dressing materials. • The contractor will not employ any person below the age of 14 years for any work • Use of hazardous material should be minimized and/or restricted. • Emergency plan (to be approved by engineer) shall be prepared to respond to any accidents or emergencies.		Construction sites	Availability of Safety gears to workers ,signage ,training records	On site checks and safety gear availability at site ,records	Construction period	Included in construction cost	Obligation of Contractor	SQC

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Time Frame	Mitigation Cost	Institutional Responsibility	
								Implementation	Supervision
	• Accident Prevention Officer must be appointed by the contractor.								
• _ Accident risk to local community •	• Restrict access to construction sites to authorized personnel. • Physical separation must be provided for movement of vehicular and human traffic. • Adequate signage must be provided for safe traffic movement		Construction sites	Records ,signage	On site checking ,consultation with local people	Construction period	Included in construction cost	Contractor	SQC
9. Common Property Resources and other Utilities									
Utilities	• All telephone and electrical poles/wires and underground cables should be shifted before start of construction	Project requirement	Throughout the corridor	Utility shifting plan	Interaction with concerned authority ,public consultation	Before Construction	Included in construction.	Contractor/SQC	SQC
10. Enhancement Measures									
Environmental enhancement along the corridor	• Maintenance of tree plantations. • Enhancement/rehabilitation of borrow areas and camp sites etc.	Environmental Enhancement	Throughout the corridor	As per EMP	On site observation ,interaction with locals	Design and Construction Stage	Included in maintenance cost.	Contractor	SQC
11. Contractor Demobilization									

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Time Frame	Mitigation Cost	Institutional Responsibility	
								Implementation	Supervision
Clean-up Operations, Restoration and Rehabilitation	• Contractor will prepare site restoration plans, which will be approved by the 'Engineer'. The clean-up and restoration operations are to be implemented by the contractor prior to demobilization. • All construction zones including river-beds, culverts, road-side areas, camps, hot mix plant sites, crushers, batching plant sites and any other area used/affected by the project will be left clean and tidy, at the contractor's expense, to the satisfaction of the Environmental officer. All the opened borrow areas will be rehabilitated .and 'Engineer' will certify in	Project requirement	Throughout the Corridor and borrow areas	As per EMP	On site observation ,interaction with locals and final checking and issue completion certificate after closing the site as per EMP	Immediately after construction	Included in construction cost.	Contractor	SQC
C. Operation Stage									
1. Climate and Air quality									
Air pollution due to due to vehicular movement	• Roadside tree plantations shall be maintained. • Regular maintenance of the road will be done to ensure good surface condition • Vehicular air pollution will be managed and monitored. • Ambient air quality monitoring. If monitored parameters are above the prescribed limit, suitable control measures must be taken.	Environmental Protection Act, 1986; The Air (Prevention and Control of Pollution) Act, 1981	Throughout the Corridor	Monitoring of ambient air quality and tree planation details	As per CPCB standards and local consultation	Throughout operation period	Road side plantation cost is separate.	SQC/contractor	

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Time Frame	Mitigation Cost	Institutional Responsibility	
								Implementation	Supervision
	• Technological and behavioural changes • Road signs shall be provided reminding motorist to properly maintain their vehicles to economize on fuel consumption and protect the environment.								
2. Noise Environment									
_ Noise due to movement of traffic	• Effective traffic management and good riding conditions shall be maintained to reduce the noise level throughout the stretch and speed limitation and honking restrictions may be enforced near sensitive locations. • The effectiveness of the multilayered plantation should be monitored and if need be, solid noise barrier shall be placed. • Create awareness amongst the residents about likely noise levels from road operation at different distances, the safe ambient noise limits and easy to implement noise reduction measures while constructing a building close to the road	Noise Pollution (Regulation and Control) Rules, 2000 and amendments thereof	Noise sensitive	Noise monitoring as per noise rules ,2000	CPCB methods, on site check. tree counting	Throughout operation period	Plantation cost is separate.	SQC	
3. Land and Soil									

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Time Frame	Mitigation Cost	Institutional Responsibility	
								Implementation	Supervision
_ Soil erosion at embankment during heavy rain fall.	• Periodic checking to be carried to assess the effectiveness of the stabilization measures viz. turfing, stone pitching, river training structures etc. • Necessary measures to be followed wherever there are failures	Project requirement	At bridge locations and embankment slopes and other probable soil erosion areas.	Check stabilization measures and their effectiveness	On site observation and local consultation	Throughout operation period	Included in Operation/ Maintenance cost	SQC	
4. Water Resources									
Contamination of surface water quality due to leakage of oil	• Monitoring of surface water bodies		Near surface Water bodies.	Water quality monitoring	Standards methods of CPCB and local consolation ,site visits	During construction and maintenance period.	Included in construction and maintenance cost.		
Siltation	• Regular visual checks shall be made to observe any incidence of blockage of drains/culverts. Regular checks shall be made for soil erosion and turfing conditions of river training structures for its effective maintenance.								
_ Water logging due to blockage of streams	• Regular checks shall be done along the alignment to ensure that flow of water is maintained through cross drains and other channels/streams. • Monitoring of water borne diseases due to stagnant water bodies		Throughout the corridor	Heath records , cross drainage structure	Documentation ,field observations				

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Time Frame	Mitigation Cost	Institutional Responsibility	
								Implementation	Supervision
Protection of Embankment in Flood prone Areas	• Immediate removal of deposited silt from drainage channels and out-let points. Rejuvenation of the drainage system by removing encroachments/ congestions. This shall be done in close coordination with concerned department. • Long term strategy to be worked out with water resources, agriculture, soil and other department.	Project requirement	Identified Flood prone areas	Site conditions, training	Data and records ,on site observations	During whole operation stage	Operation and Maintenance Cost	SQC	
5. Flora and Fauna									
Vegetation	• Planted trees, shrubs, and grasses to be properly maintained. • The tree survivalist audit to be conducted at least once in a year to assess the effectiveness • Maintenance of box culverts, wherever provided.	Forest Conservation Act 1980	Throughout project section	Tree survival audit	Records and fields observations	During whole operation period	Operation and Maintenance Cost	SQC	
6. Flooding/ inundation									
Road inundation due to choking of drainage channels	• MPRDC will ensure that all drains (side drains and all cross drainages) are periodically cleared especially before monsoon season to facilitate the quick passage of rainwater and avoid flooding.	Project operation requirement	Throughout the stretch particularly in rolling topography section	Site conditions ,design details of structure	Records and field observation ,local consultation	During whole operation period	Overall Operation cost	SQC	
7. Right-of-Way Maintenance									

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Time Frame	Mitigation Cost	Institutional Responsibility	
								Implementation	Supervision
Accident Risk due to uncontrolled growth of vegetation	• Efforts shall be made to make shoulder completely clear of vegetation. • Regular maintenance of plantation along the roadside • Invasive plant not to be planted near the road.	Project requirement	Throughout the Project route	Accident data , plan for Row maintains	Records and public consultations	During whole operation period.	Included in operation/ Maintenance cost		SQC
8. Accidents and Safety									
Accident risks associated with traffic movement.	• raffic control measures, including speed limits, will be enforced strictly. • Further encroachment and squatting within the ROW will be prevented. • No school or hospital will be allowed to be established within 100 m of the highway without permission from the planning authorities. • Monitor/ensure that all safety provisions included in design and construction phase are properly maintained • Highway patrol unit(s) for round the clock patrolling. Phone booths for accidental reporting and ambulance services with minimum response time for rescue of any accident victims, if possible. • Tow-away facility for the break down vehicles if possible.	IRC:SP:55	Throughout the Project route	Police records on accident, Safety arrangements	Records and on site observations ,local interaction	During whole operation period.	Included in operation/ Maintenance cost		SQC

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Time Frame	Mitigation Cost	Institutional Responsibility	
								Implementation	Supervision
	• Coordination with operating agency of intersecting National Highways to have common facilities and share the costs as appropriate if possible.								
_ Transport of Dangerous Goods	• □Preparation of spill prevention and control and emergency preparedness and responsive plans based on an analysis of hazards, implementation of presentation and control measures.			Throughout the project stretch	Road signage ,availability of on site emergency plan	Records and local consultation		Included in operation/ Maintenance cost.	SQC
9. Monitoring Operation Performance									
_ Monitoring Operation Performance	• □The MPRDC will monitor the operational performance of the various mitigation/ enhancement measures carried out as a part of the project . • □The indicators selected for monitoring include the survival rate of trees; utility of enhancement provision, status of rehabilitation of borrow areas, Air quality, water quality, noise levels, soil quality, drainage pattern, etc. •			Throughout the corridor				-------	SQC

EA: Executing Agency, MPRDC: Madhya Pradesh Road Development Corporation, SQC: Supervision Quality Controller, EO: Environmental Officer, IRC: Indian Road Congress

Budget for Environmental Monitoring & Management Plan

	Parameters / Components	Parameter to be monitored	Guidelines	Unit Cost (Rs)	Total Cost (Rs)
1	Ambient Air Monitoring: 3 times in a year for 3 years or construction period at 4 sites & Five years during operation/ defect liability period ,once in a year at 4 sites	PM10, PM2.5, SO2, NOx & CO	High Volume samplers to be used and located 50 m from the construction site	9000	504000
2	Water Monitoring: 3 times in a year for 3 years or construction period At 4 locations	pH, BOD, COD, TDS, TSS, DO, Total coliform, Conductivity, Oil & Grease	Analyse as per the standard methods for examination of water and waste water	5000	180000
3	Noise Monitoring: 3 times in a year for 3 years or construction period ,4 locations & Five years during operation/ defect liability period ,once in a year at 4 sites	Noise levels on dB (A) scale	Using an integrated noise level meter kept at a distance of 15 m from the construction site	3000	168000
	Total Monitoring Cost				**852000**
4.	Opening, running and restoration of stone quarry/sand extraction pits along the entire project length		IRC Code of Practice and MoSRT&H manual	LS	Engineering cost
5.	Gabion walls (above height 4 m) along elevated embankment		IRC Code of Practice and MoSRT&H manual	LS	Engineering cost
6.	Dust Suppression along the entire project length four tankers in a days for 240 Days		IRC Code of Practice and MoSRT&H manual	Rs2000/- per day per tanker	1920000/--
7	Solid Waste management during entire project period		As per MoEF guidelines	3000/ month	108000/-
8.	Erosion Control Measures (Turfing / Pitching / Seeding & Mulching) Provision of Cross drainage & side drainage structures General Borrow area management and maintenance of haul roads related to borrow areas Air/noise pollution control measures in construction equipment Management and disposal of scarified waste bituminous material Provision of Informatory Signs Bus shelters Construction of Speed Humps Management of quarries Redevelopment of Borrow Areas Construction Camp Management Costs Safety measures for workers		As per IRC Guidelines	Shall be included in contractor's quoted rates	Engineering cost
	Total Mitigation Cost (B)				**2028000/-**

	Parameters / Components	Parameter to be monitored	Guidelines	Unit Cost (Rs)	Total Cost (Rs)
8	Training ,Three training sessions during construction period.		As per modules developed by MPRDC	50000 per session	150000
	Total Training Cost (C)				**150000/-**
	Total Environmental Cost (A+B+C)				**3030000/-**

APPENDIX 4: ENVIRONMENTAL MONITORING PROGRAMME

Environmental Components	Monitoring			Location	Frequency	Institutional Responsibility	
	Parameters	Special Guidance	Standards			Implementation	Supervision
Air	$PM_{2.5}$, PM_{10}, SO_2, NO_X, CO	As per CPCB guidelines	The Air (Prevention and Control of Pollution) Rules, CPCB, 1982	At sites where hot mix plant / batching plant is located	3 times in a year for 3 years or construction period at 3 sites & once in year for five years at 3 sites during operation/defect liability period	Contractor through approved monitoring agency	PIU, MPRDC, SC
Water	pH, BOD, COD, TDS, TSS, DO, Total coliform, Conductivity, Oil & Grease	Grab sample collected from source and analyze as per standard methods for examination of water and wastewater	Water quality standards by CPCB	river tributaries and ground water at construction camp sites	3 times in a year for 3 years or construction period At 3 locations	Contractor through approved monitoring agency	PIU, MPRDC, SC
Noise Levels	Noise level on dB(A) scale	In free field at 1m distance from the equipment to be monitored	Noise standard by CPCB	At equipment yards, camp and villages along the alignment.	3 times in a year for 3 years or construction period , 3 locations & once in a year for 5 years at 3 sites during operation/defect liability period.	Contractor through approved monitoring agency	PIU, MPRDC, SC
Soil quality	Monitoring of NPK &heavy metals and grease		As per IRC code of practice	Ad hock if accident / spill locations involving bulk transport of	-	PIU through an approved agency	PIU, MPRDC

Environmental Components	Monitoring			Location	Frequency	Institutional Responsibility	
	Parameters	Special Guidance	Standards			Implementation	Supervision
				carrying hazardous materials			
Road side plantation	Monitoring of felling of trees	It should be ensured that the marked trees are felled only	As given in the IEE report	All along the corridor	During the felling of trees	Forest department	PIU, MPRDC
	Survival rate of trees, success of re-vegetation	The number of trees surviving during each visit should be compared with the number of saplings planted	The survival rate should be at-least 70% below which re-plantation should be done	At locations of compensatory afforestation	Every year for 3 years	PIU	PIU, MPRDC

APPENDIX-5: NATIONAL AMBIENT AIR QUALITY STANDARDS

Sl. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air	
			Industrial Residential, Rural & Other Areas	Ecologically Sensitive Area (Notified by Central Government)
1.	Sulphur dioxide (SO_2)(g/m^3)	Annual Average* 24 Hours**	50 80	20 80
2.	Oxides of Nitrogen (NOx) (g/m^3)	Annual Average* 24 Hours**	40 80	30 80
3.	Particulate Matter (Size Less Then 10 m) or PM_{10} (g/m^3)	Annual Average* 24 Hours**	60 100	60 100
4.	Particulate Matter (Size Less Then 2.5 m) or $PM_{2.5}$ (g/m^3)	Annual Average* 24 Hours**	40 60	40 60
5.	Ozone O_3 (g/m^3)	8 Hours* 1 Hours**	100 180	100 180
6.	Lead (Pb) (g/m^3)	Annual Average* 24 Hours**	0.5 1.0	0.5 1.0
7.	Carbon Monoxide (CO) (mg/m^3)	8 Hours* 1 Hours**	2 4	2 4
8.	Ammonia (NH_3) (g/m^3)	Annual Average* 24 Hours**	100 400	100 400
9.	Benzene (C_6H_6) (g/m^3)	Annual*	5	5
10.	Benzo (a) Pyrane (BaP) particulate phase only (g/m^3)	Annual*	1	1
11.	Arsenic (As) (g/m^3)	Annual*	6	6
12.	Nickel (Ni) (g/m^3)	Annual*	20	20

Note:

* *Annual arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform interval.*

** *24 hourly or 8 hourly or 1 hourly monitored values, as applicable shall complied 98% of the time in a year. However 2% of the time, it may exceed but not on two consecutive days.*

APPENDIX 6: INDIAN STANDARD DRINKING WATER SPECIFICATION-IS 10500:1991

S.no	Parameters	Essential Standards	Relaxed Standards
1.0	**Physical Standards**		
1.1	Colour (Hazen units)	10	50
1.2	Taste	Agreeable	Agreeable
1.3	Odour	Unobjectionable	Unobjectionable
1.4	PH	6.5-8.5	6.5-8.5
1.5	Turbidity (NTU)	10	25
1.6	TDS (mg/l)	500(without treatment)	1500(with treatment)
1.7	Total Hardness (mg/l)	300	600
2.0	**Inorganic Parameters**		
2.1	Ca (mg/l)	75	200
2.2	Mg (mg/l)	30	100
2.3	Fe (mg/l)	0.3	1
2.4	Mn (mg/l)	0.1	0.5
2.5	Cl (mg/l)	250	1000
2.6	SO_4 (mg/l)	150	400 if Mg<30mg/l
2.7	NO_3 (mg/l)	45	45
2.8	F (mg/l)	0.6-1.2	1.5
2.9	Free Cl (mg/l)	0.2	0.5
3.0	**Heavy Metals**		
3.1	Hg (mg/l)	0.001	0.001
3.2	Cd (mg/l)	0.01	0.01
3.3	Se (mg/l)	0.01	0.01
3.4	As (mg/l)	0.05	0.05
3.5	Pb (mg/l)	0.1	0.1
3.6	Zn (mg/l)	5	10
3.7	Cr^{+6} (mg/l)	0.05	0.05
3.8	Cu (mg/l)	0.05	1.5
4.0	**Other Parameters**		
4.1	Phenolic Compounds (mg/l) (as C_6H_5HO)	0.001	0.002
4.2	CN (mg/l)	0.05	0.05
4.3	Anionic Detergents (mg/l) (as MBAS)	0.2	1.0
4.4	Mineral Oil (mg/l)	0.01	0.03
4.5	Pesticides	Absent	Absent
5.0	**Microbiological Parameters**		
5.1	Mean Probable Number Of Total Coliforms (Number/100 ml)	50 without treatment 500 outdoor bathing 5000 with treatment	
6.0	**Radiological Parameters**		
6.1	Gross alpha (□c/ml)	$_{10}$-6	
6.2	Gross beta (□c/ml)	10^{-7}	

APPENDIX 7: AMBIENT AIR QUALITY STANDARDS IN RESPECT OF NOISE

Area Code	Category of Area	Leq. Limits in dB(A)	
		Day Time	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

Note: **:** 1. Day time shall mean from 6.00 a.m. to 10.00 p.m.
Night time shall mean from 10.00 p.m. to 6.00 a.m.

Silence zone is defined as an area comprising not less than 100 meters around hospitals, educational institutions and courts. The silence zones are zones, which are declared as such by the competent authority.

Mixed categories of areas may be declared as one of the four above-mentioned categories by the competent authority.

APPENDIX 8: MINUTES OF MEETING OF PUBLIC CONSULTATION AT HARDUA

सामूहिक परिचर्चा - मिश्रित

20/7/

आँगन वाड़ी केन्द्र

अतरैला

[illegible]

शैना

ग्राम में म.प्र. सड़क निर्माण परियोजना के विषय में बैठक जिसमें सड़क निर्माण के [illegible] में होने वाली कुछ सीमित [illegible] परेशानियों को बताया गया तथा समूहिक [illegible] जिसमें सड़क निर्माण में पर्यावरण सम्बन्धि परेशानियों की [illegible] दर्शाया गया तथा [illegible] विकास के [illegible] की [illegible] हित होगा [illegible] विकास [illegible] उच्च शिक्षा के लिए शहर जाना आसान, तथा ग्रामीणों ने [illegible] समस्या [illegible] सड़क निर्माण [illegible] समूहिक [illegible]

	राजवात	[illegible]	
	विमला	विमला	
	रवि	[illegible]	
	विकास		
	[illegible]		
		[illegible]	
	रमा	[illegible]	
	रामपाल		
	गीता		
	[illegible]		
	[illegible]		
	रघुवीर		
	[illegible]		

Village – Atrala (38+120 to 38+600)

ENVIRONMENTAL SURVEY

Practical View of the Community about Environmental Scenario

Km: From- Harda **To-** Chakghal– **Team No-** ① D.K. Jain. ② Bhupendra Patel.

Q.1- What do you think about the quality of water from ponds, wells, rivers or canal in your area?

Good

Satisfactory ✓

Polluted

पानी हैन्ड पंप से लाते हैं
पानी पीने में साफ और ठीक है।
गर्मी में पानी की समस्या आती है

Q.2- If the quality of water is polluted /poor then in your opinion what are its reasons?

Ingress of industrial effluent in the source

Sewage leakage/discharge in the source

Animal water holes

Rain water storage

Others, please specify

वर्षा के समय या पाईप में लीकेज
आने से कभी-कभी पानी गंदा आता है
पर उसे जल्दी ही सुधार लेते हैं।

Q.3- Is the noise level in your area disturbing / irritating?

Yes ✓

No

Q.4- If the Noise level is disturbing / irritating then in your opinion, it is due to

Vicinity of ndustry

Vehicular Traffic ✓

Construction work

Work shop / scooter repair shop

Aviation zone

Others, please specify

गाड़ियों की आवाजाही इस सड़क से होती है
जिससे बहुत आवाज उत्पन्न होता है
आवाज बहुत तेज होती है जिससे रात में नींद
आने में बाधा होती है

Q.5- How, in your opinion, the noise level can be brought to satisfactory level in your area?

सड़क बन जाने पर से आवाज बहुत घट जाएगी।

Q.6- Is the quality of air, which you breathe, is healthy and clean?

Yes ✓

No ✓

हवा ठीक है केवल गर्मी के समय धूल ज्यादा हो जाती है
गर्मी के समय धुआं और धूल ज्यादा हो जाता है।
सर्दी के समय भी लोग आग पर टायर और लकड़ी जलाकर
गर्मी लेते हैं जिससे धुआं का गुबार जमा हो जाता है।

2

Q.7- If not, then what are the reasons?

Due to vehicular pollution ✓ गाड़ियों की वजह से धुआँ काफी आता है

Due to Industrial pollution

Due to poor sanitation ✓ पानी निकास की बहुत बड़ी वजह है।

Due to domestic smoke स्टोव तथा लोगों द्वारा लकड़ी का ज्यादा इस्तेमाल

Others, please specify धुआँ की मुख्य वजह है।

Q.8- Are there any places of Archaeological / historical importance in your vicinity? If yes, please give details.

No

Q.9- Is there any previous history of natural disaster viz. Floods, Drought, earthquake etc. in your area? if so, give details with year of occurrence and damage.

No

Location: Year:

Flood Yes / No

Drought Yes / No

Earthquake Yes / No

Q.10- Are any rare species of Birds, Animals etc. visiting your area during winter? if so, please give details and locations

No

Name of the Species Location

Q.11- Do you have any drainage problems along the road? If yes then give your suggestions to improve. हाँ

यहाँ की सड़क बनजाने पर साथ में नाली भी हो तो समस्या का समाधान हो सकता है।

Q.12- Do you have any suggestion to improve the Environment w.r.t. Air, Water and Noise in your area?

- खुले इलाके में पेड़ लगाकर
- पानी की निकासी
- लोगों को जागरूक कर

Particular	Name	Sign/Date
Recorder	D. K. Jain	[illegible]
Scrutinizer	Bhupenda Patil.	Bhupenda

सामूहिक परिचर्चा - मिश्रित

(बैठक विवरण एवं उपस्थिती पत्रक)

दिनांक 20/7/14 समय 5:00 pm

स्थान बसस्टेंड के पास ग्राम चाकघाट

विकासखंड .... जिला रीवा

बैठक कार्यवाही विवरण_-

ग्राम में म.प्र. सड़क निर्माण परियोजना के विषय में पूछी गई जिसमें सड़क निर्माण के समय होने वाली कुछ सीमित परेशानि के बारे में चर्चा की गई तथा सड़क निर्माण के समय होने वाली कुछ सीमित परेशानियों की चर्चा तथा सड़क निर्माण के फायदे भी बताये [illegible] [illegible] सड़क निर्माण से [illegible] स्कूल, कॉलेज, अस्पताल तथा शहर जाने में आसानि, तथा ग्रामीणों की इस समस्या तथा सड़क निर्माण के लिए सहमति प्रदान की।

क्र	नाम	हस्ताक्षर	रिमार्क
1	अमरसिंह अहिरवार	[illegible]	
2	लाजवति	लाजवति	
3	ओमप्रकाश	ओमप्रकाश	
4	भरत गुप्ता	भरत गुप्ता	
5	शान्ति शर्मा	शांतिशर्मा	
6	किशोरीलाल	किशोरीलाल	
7	हरप्रसाद	हरप्रसाद	
8	राजाराम	राजाराम	
9	सरजू बाई	सरजू बाई	
10	मुलिया बाई	मुलिया बाई	
11			
12			
13			
14			
15			

बैठक आयोजनकर्ता एवं समन्वयक का नाम एवं हस्ताक्षर

[signature] (D.K. Jain)

4

Village – Chakghat (91+400 to 92+918)

ENVIRONMENTAL SURVEY

Practical View of the Community about Environmental Scenario

Km: From- Hardua **To-** Chakghat **Team No-** D.K. Jain, A.K. Sharma

Q.1- What do you think about the quality of water from ponds, wells, rivers or canal in your area?

Good ✓
Satisfactory
Polluted

हैन्ड पंम्प से पांनी भरकर लाते हैं।
पांनी साफ और पीने लायक है।
गर्मी में भी पांनी निकलता है।
औसतन 500 m से पांनी आता है।

Q.2- If the quality of water is polluted /poor then in your opinion what are its reasons?

Ingress of industrial effluent in the source
Sewage leakage/discharge in the source
Animal water holes
Rain water storage
Others, please specify

Q.3- Is the noise level in your area disturbing / irritating?

Yes ✓
No

Q.4- If the Noise level is disturbing / irritating then in your opinion, it is due to

Vicinity of industry
Vehicular Traffic ✓ गाड़ीयों की आवाज बहुत आती है सड़क खराब होने से भी समस्या है
Construction work
Work shop / scooter repair shop
Aviation zone
Others, please specify

बीमार, बूढ़े, मरीजों को सबसे ज्यादा समस्या होती

Q.5- How, in your opinion, the noise level can be brought to satisfactory level in your area?

सड़क बन जाए तो ठीक हो जाएगा।

Q.6- Is the quality of air, which you breathe, is healthy and clean?

Yes
No ✓

Q.7- If not, then what are the reasons?
Due to vehicular pollution ✓ गाड़ियों के आने जाने से धूल और धुआं होजाता है।
Due to Industrial pollution
Due to poor sanitation

Due to domestic smoke
Others, please specify

Q.8- Are there any places of Archaeological / historical importance in your vicinity? If yes, please give details. No

Q.9- Is there any previous history of natural disaster viz. Floods, Drought, earthquake etc. in your area? if so, give details with year of occurrence and damage.

Location: No Year:

Flood Yes / No
Drought Yes / No
Earthquake Yes / No

Q.10- Are any rare species of Birds, Animals etc. visiting your area during winter? If so, please give details and locations

Name of the Species No Location

Q.11- Do you have any drainage problems along the road? If yes then give your suggestions to improve. हाँ
पानी निकासी की बहुत समस्या है। हैण्ड पंप का भी पानी सड़क पर जमा हो जाता है।

Q.12- Do you have any suggestion to improve the Environment w.r.t. Air, Water and Noise in your area?
यहाँ पेड़ लगा कर और लोगों को समझा कर इन समस्याओं को ठीक कर सकते हैं।

Particular	Name	Sign/Date
Recorder	D.K. Jain	
Scrutinizer	A.K SHARMA	

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सामूहिक परिचर्चा - मिश्रित

(बैठक विवरण एवं उपस्थिती पत्रक)

दिनांक 20/7/14 समय 7:45 pm

स्थान मंदिर चबूतरा ग्राम चितला

विकासखंड [illegible] जिला रीवा

बैठक कार्यवाही विवरण -

"म.प्र. जिला सम्पर्क सड़क परियोजना" के संबंध में ग्रामीणों के साथ बैठक की गई। बैठक में सड़क निर्माण से संबंधित सभी पहलुओं को विस्तार से समझाया गया। सड़क निर्माण से होने वाले आर्थिक फायदों के बारे में बताया गया। [illegible] व [illegible] होगी, शिक्षा हेतु स्कूल आ सकेंगे, व्यवसाय बढ़ेगा, [illegible] आदि [illegible] इत्यादि। ग्रामीणों ने फायदों को समझते हुये सड़क निर्माण कार्य के लिए अनुमति प्रदान की।

क्र	नाम	हस्ताक्षर	रिमार्क
1	श्री केशवलाल तिवारी	केशवलाल	
2	श्रीमान अजीत राय	[illegible]	
3	श्रीमान संजीव शर्मा	[illegible]	
4	श्रीमान रघुवीर जी	[illegible]	
5	श्रीमति शकुन्तला जोशी	शकुन्तला जोशी	
6	श्रीमति पुष्पा देवी जायसवाल	[illegible]	
7	श्रीमति कुसुम त्यागी	कुसुम	
8	श्रीमान दीनदयाल तिवारी	दीनदयाल	
9	श्रीमान रमेश यादव	[illegible]	
10	श्रीमान प्रहलाद नाथ	प्रहलाद	
11	श्रीमान अनुपम राठौर जी	अनुपम राठौर	
12			
13			
14			
15			

बैठक आयोजनकर्ता एवं सुगमकर्ता का नाम एवं हस्ताक्षर

[signature] (B.K. Jain)

Village — Chilla (73+000 to 74+60)

ENVIRONMENTAL SURVEY

Practical View of the Community about Environmental Scenario

Km: From- Hardua **To-** Chakghat **Team No-** ① D.K. Jain ② A.K. Sharma

Q.1- What do you think about the quality of water from ponds, wells, rivers or canal in your area?

- Good ✓ हैंडपंप का पानी उपयोग करते हैं।
- Satisfactory
- Polluted

Q.2- If the quality of water is polluted /poor then in your opinion what are its reasons?

- Ingress of industrial effluent in the source
- Sewage leakage/discharge in the source
- Animal water holes
- Rain water storage
- Others, please specify

Q.3- Is the noise level in your area disturbing / irritating?

- Yes ✓
- No

Q.4- If the Noise level is disturbing / irritating then in your opinion, it is due to

- Vicinity of industry
- Vehicular Traffic ✓ गाड़ीयों की आवाजाही बहुत ज्यादा है जिससे सड़के भी टूट गई है और आवाज बहुत होता है
- Construction work
- Work shop / scooter repair shop
- Aviation zone
- Others, please specify

Q.5- How, in your opinion, the noise level can be brought to satisfactory level in your area?

सड़क को बनाने में और उसेद रख-रखाव ठीक होने से।

Q.6- Is the quality of air, which you breathe, is healthy and clean?

- Yes ✓
- No

Q.7- If not, then what are the reasons?

Due to vehicular pollution
Due to Industrial pollution
Due to poor sanitation

Due to domestic smoke
Others, please specify

Q.8- Are there any places of Archaeological / historical importance in your vicinity? if yes, please give details.

N.A

Q.9- Is there any previous history of natural disaster viz. Floods, Drought, earthquake etc. in your area? if so, give details with year of occurrence and damage.

N.A

Location: Year:

Flood Yes / No
Drought Yes / No
Earthquake Yes / No

Q.10- Are any rare species of Birds, Animals etc. visiting your area during winter? if so, please give details and locations

N.A

Name of the Species Location

Q.11- Do you have any drainage problems along the road? If yes then give your suggestions to improve.

– हाँ सड़क के साथ नाली नहीं होने से बिस्तार का पानी सड़क पर जमा हो जाता है और सड़के भी टूटती है। सड़क के साथ नाली बहुत आवश्यक है।

Q.12- Do you have any suggestion to improve the Environment w.r.t. Air, Water and Noise in your area?

– सड़क के किनारे पेड़ लगाकर
– रोड के दोनों ओर नाली बनाकर उसे ढकने पर।

Particular	Name	Sign/Date
Recorder	D. K Jain	
Scrutinizer	A. K Sharma	

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सामूहिक परिचर्चा - मिश्रित

(बैठक विवरण एवं उपस्थिती पत्रक)

दिनांक 21/7/17 समय 8:45am

स्थान राम प्रसाद जी के घर के पास ग्राम हरदुआ

विकासखंड .... जिला रीवा

बैठक कार्यवाही विवरण_-

ग्राम में म.प्र. सड़क निर्माण परियोजना के विषय में बैठक की गई और सड़क निर्माण के समय पैदा होने वाले पर्यावरणीय समस्याओं को बताया गया तथा सड़क निर्माण से होने वाले फायदों को बताया जैसे व्यवसायिक विकास अस्पताल आने जाने में आसानी उच्च शिक्षा के लिए शहर जाना आसान इत्यादि ग्रामीणों ने सड़क निर्माण के फायदों को समझते हुए सड़क निर्माण के लिए सहमति प्रदान की।

क्र	नाम	हस्ताक्षर	रिमार्क
1	केरत सिंह	Kerat Singh	
2	रामप्रसाद	RAM Prasad	
3	हीरा लाल	हीरा लाल	
4	कोमल सिंह	कोमल सिंह	
5	रामसंतोष	राम संतोष	
6	गिरजा देवी	[illegible]	
7	नेत सिंह	नेत सिंह	
8	हल्कू प्रसाद	हल्कू प्रसाद	
9	बिहारी लाल	बिहारी	
10	कमल सिंह	कमल सिंह	
11	चंदना	चंदना	
12	फुलिया	[illegible]	
13			
14			
15			

बैठक आयोजनकर्ता एवं समन्वयक का नाम एवं हस्ताक्षर

DKJain (D.K. Jain)

Village - Hardua (00+000 to 01+800)

ENVIRONMENTAL SURVEY

Practical View of the Community about Environmental Scenario

Km: From- Hardua **To-** Chakghat **Team No-** ① D.K. Jain ② A.K. Sharma

Q.1- What do you think about the quality of water from ponds, wells, rivers or canal in your area?

Good ✓ सरकारी इन्डपंप के पानी अच्छे हैं।
Satisfactory पानी साफ और पीने योग्य है।
Polluted औसतन दूरी 200 m तय करते हैं।

Q.2- If the quality of water is polluted /poor then in your opinion what are its reasons?

Ingress of industrial effluent in the source
Sewage leakage/discharge in the source
Animal water holes
Rain water storage
Others, please specify

Q.3- Is the noise level in your area disturbing / irritating?

Yes ✓
No

Q.4- If the Noise level is disturbing / irritating then in your opinion, it is due to

Vicinity of industry
Vehicular Traffic ✓ सड़कों में [illegible] आदमी के आने से दूर भूत है। सड़के खराब है और गाड़ियां के smooth running नहीं होने से आवाजे बहुत तेज आती है।
Construction work
Work shop / scooter repair shop
Aviation zone
Others, please specify

Q.5- How, in your opinion, the noise level can be brought to satisfactory level in your area? सड़क, निर्माण के साथ उसका रखरखाव ठीक हो।

Q.6- Is the quality of air, which you breathe, is healthy and clean?

Yes ✓
No

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सामूहिक परिचर्चा - मिश्रित

(बैठक विवरण एवं उपस्थिती पत्रक)

दिनांक 20/7/19 समय 9:45 am

स्थान चौक पर ग्राम सतवा

विकासखंड .... जिला रीवा

बैठक कार्यवाही विवरण_-

"सड़क निर्माण परियोजना" के संबंध में ग्रामीणों के साथ बैठक की गई। जिसमें सड़क निर्माण के समय होने वाली परेशानियां (कुछ समय के लिये) एवं निर्माण होने के बाद होने वाले फायदे के बारे में चर्चा की गई। जिसमें ग्रामीणों ने अपने विचार बतलाये:- सड़क निर्माण गांव के विकास का आधार है सड़क निर्माण होने से प्रदूषण कम होगा, और श्रम बचेगा, आवागमन आरामदायक हो जायेगा।
सड़क निर्माण कार्य के लिये सहमति प्रदान की।

क्र	नाम	हस्ताक्षर	रिमार्क
1	श्रीमान अशोक पवार	अशोक पवार	
2	श्रीमान राधेश्याम कुशवाह	राधेश्याम	
3	श्रीमान केशव प्रसाद जी	Keshav	
4	श्रीमान देवकीनंदन जी	देवकी नंदन	
5	श्रीमान आत्माराम त्रिवेदी	आत्माराम	
6	श्रीमान सुनील जोशी	[illegible]	
7	श्रीमति सुशीला देवी	सुशीला	
8	श्रीमति कौशल्या पाल		
9	श्रीमति अनसुईया बाई	अनसुईया	
10	श्री राधेश्याम राठौर जी	राधेश्याम	
11			
12			
13			
14			
15			

बैठक आयोजनकर्ता एवं समन्वयक का नाम एवं हस्ताक्षर

(D.K. Jain)

Village – Jawa (57+500 to 58+300)

ENVIRONMENTAL SURVEY

Practical View of the Community about Environmental Scenario

Km: From- Hardua **To-** Chakghat **Team No-** D.K. Jain, A.K. Sharma

Q.1- What do you think about the quality of water from ponds, wells, rivers or canal in your area?

Good ✓ — हैन्ड पम्प पानी।
Satisfactory — स्वाद और पीने में अच्छा है।
Polluted — गर्मी में [illegible] का पानी आता है।
गर्मी में [illegible] 700m और [illegible] दूरी से लाना होता है।

Q.2- If the quality of water is polluted /poor then in your opinion what are its reasons?

Ingress of industrial effluent in the source
Sewage leakage/discharge in the source
Animal water holes
Rain water storage
Others, please specify

Q.3- Is the noise level in your area disturbing / irritating?

Yes ✓
No

Q.4- If the Noise level is disturbing / irritating then in your opinion, it is due to

Vicinity of industry
Vehicular Traffic ✓ — हमारे यहाँ सड़कों पर गाड़ियाँ चलने से बहुत शोर होता है
Construction work
Work shop / scooter repair shop
Aviation zone
Others, please specify

Q.5- How, in your opinion, the noise level can be brought to satisfactory level in your area?

– सड़क निर्माण कर।
– पेड़ लगा कर।

Q.6- Is the quality of air, which you breathe, is healthy and clean?

Yes ✓
No

Q.7- If not, then what are the reasons?
Due to vehicular pollution
Due to Industrial pollution
Due to poor sanitation

Due to domestic smoke
Others, please specify

Q.8- Are there any places of Archaeological / historical importance in your vicinity? if yes, please give details.
Nil

Q.9- Is there any previous history of natural disaster viz. Floods, Drought, earthquake etc. in your area? if so, give details with year of occurrence and damage.
No
Location: Year:

Flood Yes / No
Drought Yes / No
Earthquake Yes / No

Q.10- Are any rare species of Birds, Animals etc. visiting your area during winter? if so, please give details and locations
No

Name of the Species Location

Q.11- Do you have any drainage problems along the road? If yes then give your suggestions to improve.
हाँ
पानी निकासी बहुत बड़ी समस्या है।
सड़क के साथ नाले का भी निर्माण होना चाहिए।

Q.12- Do you have any suggestion to improve the Environment w.r.t. Air, Water and Noise in your area?
→ पेड़ लगाएं।
→ कूड़ा का निस्तारा सही तरीके से करवाएं।

Particular	Name	Sign/Date
Recorder	D. K. Jain	
Scrutinizer	A. K. Singh	

सामूहिक परिचर्चा - मिश्रित

(बैठक विवरण एवं उपस्थिती पत्रक)

दिनांक 21/7/14 समय 11:37 pm

स्थान रामबाग तिराहा ग्राम [illegible]

विकासखंड जवा जिला रीवा

बैठक कार्यवाही विवरण:-

रामबाग तिराहा पर "म. प्र. जिला संपर्क परियोजना" के विषय में ग्रामिणों से सड़क निर्माण कार्य के बारे में चर्चा की गई जिसमें सड़क निर्माण के समय होने वाली कुछ सकारात्मक एव नकारात्मक तथ्यों पर स्पष्ट रूप से जानकारी दी गई। ग्रामिणो ने सड़क निर्माण को गांव के विकास का आधार समझते हुये सड़क निर्माण कार्य के लिये सहमति प्रदान की है।

क्र	नाम	हस्ताक्षर	रिमार्क
1	अमित तिवारी	अमित तिवारी	
2	गुलाम अहमद	गुलाम अहमद	
3	अमोल सिंह	अमोल सिंह	
4	अमित शुक्ला	[signature]	
5	अल्का वर्मा	[thumb impression]	
6	राहुल पांडे	राहुल पांडे	
7	राजीव पांडे	राजीव पांडे	
8	नारायण सिंह	[signature]	
9	शुभम पाठक	शुभम पाठक	
10	रजन लाल कुशवाहा	[signature]	
11	शिखर सिंह	[thumb impression]	
12	पूजा शुक्ला	[signature]	
13	अर्चना कुशवाहा	Archna Singh	
14	निर्मला देवी	[signature] [thumb impression]	
15	गीता बाई	[thumb impression]	

बैठक आयोजनकर्ता एवं समन्वयक का नाम एवं हस्ताक्षर

[signature] (D.k. Jain)

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Village – ~~Ramgadwa~~ Ramgadwara (38+600 to 38+840)

ENVIRONMENTAL SURVEY

Practical View of the Community about Environmental Scenario

Km: From- Hardua **To-** Chakghat **Team No-** ① D.K. Jain ② A.K. Sharma.

Q.1- What do you think about the quality of water from ponds, wells, rivers or canal in your area?

Good ✓ – Hand pump water.
Satisfactory – पानी साफ पीने योग्य और मीठा है
Polluted – पानी 750m अंदर दूरी से लाते हैं

Q.2- If the quality of water is polluted /poor then in your opinion what are its reasons?

Ingress of industrial effluent in the source
Sewage leakage/discharge in the source
Animal water holes
Rain water storage
Others, please specify

Q.3- Is the noise level in your area disturbing / irritating?
Yes ✓
No ✗

Q.4- If the Noise level is disturbing / irritating then in your opinion, it is due to
Vicinity of industry
Vehicular Traffic ✓ गाड़ियाँ बहुत शोर मचाती है
Construction work सड़के खराब हालात में है यही मुख्य कारण है
Work shop / scooter repair shop NO
Aviation zone
Others, please specify

Q.5- How, in your opinion, the noise level can be brought to satisfactory level in your area?
सड़के बनाए तो भी noise level ठीक हो सकती है

Q.6- Is the quality of air, which you breathe, is healthy and clean?
Yes
No ✓ NO

Q.7- If not, then what are the reasons?

Due to vehicular pollution
Due to Industrial pollution
Due to poor sanitation NIL
Due to domestic smoke
Others, please specify

Q.8- Are there any places of Archaeological / historical importance in your vicinity? If yes, please give details.

NIL

Q.9- Is there any previous history of natural disaster viz. Floods, Drought, earthquake etc. in your area? if so, give details with year of occurrence and damage.

NIL

Location: Year:

Flood Yes / No
Drought Yes / No
Earthquake Yes / No

Q.10- Are any rare species of Birds, Animals etc. visiting your area during winter? If so, please give details and locations

NO

Name of the Species Location

Q.11- Do you have any drainage problems along the road? If yes then give your suggestions to improve. Yes.

There is no drainage system in this area
It is very important to construct nali with road.

Q.12- Do you have any suggestion to improve the Environment w.r.t. Air, Water and Noise in your area?

- Plantation of trees
- Proper training to people

Particular	Name	Sign/Date
Recorder	D. K. Jain	
Scrutinizer	A. K. Sharma	

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सामूहिक परिचर्चा - मिश्रित

(बैठक विवरण एवं उपस्थिती पत्रक)

दिनांक 21/7/14 समय 5:30 pm.

स्थान आंगन बाड़ी केन्द्र के पास ग्राम डंगोली

विकासखंड जवा जिला रीवा

बैठक कार्यवाही विवरण_-

डंगोली ग्राम में "म.प्र. सड़क निर्माण परियोजना" के संबंध ग्रामिणों के साथ बैठक की गई। बैठक में उपस्थित ग्रामिणों को सड़क निर्माण के बारे, सड़क निर्माण के समय होने वाले पर्यावरण प्रदूषण एवं लाभ के बारे में स्पष्ट रूप से समझाया गया। ग्रामिणों ने सड़क निर्माण से व्यवसाय, शिक्षा एवं बाहर से जुड़ने में आसानी को मानते हुए सड़क निर्माण के लिये सहमति दी है।

क्र	नाम	हस्ताक्षर	रिमार्क
1	दिलिप रावत	दिलिप रावत	
2	सुरजित रावत	[illegible]	
3	सरिता तिवारी	[illegible]	
4	निर्मला तिवारी	निर्मला तिवारी	
5	राम निवास रावत	[illegible]	
6	लक्ष्मी देवी तिवारी	लक्ष्मी देवी	
7	सुधीर त्रिपाठी	[illegible]	
8	सावित्री तिवारी	सावित्री तिवारी	
9	शिवेन्द्र रावत		
10	रामसुख रावत	रामसुख	
11	यशोमति देवी		
12	कृष्ण कुमार रावत	[illegible]	
13	अखिलेश रावत	अखिलेश	
14	पवन कुमार तिवारी	Pawan	
15	श्रीमति करुणा तिवारी	करुणा तिवारी	

बैठक आयोजनकर्ता एवं समन्वयक का नाम एवं हस्ताक्षर

(D.k. Jain)

Village - [illegible] Rangoli Jagir (7+000 to 8+500)

ENVIRONMENTAL SURVEY

Practical View of the Community about Environmental Scenario

Hamlet to Chakghal -

Km: From- **To-** **Team No-** (1) D.K. Jain (2) Chanda Prasad.

Q.1- What do you think about the quality of water from ponds, wells, rivers or canal in your area?

Good ✓
Satisfactory
Polluted

पानी साफ और पीने में अच्छा है
पानी आता है ज्यादा। सामय हैंडपंप का पानी पीते हैं
कुआं और गांवों में ट्यूबवेल (सरकारी) का पानी पीते हैं
हैंडपंप 500 m दूर ट्यूबवेल 800 m दूर है।

Q.2- If the quality of water is polluted /poor then in your opinion what are its reasons?

Ingress of industrial effluent in the source
Sewage leakage/discharge in the source
Animal water holes
Rain water storage
Others, please specify

Q.3- Is the noise level in your area disturbing / irritating?

Yes ✓
No

Q.4- If the Noise level is disturbing / irritating then in your opinion, it is due to

Vicinity of industry
Vehicular Traffic ✓
Construction work
Work shop / scooter repair shop
Aviation zone
Others, please specify

हाँ इनकी प्रदूषण बहुत ज्यादा है
हमारी सड़क होती है जिससे गाड़ियों की
आवाजाही से बहुत शोर होता है।

Q.5- How, in your opinion, the noise level can be brought to satisfactory level in your area?

सड़क नई बनजाना है और उसकी देख-रेख अच्छी होती
समस्या से छुटकारा ठीक कर सकते हैं

Q.6- Is the quality of air, which you breathe, is healthy and clean?

Yes
No ✓ वायु भी सड़क खराब होने से धूल और धुआँ से भरा रहता है

Q.7- If not, then what are the reasons?

- Due to vehicular pollution ✓ सड़क के धूल मिट्टी बहुत ज्यादा है जो वाहनों के चलने पर गुबार सी तरह उड़ता है।
- Due to industrial pollution
- Due to poor sanitation
- Due to domestic smoke
- Others, please specify ✓ हमारे यहाँ भूतल निर्माण में कच्चे ईंट लकड़ी का बहुतायत से उपयोग होता है जिससे धुआं होता है

Q.8- Are there any places of Archaeological / historical importance in your vicinity? If yes, please give details.

नहीं

Q.9- Is there any previous history of natural disaster viz. Floods, Drought, earthquake etc. in your area? if so, give details with year of occurrence and damage.

		Location:	Year:
Flood	Yes / No	नहीं	
Drought	Yes / No		
Earthquake	Yes / No		

Q.10- Are any rare species of Birds, Animals etc. visiting your area during winter? If so, please give details and locations

नहीं

Name of the Species	Location

Q.11- Do you have any drainage problems along the road? If yes then give your suggestions to improve.

- बाँनी का निकास ही सड़क टूटने की मुख्य वजह है।
- यहाँ बाँनी सड़कों पर जमा होता है जो बाहर नहीं निकल पाता है

Q.12- Do you have any suggestion to improve the Environment w.r.t. Air, Water and Noise in your area?

- यहाँ पेड़ को लगाना होगा।
- लोगों को जागरूक करना होगा।
- सड़क के साथ नाली की भी देख-भाल करनी होगी।

Particular	Name	Sign/Date
Recorder	D. K. Jain	Dkjain
Scrutinizer	Chandan Prasad	chandan

APPENDIX 9: GRM IN HINDI

सहमति पत्र

(व्यक्तिगत रूप से हस्ताक्षर करने हेतु)

यह सहमति पत्र दिनांक .....2014 को श्री / श्रीमति .....
निवासी .....(जिन्हे बाद में प्रथम पक्ष कहा जायेगा) एवं मध्य प्रदेश रोड़ डेवलपमेंट कारपोरेशन की तरफ से श्री.....(पद) .
.....(जिन्हे बाद में द्वितीय पक्ष कहा जायेगा) के मध्य हस्ताक्षरित किया गया।

गवाहों / साक्षी की उपस्थिति में यह दस्तावेज निष्पादित किया गया है।

1- यह कि प्रथम पक्ष दुकान का स्वामी / किरायेदार / अतिक्रमणकारी / फेरी वाला है। तथा यह अपना .....व्यवसाय पिछले .....वर्षो से इस स्थान पर चला रहा है। दुकानदार इस दुकान का पट्टेदार है / नही है। प्रस्तावित सड़क के निर्माण के दौरान व्यवसाय का स्वामी / पट्टेदार का व्यवसाय तथा आमदनी सड़क निर्माण के दौरान बाधित होने की आशंका है। यह कालावधी 30 दिन से अधिक नही होगी।

2- यह कि प्रथम पक्ष ने मध्य प्रदेश जिला कनेक्टीविटी क्षेत्र परियोजना (MPDCSP) की आवश्यकताओं के तहत आयोजित सार्वजनिक लोक सहमति में भाग लिया है, रोड़ निर्माण से प्राप्त होने वाले लाभ को समझ लिया है एवं रोड़ निर्माण हेतु सहमति दे दी है।

3- यह कि प्रथम पक्ष द्वारा अपनी मर्जी से ग्राम.....तहसील .....में MPDCSP अंतर्गत रोड़ निर्माण विकास हेतु आपनी आजीविका में संभावित अस्थायी व्यवधान को देखते हुये भी सहमति प्रदान की है।

4- यह कि प्रथम पक्ष रोड़ निर्माण से होने वाले अस्थायी आजीविका व्यवधान के खिलाफ किसी भी प्रकार के मुआवजे का दावा नही करेगा।

5- यह कि द्वितीय पक्ष को अस्थायी आजीविका व्यवधान संबंधित सहमति स्वीकार है।

6- यह कि द्वितीय पक्ष निर्माण कार्य के दौरान रोड के समीप स्थित सभी व्यावसायिक इकाईयों को नुकसान से बचाने के लिये सभी संभव सावधानियां पूर्वक कार्य करेगा।

7- यह कि प्रथम पक्ष द्वारा द्वितीय पक्ष को यह आश्वासन दिया जाता है कि यह MPDCSP अंतर्गत रोड निर्माण को किसी प्रकार का नुकसान नही पहुँचायेगा, ना ही सार्वजनिक वाहनों के आवागमन में व्यवधान पैदा करेगा एवं ना ही ऐसे कार्यो में शामिल होगा।

8- यह कि दोनों पक्ष MPDCSP अंतर्गत प्रस्तावित इस रोड निर्माण हेतु सहमत है।

9- यह कि हस्ताक्षरित किये जाने की तारीख से यह सहमति पत्र प्रभावी होगा।

साक्षी/गवाहों की उपस्थिति में दोनों पक्षों ने उपर लिखित तारीख को इस पत्रक को हस्ताक्षरित किया है।

हस्ताक्षर प्रथम पक्ष	द्वितीय पक्ष की ओर से अधिकृत (मोहर सहित)
गवाह	गवाह
1- हस्ताक्षर.....	1- हस्ताक्षर.....
नाम –.....	नाम –.....
पूरा पता –.....	पूरा पता –.....
2-हस्ताक्षर.....	2. हस्ताक्षर.....
नाम –.....	नाम –.....
पूरा पता –.....	पूरा पता –.....

(गयाड/साक्षी में गांव के सरपंच, ग्राम पंचायत के सदस्य, डी.पी.आर. कंसलटेंट के प्रतिनिधि, गैर शासकीय संगठनों के प्रतिनिधि तथा ग्राम के बुजुर्ग/वरिष्ठ नागरिकों को शामिल किया जा सकता है)

शिकायत निवारण तंत्र

5.1 सड़क निर्माण परियोजना से संबंधित विशेष शिकायत निवारण तंत्र (GRM) स्थापित किया जायेगा जिसके तहत विस्थापित व्यवसायिक इकाईयों, संबंधित शिकायतों, सामाजिक तथा पर्यावरण संबंधित शिकायतों का निराकरण करने की सुविधापरियोजना स्तर पर प्रदान की जायेगी, यह तंत्र सामाजिक तथा पर्यावरण संबंधी समस्या, शिकायत या शकाओं के निवारण में सहायक सिद्ध होगा। यह परियोजना प्रभावित व्यक्तियों की शंकाओं तथा समस्या निराकरण करने के उद्देश्य से निर्मित किया गया है। GRM का उद्देश्य शासन की निवारण प्रक्रिया को नजर अंदाज करना नही है बल्कि जन साधारण को निर्माण से होने वाले लाभ को बताना तथा पारदर्शिता के साथ समस्या तथा शंकाओं का निवारण करना है।

5.2 निवारण प्रक्रिया (RP) यह तंत्र प्रभावी तरीको से जन साधारण/लोक सामान्य को इस कार्य के लाभ बतलाते हुऐ सार्वजनिक सहमति प्राप्त करेगा शिकायत निवारण सहमति (GRC) एक समय सीमा में समस्या निवारण कार्य करेगी। कमेटी का निर्णय ना. न्यायालय के आदेश पूर्व बाध्यकारी होगा इस समिति को MPRDC के प्रबंध संचालक की अध्यक्षता में गठित किया जायेगा। PIU स्तर पर प्रबंधक (PM) पुर्नवास अधिकारी, NGO के प्रतिनिधी, समाज के प्रतिष्ठित व्यक्ति, जन प्रतिनिधी, जिला परिषद प्रतिनिधी, कमजोर तबके के व्यक्ति तथा 2 महिला प्रतिनिधी शामिल होगे जो परियोजना कार्य पूर्ण होने तक पदस्थ रहेंगे।

5.3 शिकायत निवारण समिति द्वारा शिकायत के 3 सप्ताह के दौरान प्रतिक्रिया करेगी। निर्माण कार्य के पूर्व समस्त शिकायतोंय शंकाओं का समाधान कर लिया जायेगा।

शिकायत निवारण समिति की बैठक 3 सप्ताह में कम से कम एक बार अवश्य होगी, माननीय न्यायालय के तहत स्थानित्व अधिकारी से संबंधित विवादों के अलावा यह समिति समस्त पुर्नवास स्थानांतरण, मुआवजे के भुगतान तथा अन्य सहायता हेतु चरण बद्ध कार्य करेगी।

शिकायत निवारण प्रक्रिया तंत्र

अनुलग्न 1

(A) लोक शिकायत प्रपत्र /प्रलेखन (शिकायत निवारण)

क्र	शिकायत का प्रकार	शिकायत प्राप्ति होने की तारीख	प्रभावित स्थान ग्राम/शहर	चैनेज 0.00 से लैण्ड मार्क	शिकायतकर्ता का नाम	पूरा पता एवं मोबाईल न0	रिमार्क की गई कार्यवाही का संक्षिप्त विवरण	स्थिति		
								निवारण हो गई	कार्य प्रगति पर है।	अपूर्ण लंबित
1										
2										
3										
4										
5										
6										
7										
8										

अनुलग्न 1

(B) शिकायत का प्रकार

- घर की दीवार और छत को कंपन/विस्फोट/भारी वाहनों के कारण नुकसान
- उपयोग में आ रही सड़क, पुलिया, नहरों को नुकसान
- सड़क के उपयोग में आ रहे अवरोध
- निजी संपत्ति को नुकसान
- विस्फोट के कारण निजी या सार्वजनिक जल स्त्रोतों में जल स्तर की कमी या जल में प्रदूषण
- व्यावसायिक इकाई को/ व्यावसायिक परिसर में नुकसान
- दूषित जल का जमाव या बाढ
- घरों के समीप (सॉलिड) कचरे को फेंकना
- मूर्तियां अथवा स्मारकों को नुकसान होने का भय
- विस्थापना की स्थिति में वैकल्पिक भूमि या अधिग्रहित भूमि के मुआवजे के लिये अनुरोध पत्र
- भूमि स्वामित्व के अधिकार संबंधित किसी प्रकार का विवाद

- अधिग्रहित भूमि सीमा निर्धारण में अस्पष्टता (सीमा का निशान अस्पष्ट)
- धूल, शोर और वायु संबंधित प्रदूषण
- स्वयं आवागमन तथा पशुओं के आवगमन हेतु अतिरिक्त पुलियां की मांग।