Initial Environmental Examination (IEE)

March 2015

IND: Madhya Pradesh District Connectivity Sector Project

Nirtala-Mandi- Bamora Road

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

CURRENCY EQUIVALENTS

(as of 31 March 2015)

Currency unit	–	Indian rupees (INR/Rs)
Rs1.00	=	$ 0.016
$1.00	=	Rs 62.5096

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)
NMBR	–	Nirtala - Mandi Bamora 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	–	Kilometer
km^2	–	square kilometer
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.

In preparing any country program or strategy, financing any project, or by making any designation of or reference to a particular territory or geographic area in this document, the Asian Development Bank does not intend to make any judgments as to the legal or other status of any territory or area.

TABLE OF CONTENTS

APPENDICES

TABLES

FIGURES

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 2,200 km of MDRs (ii) improving road maintenance and asset management and (iii) developing an efficient accident response system. Madhya Pradesh Road Development Corporation Ltd (MPRDC) specifically targets MDRs to form key linkage between rural, semi urban and urban areas and complete the state roads connectivity.

2. 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 Nirtala-Mandi Bamora (NMB) Road.

3. The main objectives are to improve the regional as well as inter and intra state transport flows and in doing so improving access to services and making the State attractive to developers and investors. To fulfil the above objectives and due considerations to environmental feasibility of above road section, Initial Environmental Examination (IEE) was carried out for this section.

4. Since the project is following the sector loan modality four subprojects were selected as sample roads .The present report pertains to NMB Road sub-project, which is one of the sample roads. This subproject is categorized as Category “B‟ and hence, an IEE has been undertaken. The IEE is carried out in accordance applicable laws and regulations of the Government of India.

5. 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 right of way (ROW), no Environmental Clearance is required for the proposed road widening project as per Environmental Impact Assessment (EIA) Notification 2006.

B. Description of Project

6. The Nirtala-Mandi Bamora Road (MDR) with a length of 24.9 Km and starts at Km 0.00 near Nirtala and ends at Mandi Bamora at Km 24.9. The actual length of the project road is about 24.9Kms. It starts from Nirtala Townat T-Junction of Bina-Khurai(NH-26A) and passes through Bagthari, Sarkhedi, Silgaon, Ishawar, Rahatwas, Dhansara, Gohara and end the road Mandi Bamora Village T-Junction at (Khrwai-pathari) Road Section. At present, the road is in bad condition and needs up-gradation. Improvement of this road section will connect the interior rural areas and thereby bring people nearer to district headquarters.

7. The project involves widening & Strengthening of existing roads within available ROW to 2-lane carriageway (7.0 m wide with 3.5 m width of each lane and 2.5m earthen shoulder either side) and Intermediate lane (5.50m wide with 2.25m earthen shoulder both side). The total length of the project road is 22.6 km. This road will provide better connectivity to Prithvipur and Niwari.

C. Description of Environment

8. The proposed project road between **Nirtala-Mandi Bamora (MDR) Road** situated on the Central plateau & hill region agro climate zone and forms Gird sub-group. The soil type in the area is mainly Medium Black alluvial. The land use pattern in the project section is agricultural with intermittent semi urban/rural stretches.

9. Study area has a sub-tropical climate with hot summers from late March to early July, the humid monsoon season from late June to early October, and a cool dry winter from early November to late February. The highest recorded temperature was 47 °C and the lowest was −1 °C.

10. Baseline data on ambient air quality was found to meet the national air quality standards for rural and residential area along the project road. Similarly measured noise levels were found to be below the noise limit stipulated for residential and commercial areas.

11. There is no forest land involved in the project road. The project road does not pass through any protected area, such as, wildlife sanctuary, national park or bio-reserve neither it is located within 10 km from the project road. Approximately 193 trees may need to be cut within ROW for up-gradation of the project road. No rare or endangered species found in the area along the project road.

12. There is no mining activity along the project road. Water Quality along the project is good and meeting the Standards of drinking water quality as per IS 10500.

13. No archaeological and historical monument is located along the project road. However, small religious structures are located within the existing ROW, of which, only few religious structures will be affected during widening of the project road.

D. Anticipated Environmental Impacts and Mitigation Measures

1. Design and Construction Phase

a. Impact on Physiography and Topography

14. 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 Indian Road Congress (IRC) Guidelines (IRC, 1995).

b. Potential Environmental Impacts on Soil

15. **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 to its original land use.

16. **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.

17. **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.

18. 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 areas will be located at least 500 meters from the nearest water body and provided with perimeter interceptor drains.

c. Impact on Water Resources and Drainage

19. 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

20. 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.

21. 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. Flora, Fauna and Ecosystem

22. Clearing and grubbing activities will result to the removal of shrubs, grasses, and 193 trees along the ROW. 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

23. As the Contractors 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

24. 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

a. Impacts on Soil

25. 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. 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

26. 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 on:

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 (EMP)

27. The NMB Road specific Environment Management Plan that has been formulated which consists of mitigation and monitoring measures, and clear definition of roles and responsibilities.

28. 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 project

implementation unit (PIU) will be the key person to coordinate the receiving of complaints and addressing them.

3. Environmental Monitoring Program (EMoP)

29. 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).

30. 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.

4. Institutional Arrangement and Capacity Building

31. 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 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.

32. To enable MPRDC officials to implement for environmental safeguard requirements effectively, a training programme will be conducted for the executing agency (EA) and implementing agency (IA) of the sector loan to improve environmental awareness, construction practices, legislative compliance requirements, EMP and EMoP implementation requirements, and roles and responsibilities.

G. Conclusion and Recommendations

33. The findings of the IEE show that overall the project has limited and short term environmental impacts. Effective EMP implementation will ensure elimination and minimisation 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 EMP to enhance the capability of concerned EA and IA officials.

I. INTRODUCTION

A. Project Background

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 2,200 km of MDRs (ii) improving road maintenance and asset management and (iii) developing an efficient accident response system. Madhya Pradesh Road Development Corporation (MPRDC) specifically targets MDRs to form key linkage between rural, semi urban and urban areas and complete the state roads connectivity.

2. Government of Madhya Pradesh (GoMP) has been using a combination of budgetary, public-private partnership (PPP), and Asian Development Bank (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 – MDRs – has not been specifically targeted for improvement. MDRs form the key linkage between rural, semi urban and urban areas and have to be essentially developed to complete state road connectivity. In this background, GoMP has now proposed to improve the MDRs through the plan indicated in Table 1.1.

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]	**2,200**

[a] The actual estimates will depend on the assessment from the DPRs.
Source: MPRDC

3. The present report focuses on preparation of Initial Environment Examination (IEE) of **Nirtala–Mandi Bamora Raod (NMBR)** only. The main objectives are to improve the regional as well as inter and intra state transport flows and in doing so improving access to services and making the State attractive to developers and investors. To fulfil the above objectives and due considerations to environmental feasibility of above road section, IEE was carried out for this section.

B. Nature, Size and Location of the Project

4. The project activities involve widening of existing road within available right of way (ROW). The length of **Nirtala–Mandi Bamora Raod (NMBR)** is 24.9 Km long for which widening and up-gradation have been proposed. The road widening activities primarily will

comprise of raising the embankment at certain locations and its stabilization including construction of retaining wall if required especially near water bodies overlay on the existing carriageway, junction improvement, and construction of minor bridges, culvert and RCC drain in built-up section. The location of state road networks, sector roads and **Nirtala–Mandi Bamora Raod** is shown in Figure 1.

C. Purpose and Scope of the Study

5. This IEE report documents the environmental assessment of the **Nirtala–Mandi Bamora Road (NMBR)** Road Subproject and identifies the environmental issues to be considered at project planning and design stage. 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 discussed. The IEE addresses the environmental management requirements of the Government of India (GoI); (ii) the donor, ADB, and (iii) the Project. In general IEE addresses the following:

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. Suggest environmental management and monitoring plan with institutional measures for effective implementation of mitigates measures proposed and addressing grievances.

6. IEE has been prepared based on proposed alignment. It covers all activities viz. site clearance (tree cutting, shifting of utilities etc.), construction activities including material sourcing (borrowing, quarrying, and transportation) and operation (traffic movement). 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.

7. This IEE report is presented in eight chapters listed below:

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

8. The methodology for IEE has been adopted to accomplish the study in line with ADB Safeguard Policy Statement (SPS) 2009. The study was carried out using reconnaissance survey, field visits, consultation with stakeholders, review of existing data, identification of adverse impacts and preparation of EMP and post-project Environmental Monitoring Programme. The stepwise activities 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

9. Data pertaining to all facets of environment viz. physical, ecological and socioeconomic environment both through primary and secondary sources were collected. The objective of data collection was to provide a database on existing conditions that can be used for predicting the expected changes and for monitoring such changes. For preparation of IEE the key relevant information sources have been summarized in **Table 1.2**.

Table 2: Primary and Secondary Information Sources

Information	Sources
Technical information on existing road features and proposed Rehabilitation work. Inventorisation of road features; viz. water bodies community structures, environmental sensitive location areas, congested locations, etc.	MPRDC, Design Consultant, Ground physical surveys and graphics consultants
Climatic Condition	Indian Meteorological Department (IMD), ENVIS Website, NIC, primary data collection
Geology, Seismicity, Soil and Topography	Geological survey of India, SOI 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 a forestation norms etc.	Divisional Forest Office, Sagar District.
Status of Fishing Activity	District Fisheries Offices at Sagar District

Information	Sources
Air quality Noise, Soil and Water	Onsite monitoring and Analysis of Field samples Design consultant and public consultation during field visit
Borrow Areas, Quarries and other construction material source	Feasibility report, field observations
River geo-morphology, hydrology, drainage, flood patterns.	Primary Census Abstract of Sagar District 2001.
Socioeconomic Environment	Official websites maintained by state Govt., and Public Consultation during the Field survey

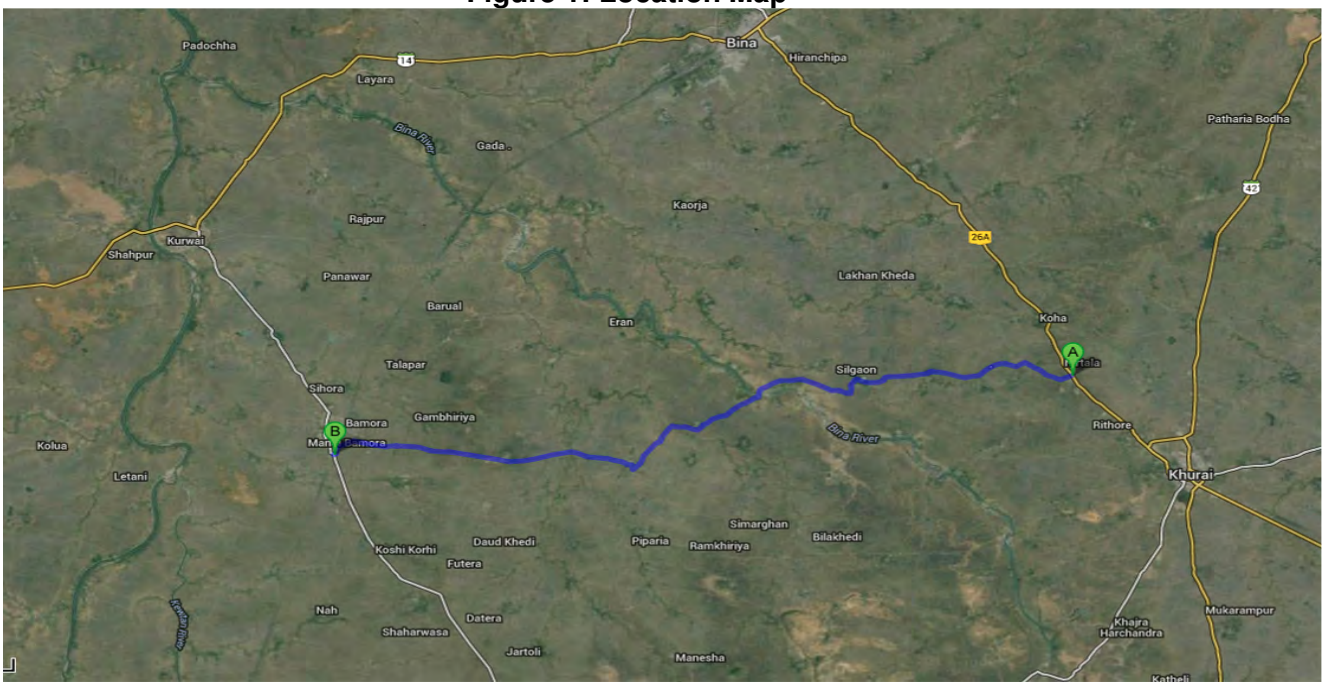
2. Public Consultation

10. Extensive consultations were held during different stages (reconnaissance, detailed design and design review) with all stakeholders that includes local and beneficiary population, government departments/agencies, road users and project-affected persons. This was done with intent to collect baseline information, for better understanding of the potential impacts and appreciate the perspectives/concerns of the stakeholders. Information gathered was used for integration in project design and formulating mitigation measures and environmental management plan. Detailed description of public consultation has been presented in Chapter 6.

E. Organizational Setting of Implementing Agency

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

Figure 1: Location Map



II. POLICY AND LEGAL FRAMEWORK

12. 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:

i. Applicability of various national and local laws and regulations at different stages of project implementations
ii. Applicability of ADB safeguards policies and categorization of the project.

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

13. The legal framework of the country consists of several acts, notifications, rules, and regulations to protect environment and wildlife. Review of Indian legal system has been carried out to identify its applicability to the project.

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	To provide guidance on environmental clearance requirements and clarification on related specific technical issues	MoEF
Memorandums(OM)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 (Amended1987) 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

Act	Objective	Responsible Institution
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
Ancient Monuments and Archaeological Sites and Remains Act (1958)	Conservation of Cultural and historical remains found in India.	Archaeological Dept. GOI
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

1. Requirement of Environmental Clearance

14. 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.

15. Since, the project road will be upgraded within existing available ROW, the above environmental impact assessment (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

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

17. Since no diversion of forestland is involved in Nirtala-Mandi Road (N-MB) Road, no forest clearance is required for this road.

3. Permission to Withdraw Ground Water

18. 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

19. For up-gradation of the project road, required clearances/ permissions related to environment has been summarized in **Table 3**.

Table 4: Permissions/Clearances Required for the Subproject

S. No	Permission/ Clearances	Acts/Notifications	Concerned agency	Responsibility
A.	**Pre-construction Stage**			
1.	Permission for falling of trees	Forest Conservation Act (1980) Procedural Guidelines developed by the Department of Environment, Government of M.P. under order of the Honorable High court, Tree removal will be guided as per state Gov Rules	District Forest Office/state Forest Department trees felling forest District Authorities non-forests areas. Compulsory tree plantation to be made at 1:3 to 1:10 as per the permission granted	MPRDC
B.	**Implementation Stage**			
2.	Consent to operate Hot Mix Plant crushers, Batching plant	Air (Prevention and Control of Pollution) Act 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 labour camps.	Water(Prevention and Control of Pollution) Act 1974	M. P. State Pollution Control Board (Before setting up of the camp)	Contractor
5.	Pollution Under Control Certificate	Central Motor and Vehicle Act 1988	Department of Transport, Govt. of M. P. authorized testing centers	Contractor
6.	Employing Labour/ workers	The Building and Other Construction Workers(Regulation of Employment and Conditions of Service) Act, 1996	District Labour Commissioner	Contractor

B. International Agreements

20. 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 the environment is closely linked to combating poverty. Key international agreements that India is signatory to and relevant for the project are provided below:

i. Convention Relative to the conservation of Flora and Fauna in their Natural State (1933)
ii. International Plan Protection Convention (1951)
iii. Convention on Wetlands of International Importance, Especially as Waterfowl Habitat (Ramsar,1971)
iv. Convention concerning the Protection of the World Cultural and Natural Heritage (Paris, 1972)
v. Convention in International Trade in Endangered Species of Wild Fauna and Flora (Washington, 1973)
vi. Convention on Migratory Species of Wild Animals (Bonn, 1979)
vii. Convention on the Prior Informed Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (PIC or Rotterdam, 1990)
viii. United Nations Framework Convention on Climate Change (Rio De Janeiro, 1992)
ix. Convention on Biological Diversity (Rio De Janeiro, 1992)
x. Protocol to the United Nations Convention on Climate Change (Kyoto, 1997)

C. Asian Development Bank Safeguard Policies

21. The Asian Development Bank has defined its Safeguard requirements under its "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. Since N-MB Road project is likely to have potential environmental risks and impacts and requires complying with the safeguard requirement of SPS and project categorization.

D. Category of the Project as per SPS

22. The project road has been evaluated considering outcome of latest ADBs Rapid Environmental Assessment Checklist (**Appendix 1**) for Roads and Highways. The N-MB Road subproject neither passes through nor is located within 10 km from any Wildlife Sanctuary, National Park, or any other environmentally sensitive or protected areas. It traverses predominantly through agricultural land and follow existing alignment. All widening is also confined to existing ROW. The majority of the activities have short-term minor, negligible, or no residual impacts. Hence, the project is categorized as Category "B" in accordance with ADB's Safeguard Policy Statement 2009.

III. PROJECT DESCRIPTION

A. Rational and Project Settings

23. The project road forms a major link Sagar District. The project road is single and the same need to be made intermediate lanes and improvement of shoulder and provision of drains. The up-gradation of the project road will improve and enhance the road conditions and usability.

It will increase travel speeds and reduce travel time. Better road conditions after up-gradation will reduce the accidents and vehicle emissions.

24. The Nirtala – Mandi Bamora road with a length of 24.9 Km starts at Km 0.00 near Nirtala and ends at Mandi Bamora at Km 24.9km. The actual length of the project road is about 24.9 Kms. It starts from Nirtala and passes through Bagthari, Sarkhedi, Silgaon,Ishawara, Rehatwas, Dhansra,Gorha and Mandi Bamora. At present, the road is in bad condition and needs up-gradation. Improvement of this road section will connect the interior rural areas and thereby bring people nearer to district headquarters.

25. The project involves widening & strengthening of existing roads within available ROW to 2-lane carriageway (7.0 m wide with 3.5 m width of each lane and 2.5m earthen shoulder either side) and intermediate lane (5.50m wide with 2.25m earthen shoulder both side). The total length of the project road is 24.9 km. This road will provide better connectivity to Nirtala to Mandi Bamora. The salient Features of the Nirtala to Mandi Bamora Road is given at **Table 5.**

Table 5: Summary Road Components and Design Standard

Road Components	
Road Length	24.9 Km length
Alignment	Follow the exits road alignment. All construction even for approach to new bridge is within existing ROW.
Flyovers/overpasses/ROB	There is no flyovers/overpasses/ ROB in the alignment.
Major Bridges	01 Major Bridges
Other Structures	02 minor bridges & 23 culverts (Replacement of existing structures wherever required, provision of new structure alongside existing structures wherever required)
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 2.5H: 1V. Construction of embankment of height more than 3.0 m, using borrow soil is recommended. However, high embankment has been restricted within ROW providing returning walls
Vertical Controls	Grade break of 0.5%, vertical curves will be provided. Length of vertical curve will be restricted to minimum 60 M
Cross-Section Elements	Carriage way: 7 m, 5.50m, Cross fall will be 2.5%. for pavement and 3 % for earthen Shoulder
Speed	80Km/hr / Permissible 50Km/hr
Horizontal Controls	As per IRC: 38 / IRC SP-48, Maximum value of 5% for super elevation and 15% for side friction factor, the minimum radius for horizontal curves 15 m. Design Speed: 20 km/h
Structural design standards	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.

Source: Detailed Project Report, 2014

B. Characteristics of the Existing Road

26. The entire length of the project road runs through plain terrain and passing across several agricultural land, villages, and towns. The pavement is of flexible bituminous for the whole stretch and the visually observed condition of the pavement is fair to poor. The existing carriageway is generally 5.0 m to 7.0m with bituminous pavement. The condition of the project road is generally poor to average. The carriageway is mostly of bituminous type, except at few sections in submergence areas where rigid pavement is noticed. The section of the road has granular shoulder of fair condition with width varying 1.0 m to 1.5 m. **Table 6** presents a summary of the road configuration.

Table 6: Existing Road Configuration and Condition

Sr. No.	Design Chainage (Km.)		Length	Villages/Town
	From	To		
1	2	3	4	5
1	00+00	00+500	500	Nirtala
2	6+900	7+400	500	Silpura
3	9+000	9+500	500	Silgaon
4	10+000	10+400	400	Mudemal
5	12+000	12+400	400	Rehtwas
6	15+000	15+800	800	Dhansra
7	21+800	22+500	700	Gorha
8	24+000	24+700	700	Mandi
9	24+700	25+000	300	Bamora

Source: Detailed Project Report, 2014

C. Current and Projected Daily Traffic

27. The current traffic is thin on this road, which is expected to rise substantially once better road, and connectivity is provided. The current and projected average daily traffic on the project road is given current traffic is thin on this road, which is expected to increase substantially once better road, and connectivity is provided. The current average daily traffic on the project road is given in **Table 7, 8, and 9.**

Table 7: Average Daily Traffic

Sr. No.	Survey Location	Fast Moving Vehicles	Slow Moving Vehicles	Total Veh/day	Total PCUs/ day
1	Bagthari Village at 1.5 km	986	115	1101	2030

Table 8: Average Daily Traffic (ADT) at Count Location

Count Station	Car/ Jeep/ Vans	Two Wheeler	Three Wheeler	Mini Bus	Bus	Tempo/ L.C.V.	2-Axle	3-Axle	Multi Axle	Tractor	Tractor with Trailor	Cycle	Cycle-Rickshaw	Hand Cart	Animal Drawn	Total All Vehicles	PCUs
Bagthari Village at 1.5km	197	325	10	10	30	49	30	10	1	102	222	115	0	0	0	1101	2030

Source: Detailed Project Report, 2014

Table 9: Projected Traffic (AADT)

Year	Car	TW	Three Wheeler	Mini Bus	Bus	LCV	2A	3A	MA	Tractor	Tractor wt Trolley	Total Fast Moving Vehicles	Cycle	Cyc Ric	Hand Cart	Animal Cart	Total Slow Moving Vehicles	PCU
PCU Factor	1	0.5	0.5	1.5	3	1.5	3	3	4.5	3	4.5		0.5	2	2	6		
Traffic Growth	**7.50%**	**7.50%**	**7.50%**	**7.50%**	**7.50%**	**7.50%**	**7.50%**	**7.50%**	**7.50%**	**7.50%**	**7.50%**		**3%**	**3%**	**3%**	**3%**		
Location 1 AADT	**197**	**325**	**10**	**10**	**30**	**49**	**30**	**10**	**1**	**102**	**222**	986	**115**	**0**	**0**	**0**	115	**2030**
2014	197	325	10	10	30	49	30	10	1	102	222	986	115	0	0	0	115	**2030**
2015	212	349	11	11	32	53	32	11	1	110	239	1060	118	0	0	0	118	**2180**
2016	228	376	12	12	35	57	35	12	1	118	257	1139	122	0	0	0	122	**2340**
10% increase Due to Diverted/Generated traffic																		
2017	250	413	13	13	38	62	38	13	1	130	282	1253	134	0	0	0	134	**2575**
2018	269	444	14	14	41	67	41	14	1	139	303	1347	138	0	0	0	138	**2765**
2019	289	477	15	15	44	72	44	15	1	150	326	1448	142	0	0	0	142	**2969**
2020	311	513	16	16	47	77	47	16	2	161	351	1557	147	0	0	0	147	**3188**
2021	334	552	17	17	51	83	51	17	2	173	377	1674	151	0	0	0	151	**3424**
2022	360	593	18	18	55	89	55	18	2	186	405	1799	156	0	0	0	156	**3678**
2023	386	638	20	20	59	96	59	20	2	200	436	1934	160	0	0	0	160	**3950**
2024	415	685	21	21	63	103	63	21	2	215	468	2079	165	0	0	0	165	**4242**
2025	447	737	23	23	68	111	68	23	2	231	503	2235	170	0	0	0	170	**4557**
2026	480	792	24	24	73	119	73	24	2	249	541	2403	175	0	0	0	175	**4895**
2027	516	851	26	26	79	128	79	26	3	267	582	2583	180	0	0	0	180	**5258**
2028	555	915	28	28	84	138	84	28	3	287	625	2777	186	0	0	0	186	**5648**
2029	596	984	30	30	91	148	91	30	3	309	672	2985	191	0	0	0	191	**6068**
2030	641	1058	33	33	98	159	98	33	3	332	723	3209	197	0	0	0	197	**6519**
2031	689	1137	35	35	105	171	105	35	3	357	777	3450	203	0	0	0	203	**7003**
2032	741	1222	38	38	113	184	113	38	4	384	835	3709	209	0	0	0	209	**7524**
2033	797	1314	40	40	121	198	121	40	4	412	898	3987	215	0	0	0	215	**8083**
2034	856	1413	43	43	130	213	130	43	4	443	965	4286	222	0	0	0	222	**8685**
2035	921	1519	47	47	140	229	140	47	5	477	1037	4607	228	0	0	0	228	**9331**

D. Proposed Improvement

1. Alignment and Geometry

28. The entire length of the project road runs through plain terrain cutting across several agricultural land, villages and towns and the existing horizontal alignment has number of sub-standard curves which qualifies for improvement based on IRC guidelines. However these curves shall be improved following the adopted standards to the extent possible within the available ROW. Besides, the horizontal geometric design has been envisaged for maximum usage of exiting pavement in rural stretches. Vertical Alignment has been designed with respective existing road conditions.

Table 10: Existing Carriageway and Shoulder

From Km	To Km	Name of Village/ Town	Formation Width (m)	CARRIAGEWAY			SHOULDER*		
				Type* (BT/CC/ GR/ER)	Width (m)	Condi-tion** (G/F/P/ VP)	Type* (BT/CC/ GR/ER)	Width (m)	Condi-tion** (G/F/P/ VP)
0+000	**1+000**	NIRTALA	-	GR	10.0	-	GR	-	-
1+000	**2+000**	-	-	CC	3.15	-	CC	-	F
2+000	**3+000**	-	-	BT	3.5	-	GR	-	VP
3+000	**4+000**	-	5.5	BT	5.5	-	GR	1.0	-
4+000	**5+000**	-	5.5	BT	5.5	-	GR	1.0	F
5+000	**6+000**	SILPURA	5.5	BT	5.5	-	GR	1.0	F
6+000	**7+000**	-	5.5	BT	5.5	-	GR	1.0	F
7+000	**8+000**	SILGAON	5.5	BT	5.5	-	GR	1.0	F
8+000	**9+000**	-	5.5	CC	5.5	-	GR	1.0	F
9+000	**10+000**	MUDEMAL	7.5	BT	5.0	-	GR	1.5	F
10+000	**11+000**	-	5.5	BT	5.5	-	GR	1.0	F
11+000	**12+000**	-	5.5	BT	5.5	-	GR	1.0	-
12+000	**13+000**	-	5.5	BT	5.5	-	GR	1.0	F
13+000	**14+000**	Rehtwas	5.5	BT	5.5	-	GR	1.0	G
14+000	**15+000**	-	5.5	BT	5.5	-	GR	1.0	G
15+000	**16+000**	Dhansra	5.5	BT	5.5	-	GR	1.0	G
16+000	**17+000**		5.5	BT	5.5	-	GR	1.0	G
17+000	**18+000**	-	5.5	BT	5.5	-	GR	1.0	G
18+000	**19+000**	-	5.5	BT	5.5	-	GR	1.0	G
19+000	**20+000**	-	5.5	BT	5.5	-	GR	1.0	G
20+000	**21+000**	-	5.5	BT	5.5	-	GR	1.0	F
21+000	**22+000**	Gorha	5.5	BT	5.5	-	GR	1.0	-
22+000	**23+000**	-	5.5	BT	5.5	-	GR	1.0	-
23+000	**24+000**	Mandi	5.5	BT	5.5	-	GR	1.0	-
24+000	**25+000**	Bamora	5.5	BT	5.5	-	GR	1.0	-

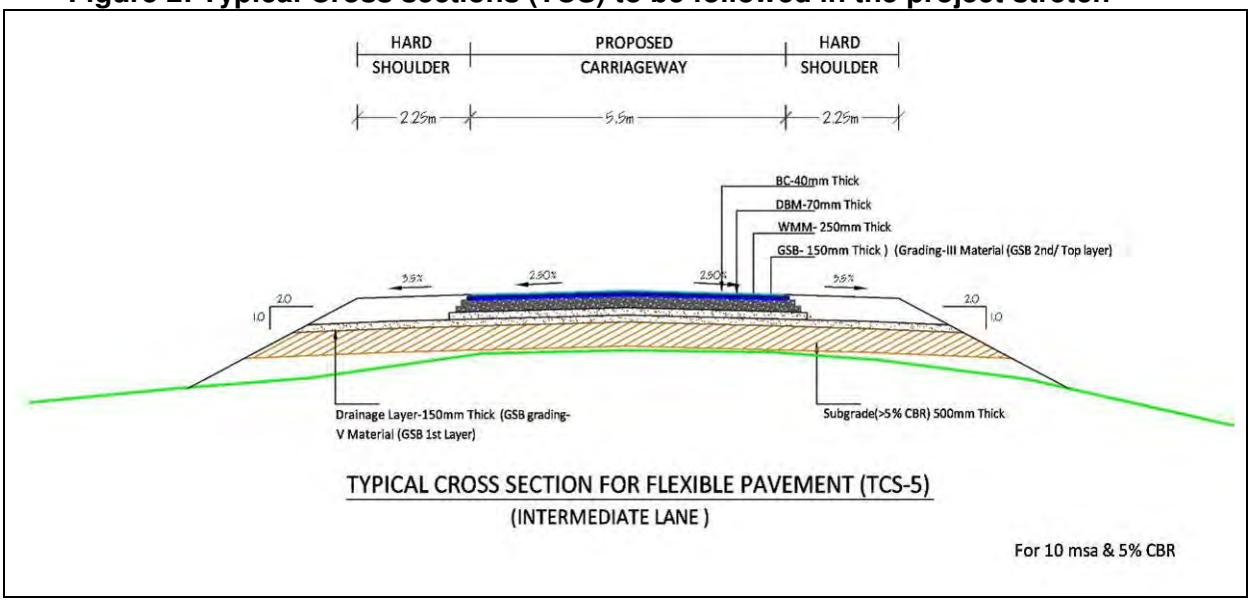
2. Proposed ROW

29. As the up-gradation/rehabilitation of the project road have been envisaged within the available. The ROW is available more than the required minimum ROW of 12m throughout the road alignment. The existing ROW is largely 24m in rural stretches and about 20-22m in built-up areas.

3. Cross Sectional Details

30. The proposed road will contain 1.5-lane standard carriageway width of 5.5m with earthen shoulder of 2.2m width either side. Median is provided in 4 lane section only for the project road. In built-up stretches where considerable commercial activity is noticed, 1.0m wide footpath is proposed on both sides. The side drain in such stretches will be accommodated under the footpath. Minimum width of utility corridor will be 2.0m. The provision of retaining wall is made where water pond is located next to road to minimize the requirement of ROW as well impact on water pond. The typical cross section (TCS) in built-up area, rural areas, near water pond locations, and high embankment locations are shown in **Figure 2.**

Figure 2: Typical Cross sections (TCS) to be followed in the project stretch



Source: Detailed Project Report for the Project Road, 2014

4. Widening Scheme

31. The widening is largely proposed to be concentric. However, widening is made right or left aligned as well depending on the availability of land and location of any religious/socially sensitive structures. Proposed reconstruction is either overlaying from minimum sub grade level after dismantling the existing blacktop. The existing pavement crust is in poor condition in some stretches, ponding of water was observed frequently.

5. Pavement Design

32. Pavement composition thickness for up gradation of flexible road pavement varies in different sections and it is given at **Table 11.**

Table 11: Proposed Crust Thickness for Existing Lane

Homogeneous Section	**Nirtal – Mandi Bamora (MDR) (Km 0.0 – Km 24.9) for flexible pavement**	
Design Period	10 Year	15 Year
ESAL (million)	1.30	2.39
Deign MSA	10	
Design CBR (%)	5	
BC (mm)	40	-

Homogeneous Section	Nirtal – Mandi Bamora (MDR) (Km 0.0 – Km 24.9) for flexible pavement	
Dense Bituminous Macadam (mm)	70	-
Wet Mix Macadam (mm)	-	250
Granular Sub-base (mm)	-	300
Sub grade (mm)	-	500

Source: Detailed Project Report, 2014

6. Junctions Design

33. There is 02 major and 11 minor existing junctions throughout the length of the road. Crossroads with paved carriageway are only considered for development of the junction

34. Major and minor junction improvements are kept at Grade as per the standard specification (IRC SP: 41:1994 - Guidelines on Design of At-Grade Intersections in Rural and Urban Roads).

Table 12: Major Junction Details

Sr. No.	Existing Chainage (Km)	Major/ Minor	Destination		Type of Junction	Surface Type	Width (m)
			Left	Right			
1	3	4	5	6	7	8	9
1	0.000	Major	Sagar	Bina	T	BT	3.5
2	24.840	Major	Ganj Basoda	Mandi Bamora	T	BT	5

Table 13: Minor Junction Details

Sr. No.	Existing Chainage (Km)	Major/ Mino	Destination		Type of Junction	Surface Type	Width (m)
			Left	Right			
1	3	4	5	6	7	8	9
1	0.400	Minor	Nirtala	-	T	GR	3.5
2	1.570	Minor		Bagthari	T	GR	3
3	1.830	Minor	Bagthari		T	GR	3
4	6.650	Minor		Lakhankheda	T	GR	3
5	7.480	Minor	Silapur		T	GR	3
6	9.100	Minor		Isharwara	T	GR	3
7	9.880	Minor		Odhomadh	T	BT	3
8	11.220	Minor		Bhapson	T	GR	3
9	15.440	Minor	Sanai		T	BT	3
10	15.610	Minor		Eran	T	BT	3
11	17.650	Minor		Satni	T	GR	3

7. Improvement of Bridges

35. There is 03 ROB, 01 major and 02 minor bridges throughout the road alignment details of existing bridges with nature of improvement on the project road are given in **Table 12 and Table 13.**

Table 14: Summary of Existing Bridges and CD Works

Type of Structure	Major Bridges	Minor Bridges	Vented Causeway	Slab culvert	Hume Pipe Culvert
Existing Structure 26 Nos.	01	02	01	0	22

Table 15: Improvement of Existing Bridge on the Project Road

Sr. No.	Existing chainage by survey (KM)	Existing chainage by survey (M)	Details of Existing Structures			
			Type of Structure Existing	Opening	Width of Structure	Condition of Structure
1	2	3	4	5	6	7
1	11/4	10360	SLAB	20s@8.5m	8.45	Good
2	14/6	13600	SLAB	2s@6.3m	8.4	Good
3	18/6	17510	SLAB	3s@8.85	8.5	Fair

Source: Detailed Project Report, 2014

8. Culverts

36. In the project road, 09 culverts will be retained, 05 new culverts and 12 culverts will be reconstructed in the project road. The summary of development of culverts showed in (**Table 11**).

Table 16: Summary of Development of Culverts

Improvement proposed	Type of Structure					Remarks
	Pipe Culvert	Slab/ Box Culvert	Minor Bridges	Major Bridges	Vented causeway	
Widening + Repair & Strengthening					-	
Retained with Repair and strength	9		2	1	-	
Reconstruction	12				-	
New Construction	5				-	
Existing Causeway reconstructed as culvert/ Slab Culvert					-	
Existing slab culvert is reconstructed as Pipe Culvert	-	-	-	-	-	
Existing Pipe Culvert is reconstructed as Slab Culvert	-	1	-	-	-	
Existing Minor is reconstructed as Major bridge	-	-	-	-	-	

Improvement proposed	Type of Structure					Remarks
	Pipe Culvert	Slab/ Box Culvert	Minor Bridges	Major Bridges	Vented causeway	
Existing Causeway is reconstructed as Minor bridge	-	-	1	-	-	
Total	26	1	3	1	0	
Grand Total				**31**		

Source: Detailed Project Report, 2014

9. Roadside Drainage

37. Based on the hydraulic study and site conditions unlined drains are proposed in the rural section, RCC rectangular drains are proposed in the built-up section and hut drains are proposed in the high embankment section.

10. Road Furniture and other Features

38. The road furniture, traffic safety features and other facilities included in the design are as given below:

i. **Road Markings**: Road markings perform the important function of guiding and controlling traffic on a highway. The markings serve as psychological barriers and signify the delineation of traffic paths and their lateral clearance from traffic hazards for safe movement of traffic. Road markings are therefore essential to ensure smooth and orderly flow of traffic and to promote road safety. The Code of Practice for Road Markings, IRC: 35-1997 has been used in the study as the design basis. The location and type of marking lines, material and colour is followed using IRC: 35-1997 – "Code of Practice for Road Markings". The road markings were carefully planned on carriageways, intersections and bridge locations.

ii. **Cautionary, Mandatory and Informatory Signs:** Cautionary, mandatory and informatory signs have been provided depending on the situation and function they perform in accordance with the IRC: 67-2001 guidelines for Road Signs.

iii. **Crash Barrier:** Metal Beam Crash Barrier is proposed at locations where the embankment height is more than 3.0m, at horizontal curves of radius less than 161m and also at major bridge approaches.

iv. **Road Humps and Rumble Strips:** The Road Humps are formed by providing rounded hump of 3.7m width (17m radius) and 0.10m height for the preferred advisory crossing speed of 25 kmph for general traffic as per the IRC: 99–1988 guidelines. The basic material for construction is bituminous concrete formed to required shape. Road humps are located at T-intersections (and cross road intersections) on minor roads or perpendicular arms about 25 m away from the inner edge of the carriageway. Proper signs boards and markings are provided to advise the drivers in advance of the situation. Road humps are extended across carriageway up to the edge of paved shoulder. Rumble Strips are formed by a sequence of transverse strips laid across a carriageway. Maximum permitted height

of 15mm, provided no vertical face exceeds 6mm. These rumble device produce audible and vibratory effects to alert drivers to take greater care and do not normally reduce traffic speeds in themselves. Proper signboards and marking are proposed to advise the drivers in advance of the situation.

E. Borrow and Quarry Materials Sourcing

39. Potential sources of earth for the construction of embankment and subgrade have been identified on either side of NMB Road. The borrow earth, sand and quarry material will be sourced locally within a distance of about 25-30 Km from the road. (Guidelines for Borrow Area Management are given in **Appendix 2**)

Table 17: Borrow Soil and Aggregate Source

Type of Material	Location	Side	Approximate Lead distance (km)
Borrow Soil (Sub-grade)	Km 7.8-L/S-1 km away from road	LHS	1
	Km 10.5-L/S-1km away from road	LHS	1
	Km 22.4-1.5km away from road	LHS	1.5
Aggregate	Km 0-12 km away from road (Jagdishpur Village)	RHS	0

F. Water for Construction

40. Water for construction of the project road will be taken from ground water and surface water sources after obtaining necessary permissions. No public water sources will be used for road construction.

G. Construction Camps

41. One construction camp shall be set up by the contractor at a suitable location along the project corridor which will be set up in consultation with the Project Director and M. P. State Pollution Control Board.

H. Construction Schedule

42. The road up-gradation work is planned to be completed within 18 months from the construction start date.

IV. DESCRIPTION OF THE ENVIRONMENT

A. Introduction

43. 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 analyzed 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 NMB Road is presented in the following sections.

B. Physical Environment

1. Topography, Geology & Soil

44. 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. “Madhya Pradesh” by virtue of its geographical location can be termed as “Heart of India”. The project roads starts from 00.00km at Nirtala Village at T-Junction at Sagar-Bina (NH-26) Road (24°4'28.97"N Latitude, 78°17'45.39"E Longitude and ends at T-Junction of Kurwai-Pathari at Mandi Bamora Road at Km 24.9 and Latitude 24° 3'14.06"N, 78°5'17.09"E Longitude). Nirtala–Mandi Bamora road (“The Project Road”) is situated in Central part of Madhya Pradesh State having a total length of 24.9Km.

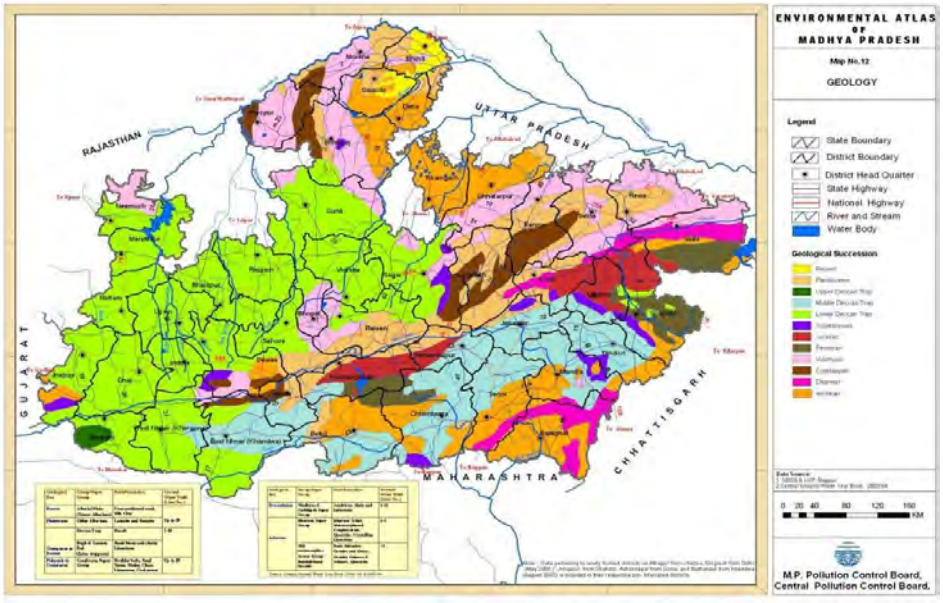
45. The soils of state are rich and fertile. The state has a variety of soils ranging from rich clayey to gravely. The major groups of soils found in the state can be divided into the following four categories i.e., alluvial, medium & deep black; shallow & medium black; and mixed red & black. Categorically, the state has two agro-climatic zones namely (i) Central Plateau & Hill Region and (ii) Western Plateau & Hill Region. These two zones have been further sub-grouped and the description regarding area and its soil & geological features is given in Table 4.1 below:

Table 18: Geological Features of the State

Zones	Sub-group (Region)	District covered	Rainfall (mm)	Climate	Type of Soil
Central Plateau and Hill Region	1. Bundelkhand	Chatterpur, Datia, Tikamgarh	700	Dry sub humid	Mixed red & Black
	2. Madhya Pradesh Hills	Mandla, Dindori	1570	Moist sub humid	Red & Yellow
	3. Keymore Plateau &Satpura Hills	Jabalpur, Panna, Satna, Rewa, Sidhi, Seoni, Katni, Balaghat, Shahdol, Anooppur, Umariya	1100	Dry sub humid	Medium Black
	4. Vindhya Plateau	Bhopal, Damoh, Raisen, Sagar, Sehore, Vidisha	1130	Dry sub humid	Shallow to Medium Black
	5. Satpura Plateau	Betul, Chhindwara, Narsinghpur	1220	Dry subhumid	Shallow to Medium Black
	6. Central Narmada Valley	Hosangabad, Harda	1300	Dry subhumid	Deep Black
	7. Gird	Morena, Bhind, Gwalior, Guna, Shivpuri, Ashoknagar, Sheopur	670	Semi-arid	Medium Black alluvial
Western Plateau and Hill Region	8. Jhabua Hills	Jhabua	988	Semi-arid	Medium to deep black
	9. Malwa&Nimar Plateau	Indore, Dhar, Ujjain, Ratlam, Dewas, Mandsaur, Rajgarh, Shajapur, Khandwa, Khargone, Neemuch, Badwani, Burhanpur	874	Semi-arid	Medium to deep black

Figure 3 and Table 19 show the geological and soil map of MP.

Figure 3: Geological Map of Madhya Pradesh



46. The proposed project road between Nirtala-Mandi Bamora situated on the Central plateau & hill region agro climate zone and forms Vindhya Plateau. The soil type in the area is mainly shallow to Medium Black. The soil samples have also been collected from villages Silgaon and Dhansara along the project corridor and results are presented in Table 4.2.

Table 19: Soil Quality along the Project Road

Sr. No.	Parameters	Unit	Silgaon	Dhansara
1	Moisture	%	5.21	4.31
2	Nitrogen as N	%	25.2	21.37
3	Potassium as K	%	10.3	11.5
4	Phosphorus as P	%	26.3	21.45

47. The results shows available N P K Status of soils has medium Nitrogen level, low in Phosphorous and high in Potassium.

Figure 4: Soil Map of MP

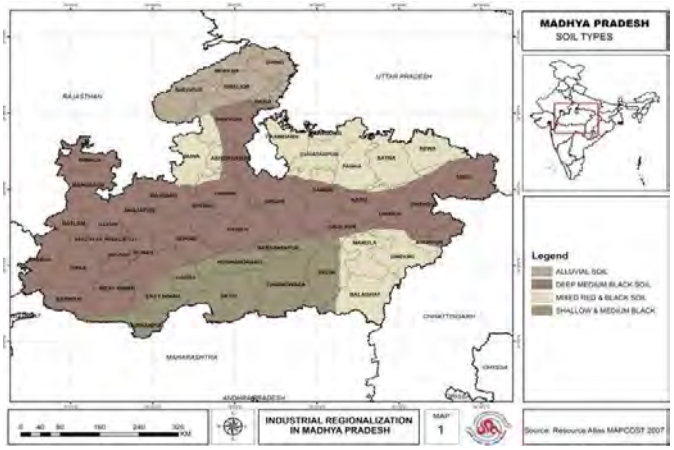
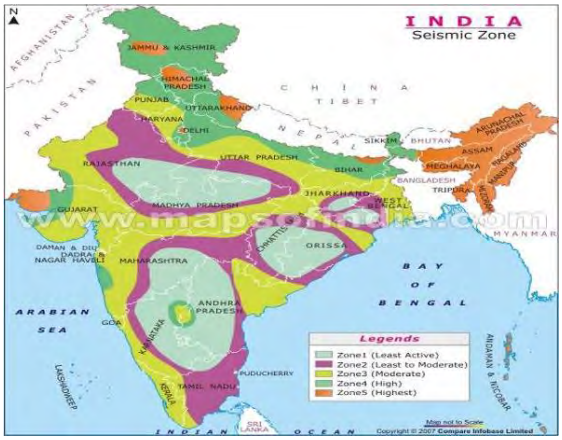


Figure 5: Seismic Zone Map of India



Source: ISI893(Part1)2002

2. Seismicity:

48. Madhya Pradesh falls under zone least active to moderate zone as per seismic map of India. The Figure 4.3 shows seismic Zone map of India

3. Climate:

49. The climate of Sagar district can be classified mainly into three season. Winter season starts from middle of November to end of February. March to May constitute summer season and the monsoon season starts from second week of June to end of September. During winter season the January is the coldest months with the temperature falling as low as 11.20g C and max up to 24.50C. During the month of May, temperature goes up to 40.60 C (max.).

Table 20: Average Temperature in Sagar District

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max Temperature °C (°F)	24.5 (76.1)	26.7 (80.1)	32.2 (90)	37.8 (100)	40.6 (105.1)	37.2 (99)	30.2 (86.4)	28.6 (83.5)	30.4 (86.7)	31.6 (88.9)	28.7 (83.7)	25.1 (77.2)	31.1 (88)
Average Temperature °C (°F)	17.9 (64.2)	19.9 (67.8)	25.3 (77.5)	30.6 (87.1)	33.5 (92.3)	31.4 (88.5)	26.7 (80.1)	25.6 (78.1)	26.3 (79.3)	25.9 (78.6)	22.4 (72.3)	18.8 (65.8)	25.4 (77.7)
Average Min Temperature °C (°F)	11.2 (52.2)	13 (55.4)	18.3 (64.9)	23.3 (73.9)	26.3 (79.3)	25.4 (77.7)	23.2 (73.8)	22.5 (72.5)	22.1 (71.8)	20.2 (68.4)	16 (60.8)	12.5 (54.5)	19.5 (67.1)

Source: http://www.sagar.climatemps.com/temperatures.php (@2009-2014. climatemps.com)

50. The average annual rainfall for the state is 1160 mm. Rainfall is heaviest in the south-eastern parts of the state and it decreases as one move towards the north-west. Balaghat in the south receives the maximum rains; where average rainfall is above 1600mm. The other southern districts of Mandla, Dindori and Anuppur receive between 1200-1400mm of rain. The rainfall drops to the 1000-1200mm as one move further north and west. Western districts in MP including most of those in the Malwa plateau and Sheopur and Shivpuri in the north receives 800-1000mm of rain. Average annual rainfall is below 800 mm in the south-western tip of the state, including southern half of Jhabua and western half of Barwani district. The rainfall is below 800mm in the districts lying in the north most part of the state including Morena, Datia, Gwalior and Bhind. Most of the rainfall

in the state is received from the south-west monsoon during June to September. In Sagar that falls under Bundelkhand agroclimatic zone, average rainfall ranges between 800 to 1400 mm. (Source: Madhya Pradesh State Action Plan on Climatic Change, 2012).

4. Surface and Ground Water Hydrology

a. Surface Water Hydrology

51. The project area crosses a number of tributaries, streams, canal and nallahs. With the increase in the paved area, the surface runoff shall increase; thereby affecting the local drainage of the region Since Soil erosion is associated with concentrated flow of water, it is imperative to prevent any increased diversion of runoff into the drainage channels.

52. The project passes through the Bina river and small rivers tributaries. There are 01 major bridge, 02 minor bridges, 22 Hume pipe culverts and 01 vented causeway on the project road.

53. The details of water bodies located along the project road are given in Table 21.

Table 21: Water Bodies on the Road

Sr. No.	Chainage in (km)	Distance from CL	L/R/C	Type HP/WELL/ Crossing
1	1+040	9	R	Well
2	1+840	3.6	L	HP
3	4+380	7.7	L	HP
4	4+580	11.3	L	Well
5	4+750	9.3	R	HP
6	4+750	13.4	L	Well
7	4+765	23	L	HP
8	6+820	9.8	R	HP
9	9+100	6.4	R	HP
10	9+880	6.5	L	HP
11	10+400		C	RIVER CROSSING
12	12+130	7.4	L	HP
13	13+600		C	SMALL RIVER
14	13+980	5.9	R	HP
15	15+620	7.6	R	HP
16	15+730	4.3	L	HP
17	15+915	6.4	L	HP
18	17+510		C	SMALL RIVER
19	19+670	13.3	L	HP
20	24+540	6.6	R	HP

No hand pumps will be shifted

b. Ground Water Hydrology

54. Ground water is the major water source in the area for drinking purpose. The source of recharging of ground water is mostly from precipitation (rainfall) & canals. Hand pumps are commonly used to draw the water from ground in the villages. Static water levels vary along the stretch of project road. First or upper ground water aquifer lies in the range of 10 to 15m below ground level (bgl). The ground water levels in the area show a decline of 1.0 m to 1.2 m from post monsoon to pre monsoon period.

5. Water Quality

55. Water quality along the project road has been analyzed for assessing the water environment and to evaluate anticipated impact of the project road. Ground and surface water sources along the road alignment were examined for physico-chemical characteristics. The samples were collected and analyzed as per the procedures specified in 'Standard Methods for the Examination of Water and Wastewater' published by American Public Health Association (APHA). These water samples were taken as grab samples and were analyzed for various parameters and compared with the standards for drinking water as per IS:10500. Ground water samples were collected from most commonly used hand pumps along the project road. Analysis results for ground water samples are given in **Table 22.**

Table 22: Water Quality in the Project Road Area

Sr. No.	Parameter	Unit	Method No.	Requirement as per IS-10500-2012		Bina River, Near Village Silgaon	HP, Village Rehtwas, km 12.5
				Desirable Limit	Permissible Limit		
1	pH	-	4500	6.5-8.5	No relaxation	7.89	7.44
2	Turbidity	NTU	2130	5	10	4.1	3.4
3	Conductivity	µmhos/cm	2510	-	-	442	335
4	Alkalinity	mg/lit	2320	200	600	149	134
5	Total Dissolved Solid	mg/lit	2540	500	2000	617	578
6	Total Hardbess as CaCO3	mg/lit	2340	300	600	228	179
7	Ca Hardness as CaCO3	mg/lit	3500	-	-	99	86
8	Mg Hardness as CaCO3	mg/lit	2340	-	-	92	112
9	Chlorides as Cl	mg/lit	4500	250	1000	221	139
10	Sulphates as SO4	mg/lit	4500	200	400	213	127.84
11	Iron as Fe	mg/lit	3500	0.3	1	0.21	0.18
12	Nitrates as NO3	mg/lit	4500	45	100	33.48	17.32
13	Fluorides as F	mg/lit	4500	1.0	1.5	0.87	0.98
14	Phosphates as P	mg/lit	3500	-	-	0.36	0.24
15	Coliforms	No per 100 ml	IS:15185	Absent	10	<2	<2

56. The water quality meets the permissible limit of water quality as per IS: 10500 except for bacteriological parameters in surface water.

6. Ambient Air Quality

57. Ambient air quality with respect to area along the project road form baseline information. The study area represents mostly rural/residential environment. The sources of air pollution in the region are vehicular traffic; dust arising from unpaved road and domestic fuel burning. The prime objective of the baseline air quality study is to establish the existing ambient air quality along the

project road. This will also be useful for assessing the conformity to standards of the ambient air quality specified by CPCB due to the construction and operation of the project road. The baseline status of the ambient air quality has been established through a scientifically designed ambient air quality monitoring network. The Ambient Air Quality (AAQ) has been monitored at 2 locations (Sarkhedi and Dhansara) along the project road for Particulate Matter ($PM_{2.5}$), Particulate Matter (PM_{10}),Sulphur Dioxide (SO_2), Oxides of Nitrogen (NO_X); and Carbon monoxides (CO) using standard analysis technique (**Table 23**).

Table 23: Techniques Used for Ambient Air Quality Monitoring

Sl. No	Parameter	Technique	Minimum Detectable Limit (g/m^3)
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

58. Ambient air quality monitoring results for $PM_{2.5}$, PM_{10}, SO_2, NOx and CO concentrations are given in **Table 4.6** and summarised 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.

i. **$PM_{2.5}$**: The mean $PM_{2.5}$concentration at ambient air quality monitoring locations varies from **24 to 31** $\mu g/m^3$.

ii. **PM_{10}: The** mean PM_{10}concentration at ambient air quality monitoring locations varies from 62 to 68 $\mu g/m^3$. The values are within the permissible limit at all the stations.

iii. **SO_2:** The mean concentrations of SO_2at all ambient air quality monitoring locations varies from 8 to 10 $\mu g/m^3$. The values are within the permissible limit at all the stations.

iv. **NOx:** The mean concentrations of NOx at all AAQM locations range from 13 to 15 $\mu g/m^3$. The values are within the permissible limit at all the stations.

v. **CO:** The mean concentrations of CO at all AAQM locations range from 796 to 823 $\mu g/m^3$. The values are within the permissible limit at all the stations.

Table 24: Ambient Air Quality Along the Project Road

Locations	Period	PM2.5	PM10	SO_2	NO_x	CO
		ug/m^3	ug/m^3	ug/m^3	ug/m^3	ug/m^3
A. Prescribed Standard		**60**	**100**	**80**	**80**	**2000**
B. Monitored Results						
Sarkhedi Village at km 4.4	July 2014	31	68	10	15	823
Dhansara Village at 1km 15.8	July 2014	24	62	8	13	796

Source: Field Monitoring

7. Noise Measurements

59. During the study period, 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. On the spot measurement device manufactured by Cygnet[4] was used and day and night Noise level measures. Day and night-time Leq have been calculated from hourly Leq values and compared with the stipulated standards. **Table 25** gives the day and night-time Leq noise levels.

60. Measured Leq noise levels are within the limit stipulated for residential area at all the locations except at Dabra which may exceed in day time due to various commercial activities along the project road.

Table 25: Day and Night Time Leq in the Area

Locations	Day Time	Night Time	Prescribed Standards dB(A)	
	dB(A)	dB(A)	Day Time	Night Time
Sarkhedi Village at km 4.4	49.1	40.1	55	45
Dhansara Village at 1km 15.8	47.6	41.7	55	45

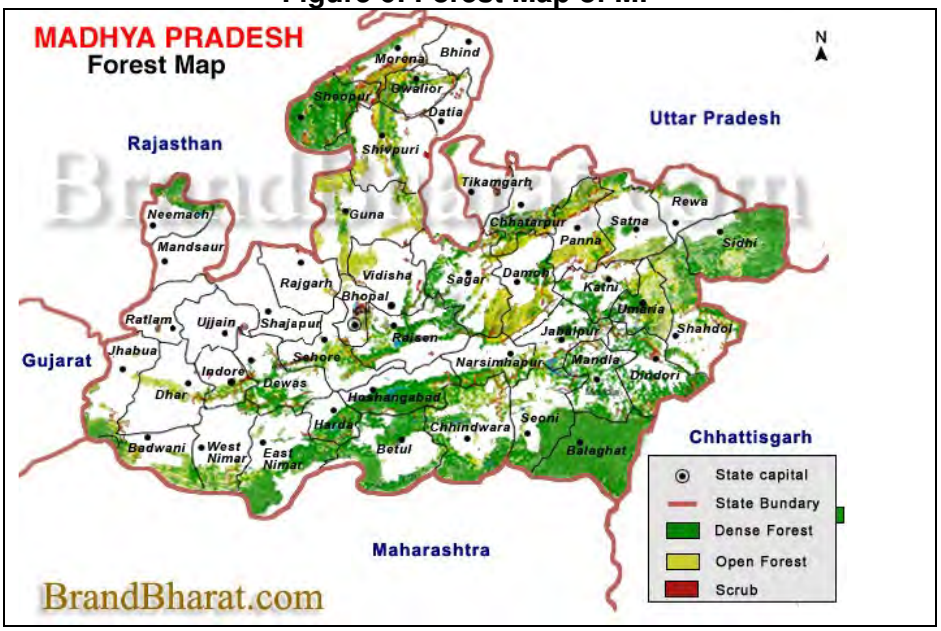
Source: Field monitoring July 2014

C. Ecological Resources

1. Forest

61. There is no forest land involved in the project road.

Figure 6: Forest Map of MP



2. Trees along the Project Road

62. Trees exist within the ROW and some of them are likely to be cut during up-gradation of the project road. Approximately 251 trees are within ROW of project road and only 193 trees need to be cut for up-gradation of the project road.(Table 4.8 & 4.9) The commonly found tree species in the area along the road are Babul (*Acacia nilotica*), Neem (*Azadirachitaindica*), Palas (*Buteamonosperma*), Aam (*Mengiferaindica*), Pipal (*Ficusreligiosa*), etc. are found in abundance.

Table 26: Details of Tree Inventory List

Sr. No.	Chainage (Km)	Distance from Road Center	Local Name of Tree	Botanical Name of tree	Grith size of tree *(1.37m above G.L.)	Numbers marked in field	Remark
1	150	5	SEESAM	*Dalbergiasissoo*	G2	1	R
2	1200	7.8	JAMUN	*Syzygium cumini*	G1	1	L
3	1440	6.8	BABUL	*Acacia nilotica*	G1	2	R
4	1440	1.5	BABUL	*Acacia nilotica*	G1	1	L
5	1480	3.2	BABUL	*Acacia nilotica*	G1	1	L
6	1850	6.4	BABUL	*Acacia nilotica*	G1	3	R
7	1880	5.2	BABUL	*Acacia nilotica*	G1	1	R
8	1890	17.7	BABUL	*Acacia nilotica*	G1	1	L
9	2210	8	BABUL	*Acacia nilotica*	G1	1	L
10	2280	3.6	BABUL	*Acacia nilotica*	G1	1	L
11	2400	8	BABUL	*Acacia nilotica*	G1	1	R
12	2500	3.7	BABUL	*Acacia nilotica*	G1	1	L
13	2560	3.4	BABUL	*Acacia nilotica*	G1	1	R
14	2780	3.6	BABUL	*Acacia nilotica*	G1	1	L
15	2880	4.9	BABUL	*Acacia nilotica*	G1	1	R
16	3330	4.5	BABUL	*Acacia nilotica*	G1	1	L
17	3640	6.4	BABUL	*Acacia nilotica*	G1	1	R
18	3650	3.2	JAMUN	*Syzygium cumini*	G1	1	R
19	3660	3.1	BABUL	*Acacia nilotica*	G1	1	R
20	3660	3.4	BABUL	*Acacia nilotica*	G1	1	L
21	3660	2.4	SEMAR	Bombaxceiba	G1	1	R
22	3665	3.8	SEMAR	Bombaxceiba	G1	1	R
23	3670	2.7	BABUL	*Acacia nilotica*	G1	1	R
24	3680	3.4	BABUL	*Acacia nilotica*	G1	1	L
25	3685	3	BABUL	*Acacia nilotica*	G1	1	R
26	3695	6.6	BABUL	*Acacia nilotica*	G1	1	R
27	3700	5.4	BABUL	*Acacia nilotica*	G1	1	R
28	3715	4.5	BABUL	*Acacia nilotica*	G1	1	R
29	3715	2.6	BABUL	*Acacia nilotica*	G1	2	L
30	3730	4.1	BABUL	*Acacia nilotica*	G1	1	L
31	3750	3.7	BABUL	*Acacia nilotica*	G1	1	L
32	3785	3.9	BABUL	*Acacia nilotica*	G1	1	R
33	3800	3.6	BABUL	*Acacia nilotica*	G1	1	R
34	3840	4.5	BABUL	*Acacia nilotica*	G1	1	R
35	3850	5.5	BABUL	*Acacia nilotica*	G1	1	L

Sr. No.	Chainage (Km)	Distance from Road Center	Local Name of Tree	Botanical Name of tree	Grith size of tree *(1.37m above G.L.)	Numbers marked in field	Remark
36	3910	5.4	BABUL	*Acacia nilotica*	G1	1	L
37	3915	5	BABUL	*Acacia nilotica*	G1	1	L
38	3920	5.8	BABUL	*Acacia nilotica*	G1	1	L
39	3940	6.4	BABUL	*Acacia nilotica*	G1	1	L
40	3945	6	BABUL	*Acacia nilotica*	G1	1	L
41	4120	5.4	BABUL	*Acacia nilotica*	G1	1	L
42	4145	4.2	BABUL	*Acacia nilotica*	G1	1	L
43	4150	3.7	BABUL	*Acacia nilotica*	G1	1	L
44	4210	3.7	BABUL	*Acacia nilotica*	G1	1	L
45	4400	4.8	BABUL	*Acacia nilotica*	G1	1	R
46	4620	4.8	BAIR	*Ziziphusmauritiana*	G1	1	L
47	4840	4.7	BABUL	*Acacia nilotica*	G1	2	L
48	4850	4	BABUL	*Acacia nilotica*	G1	1	L
49	4870	3.5	BABUL	*Acacia nilotica*	G1	1	L
50	5200	9.9	BABUL	*Acacia nilotica*	G1	1	L
51	5290	3.9	BABUL	*Acacia nilotica*	G1	1	L
52	5550	4	BABUL	*Acacia nilotica*	G1	1	L
53	5700	2.8	BABUL	*Acacia nilotica*	G1	1	R
54	6050	3.5	BABUL	*Acacia nilotica*	G1	1	L
55	6910	6.2	BABUL	*Acacia nilotica*	G1	1	L
56	7010	6.8	BABUL	*Acacia nilotica*	G1	1	R
57	7070	3.2	BABUL	*Acacia nilotica*	G1	1	R
58	7110	1.8	BABUL	*Acacia nilotica*	G1	1	R
59	7110	6	BABUL	*Acacia nilotica*	G1	1	L
60	7600	3.4	BABUL	*Acacia nilotica*	G1	1	L
61	7920	3.4	BABUL	*Acacia nilotica*	G1	1	R
62	7940	3.8	BABUL	*Acacia nilotica*	G1	1	L
63	8190	4	BABUL	*Acacia nilotica*	G1	1	L
64	8210	1	BABUL	*Acacia nilotica*	G1	1	R
65	8220	5	BABUL	*Acacia nilotica*	G1	1	L
66	8250	2	BABUL	*Acacia nilotica*	G1	1	R
67	8330	2.7	BABUL	*Acacia nilotica*	G1	1	L
68	8370	3.5	BABUL	*Acacia nilotica*	G1	1	L
69	8380	3	BABUL	*Acacia nilotica*	G1	1	L
70	8410	3.5	BABUL	*Acacia nilotica*	G1	1	R
71	8430	3.5	BABUL	*Acacia nilotica*	G1	1	R
72	8465	2.7	BABUL	*Acacia nilotica*	G1	1	R
73	8470	2.5	BABUL	*Acacia nilotica*	G1	2	R
74	8480	2.7	BABUL	*Acacia nilotica*	G1	1	R
75	8490	3.7	BABUL	*Acacia nilotica*	G1	1	L
76	8510	3	BABUL	*Acacia nilotica*	G1	1	L
77	8560	5.7	BABUL	*Acacia nilotica*	G1	1	R
78	8660	3.4	BABUL	*Acacia nilotica*	G1	1	L
79	8880	4.5	SEMAR	Bombaxceiba	G1	1	R
80	9130	2.7	SEMAR	Bombaxceiba	G1	1	R

Sr. No.	Chainage (Km)	Distance from Road Center	Local Name of Tree	Botanical Name of tree	Grith size of tree *(1.37m above G.L.)	Numbers marked in field	Remark
81	9240	3.2	BABUL	*Acacia nilotica*	G1	1	L
82	9250	3.8	BABUL	*Acacia nilotica*	G1	1	L
83	9320	2.4	BABUL	*Acacia nilotica*	G1	1	R
84	9350	3.8	BABUL	*Acacia nilotica*	G1	1	L
85	9350	2.7	BABUL	*Acacia nilotica*	G1	1	R
86	9410	3.5	BABUL	*Acacia nilotica*	G1	1	L
87	9430	4.3	BABUL	*Acacia nilotica*	G1	1	R
88	9470	2	BABUL	*Acacia nilotica*	G1	2	R
89	9485	4.5	BABUL	*Acacia nilotica*	G1	1	L
90	9520	2.3	BABUL	*Acacia nilotica*	G1	1	R
91	9540	3.4	BABUL	*Acacia nilotica*	G1	1	L
92	9560	3.5	BABUL	*Acacia nilotica*	G1	1	L
93	9575	4.1	BABUL	*Acacia nilotica*	G1	1	R
94	9850	4.2	BABUL	*Acacia nilotica*	G1	1	R
95	10140	4.8	BABUL	*Acacia nilotica*	G1	1	L
96	10190	4.9	BABUL	*Acacia nilotica*	G1	1	L
97	10200	4.4	BABUL	*Acacia nilotica*	G1	1	L
98	10200	5.8	BABUL	*Acacia nilotica*	G1	1	R
99	10220	4.1	BABUL	*Acacia nilotica*	G1	1	R
100	10230	3.5	BABUL	*Acacia nilotica*	G1	1	L
101	10660	6.5	BABUL	*Acacia nilotica*	G1	1	R
102	10730	6	BABUL	*Acacia nilotica*	G1	1	L
103	10920	4.8	BABUL	*Acacia nilotica*	G1	1	R
104	11170	3.7	BABUL	*Acacia nilotica*	G1	1	L
105	11170	2.8	BABUL	*Acacia nilotica*	G1	1	R
106	11230	7.7	BABUL	*Acacia nilotica*	G1	1	R
107	11290	3.7	BABUL	*Acacia nilotica*	G1	1	R
108	11320	3	BABUL	*Acacia nilotica*	G1	1	R
109	11320	4.4	BABUL	*Acacia nilotica*	G1	1	L
110	11340	2.7	BABUL	*Acacia nilotica*	G1	1	R
111	11515	2.7	BABUL	*Acacia nilotica*	G1	1	L
112	11515	3.2	BABUL	*Acacia nilotica*	G1	1	R
113	11750	2.8	BABUL	*Acacia nilotica*	G1	1	L
114	11780	3.4	BABUL	*Acacia nilotica*	G1	1	L
115	11790	4.2	BABUL	*Acacia nilotica*	G1	1	R
116	12110	11.6	BABUL	*Acacia nilotica*	G3	1	L
117	12130	4	BABUL	*Acacia nilotica*	G1	2	L
118	12150	5	BABUL	*Acacia nilotica*	G1	2	L
119	12190	3.5	BABUL	*Acacia nilotica*	G1	1	L
120	12270	3.4	BABUL	*Acacia nilotica*	G1	1	L
121	12280	6.9	BABUL	*Acacia nilotica*	G1	1	L
122	12410	4.5	BABUL	*Acacia nilotica*	G1	1	R
123	12445	6.2	JAMUN	*Syzygium cumini*	G2	1	L
124	12710	3.9	BABUL	*Acacia nilotica*	G1	1	L
125	12790	3	BABUL	*Acacia nilotica*	G1	1	R

Sr. No.	Chainage (Km)	Distance from Road Center	Local Name of Tree	Botanical Name of tree	Grith size of tree *(1.37m above G.L.)	Numbers marked in field	Remark
126	12810	2.7	BABUL	*Acacia nilotica*	G1	1	R
127	12860	3.5	BABUL	*Acacia nilotica*	G1	1	L
128	12880	3.5	BABUL	*Acacia nilotica*	G1	1	L
129	12920	3.5	BABUL	*Acacia nilotica*	G1	1	R
130	12940	5	BABUL	*Acacia nilotica*	G1	1	R
131	12940	2.7	BABUL	*Acacia nilotica*	G1	1	L
132	12970	3	BABUL	*Acacia nilotica*	G1	1	L
133	12980	5	BABUL	*Acacia nilotica*	G1	1	R
134	12980	4	BABUL	*Acacia nilotica*	G1	1	L
135	12990	4.5	BABUL	*Acacia nilotica*	G1	1	R
136	13330	4.5	BABUL	*Acacia nilotica*	G1	1	L
137	13350	4.8	BABUL	*Acacia nilotica*	G1	1	R
138	13420	3.8	BABUL	*Acacia nilotica*	G1	1	L
139	13440	4	BABUL	*Acacia nilotica*	G1	1	R
140	13960	4.7	BABUL	*Acacia nilotica*	G2	1	R
141	13970	7.9	BABUL	*Acacia nilotica*	G2	1	R
142	13975	7.8	BABUL	*Acacia nilotica*	G2	1	R
143	13980	8	BABUL	*Acacia nilotica*	G2	1	R
144	14580	4	BABUL	*Acacia nilotica*	G1	1	R
145	14730	3.5	BABUL	*Acacia nilotica*	G1	1	L
146	14800	4.5	BABUL	*Acacia nilotica*	G1	1	L
147	14850	3	BABUL	*Acacia nilotica*	G1	1	L
148	14865	3.5	BABUL	*Acacia nilotica*	G1	1	R
149	14890	3	BABUL	*Acacia nilotica*	G1	2	L
150	14940	3.5	BABUL	*Acacia nilotica*	G1	1	L
151	14950	3.1	BABUL	*Acacia nilotica*	G1	1	L
152	14960	2.2	BABUL	*Acacia nilotica*	G1	1	L
153	15025	4	BABUL	*Acacia nilotica*	G1	1	R
154	15070	1	BABUL	*Acacia nilotica*	G2	1	R
155	15110	4.4	BABUL	*Acacia nilotica*	G1	1	R
156	15120	3.4	BABUL	*Acacia nilotica*	G1	1	R
157	15130	3.4	BABUL	*Acacia nilotica*	G1	2	R
158	15430	4.4	BAIR	*Ziziphusmauritiana*	G1	1	L
159	15430	7.7	BABUL	*Acacia nilotica*	G1	1	L
160	15470	5.9	BABUL	*Acacia nilotica*	G1	1	L
161	15470	4.7	KAITH	*Limonia acidissima*	G1	1	R
162	15480	3.2	BAIR	*Ziziphusmauritiana*	G1	1	L
163	15480	4.9	BAIR	*Ziziphusmauritiana*	G1	1	R
164	15630	6	BABUL	*Acacia nilotica*	G1	2	L
165	15670	5	BABUL	*Acacia nilotica*	G1	1	L
166	15670	3	BABUL	*Acacia nilotica*	G1	1	R
167	15670	3.9	BABUL	*Acacia nilotica*	G1	1	R
168	15720	10.7	BABUL	*Acacia nilotica*	G3	1	L
169	15730	7	BABUL	*Acacia nilotica*	G2	1	L
170	15790	2.9	BABUL	*Acacia nilotica*	G1	1	R

Sr. No.	Chainage (Km)	Distance from Road Center	Local Name of Tree	Botanical Name of tree	Grith size of tree *(1.37m above G.L.)	Numbers marked in field	Remark
171	15870	3.5	BABUL	*Acacia nilotica*	G1	1	L
172	15930	4.3	BABUL	*Acacia nilotica*	G1	1	L
173	16020	5.3	BABUL	*Acacia nilotica*	G1	1	L
174	16600	3.7	BABUL	*Acacia nilotica*	G1	1	R
175	16840	3.2	BABUL	*Acacia nilotica*	G2	1	L
176	16870	5.6	BABUL	*Acacia nilotica*	G1	1	L
177	16890	4.8	BABUL	*Acacia nilotica*	G1	1	R
178	16970	4	BABUL	*Acacia nilotica*	G1	1	L
179	17010	3.4	BABUL	*Acacia nilotica*	G1	1	L
180	17050	4.3	BABUL	*Acacia nilotica*	G1	1	L
181	17220	3.9	BABUL	*Acacia nilotica*	G2	1	R
182	17330	3.5	BABUL	*Acacia nilotica*	G2	1	R
183	17545	8.7	BABUL	*Acacia nilotica*	G2	1	R
184	17860	4.5	BABUL	*Acacia nilotica*	G1	1	L
185	17980	4.5	BABUL	*Acacia nilotica*	G1	1	L
186	18220	3.5	BABUL	*Acacia nilotica*	G1	1	R
187	18270	3	BABUL	*Acacia nilotica*	G1	2	R
188	18320	3.6	BABUL	*Acacia nilotica*	G1	1	R
189	18350	3	BABUL	*Acacia nilotica*	G1	1	R
190	18570	3.6	BABUL	*Acacia nilotica*	G1	1	L
191	18590	4.3	BABUL	*Acacia nilotica*	G1	1	R
192	18610	3.9	BABUL	*Acacia nilotica*	G1	1	R
193	18630	3.5	BABUL	*Acacia nilotica*	G1	1	R
194	19160	3.5	BABUL	*Acacia nilotica*	G1	1	R
195	19230	5.7	BABUL	*Acacia nilotica*	G1	1	R
196	19620	5	BABUL	*Acacia nilotica*	G1	1	R
197	20280	11	BABUL	*Acacia nilotica*	G1	1	L
198	20300	10	BABUL	*Acacia nilotica*	G1	1	L
199	20320	10.5	BABUL	*Acacia nilotica*	G1	1	L
200	20330	11	MAHUA	*Madhuca longifolia*	G1	1	R
201	20370	10	BABUL	*Acacia nilotica*	G1	1	R
202	20460	3.6	BABUL	*Acacia nilotica*	G1	1	L
203	21350	3	BABUL	*Acacia nilotica*	G1	1	L
204	21390	3	BABUL	*Acacia nilotica*	G1	1	R
205	21530	2.2	BABUL	*Acacia nilotica*	G1	1	R
206	21610	5	BABUL	*Acacia nilotica*	G1	1	R
207	21660	4.5	BABUL	*Acacia nilotica*	G1	1	R
208	21690	4.7	BABUL	*Acacia nilotica*	G1	1	L
209	21720	4.5	BABUL	*Acacia nilotica*	G1	1	L
210	22130	5.2	MAHUA	*Madhuca longifolia*	G1	2	R
211	22170	3.5	BABUL	*Acacia nilotica*	G1	1	R
212	22250	4.6	BABUL	*Acacia nilotica*	G1	1	L
213	22260	4.5	BABUL	*Acacia nilotica*	G1	1	L
214	22280	4	BABUL	*Acacia nilotica*	G1	1	L
215	22290	3.8	BABUL	*Acacia nilotica*	G1	1	L

Sr. No.	Chainage (Km)	Distance from Road Center	Local Name of Tree	Botanical Name of tree	Grith size of tree *(1.37m above G.L.)	Numbers marked in field	Remark
216	22310	3.8	BABUL	*Acacia nilotica*	G1	1	R
217	22335	4.1	BABUL	*Acacia nilotica*	G1	1	L
218	22350	4.6	BABUL	*Acacia nilotica*	G1	1	L
219	22400	4	BABUL	*Acacia nilotica*	G1	1	L
220	22445	4	BABUL	*Acacia nilotica*	G1	1	L
221	22460	3.8	BABUL	*Acacia nilotica*	G1	1	L
222	22620	4.2	BABUL	*Acacia nilotica*	G1	1	L
223	22640	4.7	BABUL	*Acacia nilotica*	G1	1	L
224	22780	3.7	BABUL	*Acacia nilotica*	G1	1	L
225	22800	3.4	BABUL	*Acacia nilotica*	G1	1	L
226	23070	4.7	BABUL	*Acacia nilotica*	G1	1	L
227	23085	4.8	BABUL	*Acacia nilotica*	G1	1	R
228	23110	4.5	BABUL	*Acacia nilotica*	G1	1	L
229	23165	7.8	BABUL	*Acacia nilotica*	G1	1	L
230	23270	6	BABUL	*Acacia nilotica*	G1	1	L
231	24020	4.4	BABUL	*Acacia nilotica*	G1	1	L
232	24030	7.4	BABUL	*Acacia nilotica*	G1	1	R
233	24550	3.6	BABUL	*Acacia nilotica*	G1	1	L
234	24560	5.2	BABUL	*Acacia nilotica*	G1	1	R

Table 27: Summary of Tree List

Sr.No.	Trees	Botanical Name	No. of Trees
1	BABUL	*Acacia nilotica*	236
2	BAIR	*Ziziphusmauritiana*	4
3	JAMUN	*Syzygium cumini*	3
4	KAITH	*Limonia acidissima*	1
5	MAHUA	*Madhuca longifolia*	2
6	SEESAM	*Dalbergiasissoo*	1
7	SEMAR	Bombaxceiba	4
		Total	**251**

3. Wildlife and Protected Areas

63. The project road does not pass through any protected area, such as, wildlife sanctuary, national park or bio-reserve. There is no wildlife Sanctuary, national park or bio-reserve within 10 km from the project road. Although few animals are found around the road like, Snake, mangoos, rat, fox, etc.

4. Aquatic Ecology and Fisheries

64. Natural drains will be crossed by suitable bridges and natural course of water bodies will not be affected by the widening of the project road. Therefore, aquatic biology is not an issue for the project road.

5. Rare or Endangered Species

65. No rare or endangered species found in the area along the project road.

6. Fauna and Wild life

66. The project road passes mainly through agricultural areas 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 Cow, Buffalo, wild cow (Terrestrial Fauna), Pigeon, Peacock (Aves species), king cobra (Binoccelate cobra), Toad, Frog (Amphibians), chital or Indian Spotted Deer (Axis axis).

E. Economic Development and Social and Cultural Resources

67. The district of Sagar (previously Saugor) lies in the north central region of Madhya Pradesh. A major road and agricultural trade centre, it has industries such as oil and flour milling, saw-milling, ghee processing, handloom cotton weaving, railway and engineering works. It is known in all over India due to its University named as Dr. Harisingh Gaur University, Army Cantonment and Bhagyodyay.

68. **Agriculture and Allied Sector:** Soybean, wheat, Chickpea, maize, lentil & pea grows abundantly in and around Sagar. Per capita agriculture production of the cereals, pulses, food grains are increasing. Total area of sagar district is 1025200 Hectare & the total population is 2,378,295. The cultivated area is 537400 hectare, forest area is 298000 hectare, land under non agriculture use is 5300 hectare, Permanent pastures area is 85400 hectare, cultivable waste land is 10300 hectare, land under miscellaneous tree crops & groves area is 1300 hectare, barren & uncultivable area is 14600 hectare.

69. **Industries:** Government of MP has kept Sagar in category 'C' of industrial backward districts for industrialization and business purpose District Industry centre is working as Nodal Agency. Main and traditional business of Sagar is Bidi Making and found in whole of Sagar district. After 1978, establishment of District Industry Centre took place and lead to the opening of new industrial units in Sagar. For establishment of Industries following Units are available In the district four main industry of medium category are there. They are Straw Board, Vegetable Oil, refined Oil and Single Superphosphate Fertilizer. About 15 crores rupees are invested in these industries. About 10,000 Small Scale industries have been registered in the district. The main are Steel Utensils, Plastic Goods, Detergent Cake Powder, Maida, Agriculture Equipments, Welding Electrodes, Alum, Caustic Soda, Solvent Plant, Agarbatti, Granite, Acrylic Sheet, Acrylic Products, Dal Mil, PVC Cable, Pipe etc. In Khurai and Bina Agricultural equipments industry are in working in cluster units.

70. **Demography:** In 2011, Sager had population of 2378295 of which male and female were 1254251 and 1124044 respectively. In 2001 census, Sagar had a population of 2021987 of which males were 1073205 and remaining 948782 were females. Sagar District population constituted 3.27percent of total Maharashtra population. In 2001 census, this figure for Sagar District was at 3.35 percent of Maharashtra population.

71. **Population Growth Rate:** There was change of 17.63 percent in the population compared to population as per 2001. In the previous census of India 2001, Sagar district recorded increase of 22.70 percent to its Population compared to 1991.

Table 28: Demographic Features of Madhya Pradesh and Country as per 2001 Census

S. No.	Feature	All India	Madhya Pradesh	Sagar
1.	Geographical Area (sq.km)	3287240	308,144	10,252 km2(3,958 sq mi)
2.	Total Population	1028737436	6,03,85,118	2,378,295
3.	Male Population	532,223,090	3,14,56,873	
4.	Female Population	496,514,346	2,89,28,245	
5.	Rural Population	742,490,639	4,42,82,528	
6.	Urban Population	286,119,689	1,61,02,590	
7.	Density	325	196	230/km2 (600/sq mi)
8.	Sex ratio (female/1000 male)	933	920	896/1000
9.	Literacy (%)	64.8	64.08	77.52 per cent

Ref. Census Data, Census of India, 2001 (www.censusindia.gov.in), 2) Statistical Abstract of State Government, Directorate of Economics and Statistics

1. Archaeological and Historical Monuments

72. No archaeological and historical monument is located along the project road.

2. Sensitive Receptors

73. During the environmental and social screening survey, it was observed that many small religious structures, school etc are located along the project road. No such structures will be affected during widening of the road. Details of sensitive receptors along the project road are shown in **Table 29.**

Table 29: Sensitive Receptors

SR.NO	CH IN 'M'	Length of the structure along the road (m)	Distance from the center	L/R	Type
1	100	5	30	R	SCHOOL
2	110	5.5	10.9	R	TEMPLE
3	400	10	50	L	PRIMARY HEALTH CENTER
4	1540	26	30	L	SCHOOL
5	4400	10	10	L	PRIMARY HEALTH CENTER
6	4400	10	10	L	SCHOOL
7	4780	8.5	15.7	L	PANCHAYAT BUILDING
8	6820	5.7	13.8	R	AAGANWADI
9	7470	6.7	6.3	L	TEMPLE
10	10550	5.5	11	L	BUS SHELTTER
11	15550	7.2	9.4	L	TEMPLE
12	18600	30.28	12.75	L	PETROLPUMP

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

74. Of the project area, nature, and extent of the proposed activities. Suitable approach and methodology was adopted to ascertain likely impacts both during design and construction and operation stage. Valued Environmental Components were identified during initial site visit followed by its detailed investigation during later stage of the study.

A. Impact on Physical Environment Design Stage

1. Natural Hazard

75. 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

76. 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.

77. 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.

78. 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

79. There are no national parks, wildlife sanctuaries or similar eco-sensitive areas within10 km distance of the subproject road alignment.

80. A total of 193 trees are likely to be cleared along the RoW to accommodate the road widening. Compensatory plantation of 1:10 will be undertaken to address this impact.

B. Construction Stage

1. Air Quality

81. 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. 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.

82. **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. 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.
vii. Only crushers licensed by PCB shall be used.
viii. LPG should be used as fuel source in construction camps instead of wood. Tree cutting shall be restricted.
ix. Mask and other PPE shall be provided to the construction workers.
x. Diesel Generating (DG) sets shall be fitted with adequate height as per regulations (Height of stack = height of the building + 0.2 □□KVA.
xi. Low sulphur diesel shall be used in DG sets as well as machineries.
xii. 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

83. 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.

84. 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.

85. 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.

86. **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.

87. 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.

88. 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.

89. 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

a. Loss of Productive Soil and Change in Land Use

90. 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.

91. **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 to land owner.

b. Soil Erosion

92. 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.

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

i. Bank protection measures shall be taken at erosion prone areas to include the use of geo-textiles matting and 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 and 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 soil erosion

4. Borrow Areas and Quarries

94. 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.

95. 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.

96. 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.

97. **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.

98. 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.

99. 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 rehabilitated following the broad guidelines given at Appendix 2**.**

100. 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.

5. Compaction and Contamination of Soil

101. 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.

102. 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.

103. **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.

104. 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.

105. 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. Nonbituminous wastes to be dumped in borrow pits with the concurrence of landowner and covered with a layer of top soil onserved from opening the pit.
vi. Bituminous wastes will be disposed off in an identified dumping site approved by the State Pollution Control Board.

106. Construction waste constitutes debris, which are generated due to dismantling of pavement (though involved only for few kilometers 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.

107. **Mitigation Measures.** Construction waste shall be disposed of in environmentally acceptable manner. Some of the measures are as follows:

i. The existing bitumen surface can 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, drains, cross drainage should 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.

ii. The bituminous wastes shall be disposed in secure landfill sites only in environmentally accepted manner. For removal of debris, wastes and its disposal MoRTH guidelines should be followed.

iii. The locations of dumping sites should be selected with following considerations.

iv. Unproductive/wastelands shall be selected for dumping sites.

v. Away from residential areas and located at least 1000 m downwind side of these locations,

vi. Dumping sites do not contaminate any water sources

vii. Dumping sites have adequate capacity equal to the amount of debris generated.

viii. Public perception and consent from the village Panchayats about the location of debris disposal site shall be obtained before finalizing the location.

6. Groundwater

108. 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.

109. **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.

7. Surface Water Bodies

110. 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.

8. Mitigation Measures

111. 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

9. Hydrology and Drainage

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

113. **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.

114. 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. 122. IRC: 34-1970: Recommendations for road construction in waterlogged area and IRC:

115. 75 and MORT&H guidelines for Design of High Embankments shall be referred. No construction material will be stored or disposed near any water body except for reusing it for enhancement measures such as embankment raising.

10. Impact on Biological Environment

a. Terrestrial Ecology

116. 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.

117. 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 60 trees are likely to be affected due to the proposed project. The cutting of trees will have minor to negligible impact on local environment.

118. **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.

119. The project envisages plantation of approximately 600 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 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 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.

120. 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.

121. 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

122. 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.

123. **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.

11. Socio-Economic Impact

124. DBH Road project will have both positive and negative impact on socioeconomic aspects as narrated below.

a. Positive Impacts

125. 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.

b. Anticipated Negative Impacts

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

12. Labor and Construction Camp

127. 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.

128. **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.

129. 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.

130. 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.

13. Safety

131. 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.

132. **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-

133. 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.

134. 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 sped breakers shall be made near schools and religious places.

C. Impacts during operation stage

135. 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.

1. Air Quality

136. 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.

137. **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.

2. Noise

138. 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.

139. **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 the 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.

3. Land and Soil

140. 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.

141. **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.

4. Soil Erosion

142. 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.

143. **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.

5. Groundwater

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

6. Surface Water Bodies

145. 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.

7. Hydrology and Drainage

146. 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.

8. Impact on Biological Environment

a. Terrestrial ecology

147. 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.

148. **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

149. 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.

9. Community Health and Safety

150. 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.

151. **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

152.[4] The Transport Emissions Evaluation Model for Projects (TEEMP) 3 developed by Clean Air Asia 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.

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

i. The road will rehabilitate 24.9 km of major district roads;
ii. The existing road having single lane with a 7.0 m carriageway width will be improved and maintained 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.

154. 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: 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 2035 with the project is given in the table below.

155. TEEMP is an excel-based, free-of-charge spreadsheet models to evaluate emissions impacts of transport projects.

156. A network of 250 organizations in 31 countries established by the Asian Development Bank, World Bank, and USAID to promote better air quality and livable cities by translating knowledge to policies and actions that reduce air pollution and greenhouse gas emissions from transport, energy and other sectors.

Table 30: Annual Average Daily Traffic for Different Vehicle Categories Vehicle Category	**2014 (Without the Project)**	**With Project**
2-wheelar	325	1519
3-whelar	10	47
Car/ Jeep/ Taxi/ Van	197	921
Light Commercial Vehicle	49	229
Minibus, Standard bus	40	187
Heavy Commercial Vehicle	325	1706
Total	**946**	**4609**

157. 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:

Table 31: CO2 Emission Factors

Vehicle Type	**Gas/Petrol(Kg/l)**	**Diesel(Kg/l)**
2-wheel	2.28	
3- Wheel		2.63
Car /Car/Jeep	2.59	2.68
LVC		3.21
Bus		3.61
HVC		3.50

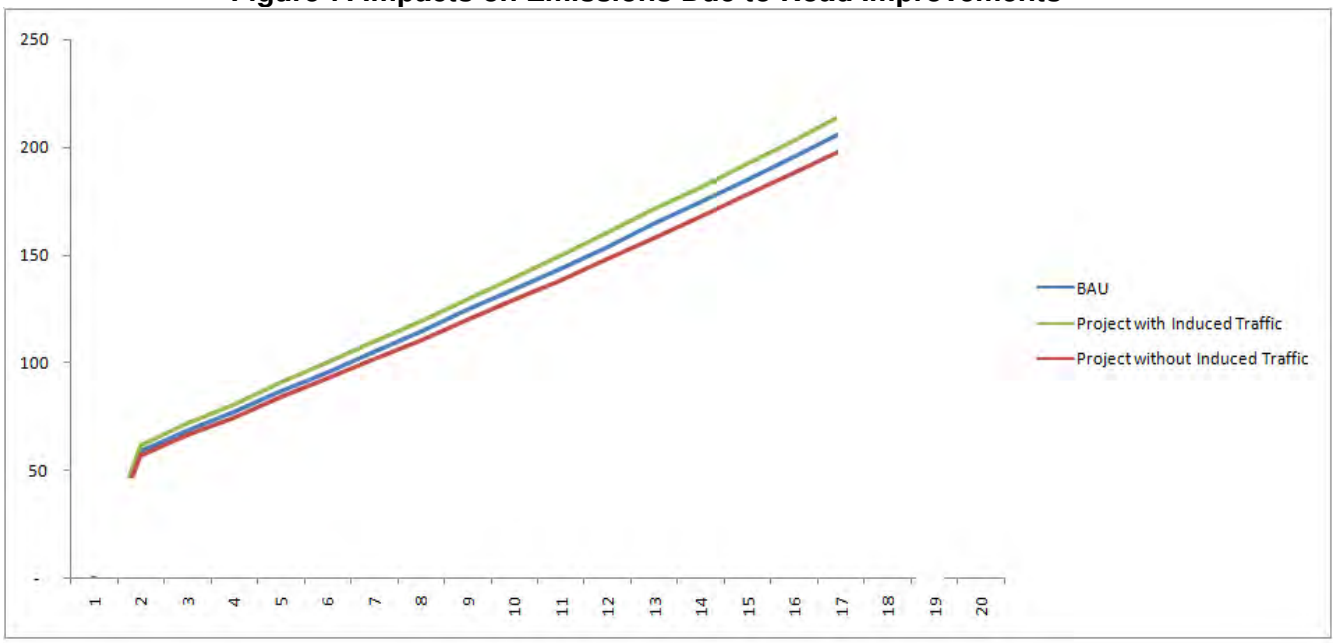
158. Emissions from road construction were also calculated using estimates of the total quantity of materials that will be used to rehabilitate the road which is 144 tons of steel, 1,215 tons of cement and 1480 tons of bitumen.

159. **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.

160. CO2 emissions will also result from the processing and manufacturing of raw materials needed to upgrade the road and in the case of **Nirtala-Mandi Bamora** road, a total of 1,215 tons of cement, 144 tons of steel, and 1,480 tons of bitumen will be needed. These construction materials will produce an estimated 1,607 tons of CO2.

161. The Figure below presents the impacts on emissions due to road improvements. Total CO2 emission at business-as-usual scenario was estimated at 32,660 tons for the entire project life and without-and with-induced traffic are 30,082 and 34,200 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.

Figure 7: Impacts on Emissions Due to Road Improvements



162. The design life of the roads is 20 years. The project's CO2 emission intensity indicators are provided in the succeeding Table 32.

Table 32: CO2 Emissions Intensity Indicators

Details	CO2		
	Business As-Usual	Project (without Induced Traffic)	Project (with Induced Traffic)
tons/km	1081.73	1141.01	1747.59
tons/year	2,105.85	2,182.61	2,191.13

Details	CO2		
	Business As-Usual	Project (without Induced Traffic)	Project (with Induced Traffic)
tons/km/year	44.09	45.05	47.38
g/pkm	50.93	52.62	51.34
g/tkm	38.21	38.85	38.39

2. Climate Risks and Adaptation needs

163. 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:

i. Landslide triggered by increased precipitation
ii. Fire
iii. Flood
iv. Drought
v. Tsunami
vi. Cyclone wind
vii. Cyclone surge
viii. Sea level rise
ix. Coastal erosion

164. 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.

165. 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.

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

167. 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

168. According to the ADB Environment Safeguards Sourcebook5 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.

169. 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.

170. 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.

171. 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.

172. 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.

VI. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

173. 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, coordination, 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. Objectives of the Public Consultation:

174. Stakeholder's consultations were held with intent to understand their concerns, apprehensions, overall opinion and solicit recommendations to improve project design and implementation. Informal meetings, interviews were organized covering the entire project design stage. Consultations provide affected people a platform to ensure incorporation of their concerns in the decision making process and foster co-operation among officers of MPRDC, the community and the stakeholders to achieve a cordial working relationship for smooth implementation of the project. It inculcates the sense of belongingness in the public about the project.

175. The discussions were designed to receive maximum inputs from the participants regarding their acceptability and environmental concerns arising out of the sub-project. They were given the brief outline of the project to which their opinions was required particularly in identifying and mitigating any potential adverse impact.

B. Methodology for Consultations:

176. 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 consultations have been carried out at three locations during initial surveys as shown in table 6.1. The total numbers of participants in the consultations are 66 out of which 24or 36% are women.

Table 33: List of Public Consultation and Date

Sr. No.	Village/Town of Consultation	Date of Consultation	No. of Participants		
			M	F	T
1	Nirtala	08/07/2014	1	8	9
2	Sarkhedi	08/07/2014	-	9	9
3	Rahatwas	08/07/2014	9	6	15
4	Bamora	08/07/2014	15	1	16
5	Dhansara	08/07/2014	17	-	17
		TOTAL	42	24	**66**

3. Project Stakeholders

177. 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

4. Consultation with Government Departments

178. Various officials consulted during IEE preparation included PWD Officials, 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.

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

5. Consultation with Local People and Beneficiaries

180. 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

181. 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 summarized in Table 34.

182. 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 34: Outcome of Consultations

Sr. No.	Date and Location	Issues Discussed	Measures Taken	Total Participants
1	**Date** 08/07/2014 **Village**: Nirtala	▪ Road Safety is the major issue among local population. They feel speed breakers need to be constructed in all villages particularly in front of schools. Some feel that there should be fencing between carriageway and shoulder in order to segregate motorized traffic and local movement of children, elders and animals. ▪ Tree cutting and plantation ▪ Roads need to be designed taking care of hydrological aspects as during rainy season, some sections of road get submerged. In all villages, people emphasized for provision of concrete	Proposed widening and strengthening of road will provide better level of service in terms of improved riding quality and smooth traffic flow. There will be considerable reduction in terms of pollution and accidents. Accessibility to health and education will increase. Employment will be generated for local population during construction. The discussion generated awareness among local population. Better road will improve	9
2	**Date:** 08/07/2014 **Village**: Sarkhedi			9
3	**Date:** 08/07/2014 **Village** Rahatwas			15

Sr. No.	Date and Location	Issues Discussed	Measures Taken	Total Participants
4	**Date:** 08/07/2014 **Village:** Bamora	drains and cement concrete road in village portion. ▪ Road condition is very bad that results in delay, uncomfortable drive, wear and tear of vehicles. ▪ Villagers also want that cutting of trees need to be minimized, minimum loss of structures, plantation along the road, adequate rehabilitation and resettlement measures including provision of jobs for land losers. ▪ Proper measures to be adopted to avoid drainage problem during construction of road	public transportation system and reduce congestion. Non title holders will also be compensated as per ADB guidelines. Drainage is proposed in built up as well as rural area. Road safety features like signages, delineators, pavement markings, road illumination have been incorporated in design.. Proper Rehabilitation measure will be taken and compensation as per market rate.	16
5	**Date** 08/07/2014 **Village:** Dhansara			17

183. 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

184. 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.

185. It is observed from the interview survey that there is increased environmental awareness among the people. It can also be seen from Table 6.3 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 are good and people have increased environmental awareness. Table 6.4 shows the result of public opinion survey carried out in the region.

Table 35: People's 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	66	87	10	3
2	Noise quality of the area	66	65	30	5
3	Air quality of the area	66	70	25	5
4	Archaeological sites	66	60	15	25
5	Natural disaster	66	65	20	15
6	Rare species of animals and birds found	66	10	80	10
7	Cultural sites i.e. market, Melas	66	70	15	15-

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

D. Conclusion and Recommendation:

186. 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 minimize these problems. Wherever possible, such people should be employed.

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

1. Positive Impacts:

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

2. Negative Impacts

i. Few tree loss which reduce the green cover but simultaneously plantation will take place to improve the green cover.
ii. 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 localized – in order to minimize the impacts, the mitigation measures recommended

iii. During construction the traffic will slow and messy.

188. 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:

i. All elements of the projects will be beneficial;
ii. All negative impacts, during and post construction, including those deemed "significant" can be properly mitigated; and
iii. No comprehensive, broad, diverse or irreversible adverse impacts have been identified.

VII. Environmental Management Plan and Grievance Redress Mechanism

189. 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

190. The NMB 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

191. The EMP provided at 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 NMB Road is considered as 18 months from the date of start of construction.

C. Emergency Response Plan

192. 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)

193. 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,

194. 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 focusing monitoring during construction and operation stage both with following monitoring and budgeting responsibility:

i. Construction Stage: (three years of construction period)
ii. Monitoring to be carried out by construction supervision consultant (CSC). The costs to form part of CSC budget.
iii. 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.

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

1. Ambient Air Quality (AAQ) Monitoring

196. 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

197. 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

198. 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 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

199. 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 70%, 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 70% 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

200. 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

201. 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 at MPRDC headquarters, reporting to the General Manager, will be responsible for ensuring compliance with environmental and social safeguards of project roads. MPRDC has seven division offices (Bhopal, Jabalpur, Sager, Gwalior, Ujjain, Indoor, and Rewa) acting as Project Implementation Units (PIUs), each 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. 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 the environment expert. An external monitor will conduct periodic external monitoring of EMP implementation. Environmental awareness and EMP implementation training will be held for MPRDC staff, contractors and CSC.

202. The six monthly monitoring proposed to be arranged through external agency will also relate to 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).

203. Monitoring during operation shall be conducted for initial three years (once a year basis) as part of CSC contract and budget. Thereafter it will be done on an as-needed basis depending on the design or change in project activity.

1. MPRDC's Responsibilities

i. Ensure that Project complies with ADB's SPS and GOI's laws and regulation
ii. Ensure that the project complies with all environment safeguard

requirements as given in this EARF

iii. Prepare IEE reports including EMP as may be required and hire an environmental consultant as required

iv. Prepare the Rapid Environmental Assessment screening checklist and forward this checklist to ADB for evaluation and confirmation of the project category;

v. Based on the confirmation of the environmental categorization of the subprojects, prepare TORs to conduct IEE studies including preparation of EMP and Environmental Monitoring Plan in accordance with the environmental policy principles and safeguard requirements under the ADB SPS;

vi. Ensure that the preparation of environmental studies will be completed with meaningful consultations with affected people and other concerned stakeholders, including civil society throughout the project preparation stages as required by the ADB SPS

vii. Undertake initial review of the IEE and EMP reports to ensure its compliance with the Government's and ADB's requirement;

viii. Review the budgetary needs for complying with the Government's and ADB's requirements on environment safeguards

ix. Obtain necessary consents or permissions (e.g. environment permission, forest clearance) from relevant Government Agencies to minimize risks to the environment and mitigate environmental impacts associated. Also ensure that all necessary regulatory clearances will be obtained prior to commencing any civil work of the subproject;

x. Submit to ADB the final IEE including EMP reports with consent letter for disclosure of the report on the ADB website

xi. Ensure that the EMP which includes required mitigation measures and monitoring requirements forms part of bidding document after seeking concurrence from ADB. EMP items may be included in the Bill of Quantities (BOQ) as necessary. For example if a subproject is required to construct noise barriers, the costs will need to be included in the BOQ;

xii. Ensure that contractors have access to the IEE report including EMP of the subprojects;

xiii. Organize training and awareness programs on implementation of environment safeguards for relevant staff of MPRDC, PIU, CSC and contractors

xiv. Ensure that contractors understand their responsibilities to mitigate environmental problems associated with their construction activities

xv. Ensure and Monitor that the EMP including Environmental Monitoring Plan will be properly implemented;

xvi. In case of unanticipated environmental impacts during project implementation stage arrange to prepare and implement an updated EMP to account for such impacts after seeking concurrence from ADB. The updating shall be carried out after due consultation with the stake holders;

xvii. In case during project implementation a subproject needs to be realigned, review the environmental classification and revise accordingly, and identify whether supplementary IEE study is required. If it is required, prepare the TOR for undertaking supplementary IEE and hire an environment consultant to carry out the study;

xviii. Ensure that construction workers work under safe and healthy working environment in accordance with the World Bank EHS guidelines relating to occupational health and safety;

xix. Ensure effective implementation of Grievance Redress Mechanism to address affected people's concerns and complaints, promptly, using understandable and transparent process that is gender responsive, culturally

appropriate, and readily accessible to all segments of the affected people;

xx. Submit semi-annual monitoring reports for all sub-projects on the implementation of EMPs to ADB for disclosure on the ADB website.

xxi. Ensure proper implementation of corrective action plan if identified in the monitoring report; and

xxii. Disclose information as defined in this EARF.

xxiii. isclose information as defined in this EARF.

2. PIU Responsibilities

i. Ensure that Project complies with ADB's SPS and GOI's laws and regulations

ii. Ensure that the project complies with all environment safeguard requirements as given in this EARF

iii. Obtain necessary consents or permissions (e.g. forest clearance, no objection certificate) from relevant Government Agencies. Also ensure that all necessary regulatory clearances will be obtained prior to commencing any civil work of the subproject;

iv. Ensure that contractors have access to the IEE report including EMP of the subprojects;

v. Ensure that contractors understand their responsibilities to mitigate environmental problems associated with their construction activities

vi. Participate in training and awareness programs on implementation of environment safeguards and organize further on the job or subject specific training for the contractor during project implementation as necessary with the support of the CSC environmental specialist

vii. Conduct regular on site monitoring to ensure proper implementation of the EMP including Environmental Monitoring Plan;

viii. Verify and approve monitoring checklists and/or reports that will be prepared and submitted by the CSC

ix. In case of unanticipated environmental impacts during project implementation stage, identify the need to prepare and implement an updated EMP to account for such impacts after seeking concurrence from ADB.

x. Ensure that construction workers work under safe and healthy working environment in accordance with the World Bank EHS guidelines relating to occupational health and safety;

xi. Ensure effective implementation of Grievance Redress Mechanism in accordance with the steps given in figure 1 to address affected people's concerns and complaints, promptly, using an understandable and transparent process that is gender responsive, culturally appropriate, and readily accessible to all segments of the affected people;

xii. Ensure timely submission of semi-annual monitoring reports for all sub-projects on the implementation of EMPs to MPRDC for further submission to ADB for disclosure on the ADB website; and

xiii. Ensure proper implementation of corrective action plan if identified in the monitoring report

3. CSC Responsibilities

i. Ensure that Project complies with ADB's SPS and GOI's laws and regulations

ii. Ensure that the project complies with all environment safeguard requirements as given in this EARF
iii. Provide necessary technical advice and support to the PIU and/or contractor to obtain consents or permissions (e.g. forest clearance, no objection certificate) from relevant Government Agencies. Also ensure that all necessary regulatory clearances will be obtained prior to commencing any civil work of the subproject;
iv. Ensure that contractors have access to the IEE report including EMP of the subprojects;
v. Ensure that contractors understand their responsibilities to mitigate environmental problems associated with their construction activities
vi. **Closely coordinate and communicate with the contractor to facilitate** implementation of all mitigation measures identified in EMP
vii. Conduct training and awareness programs on implementation of environment safeguards for MPRDC, PIU and the contractors during the pre-construction stage and further organize on the job or subject specific training for the contractor during project implementation as necessary
viii. Conduct regular on site monitoring to ensure proper implementation of the EMP including Environmental Monitoring Plan;
ix. Prepare monitoring checklists and/or reports based on the site monitoring and submit them to the PIU for approval
x. In case of unanticipated environmental impacts during project implementation stage, upon the advice from the PIU and/or MPRDC prepare an updated EMP to account for such impacts after seeking concurrence from ADB.
xi. Ensure that construction workers work under safe and healthy working environment;
xii. Facilitate effective implementation of the Grievance Redress Mechanism in accordance with the steps given in figure 1 to address affected people's concerns and complaints, promptly, using an understandable and transparent process that is gender responsive, culturally appropriate, and readily accessible to all segments of the affected people;
xiii. Prepare semi-annual monitoring reports for all sub-projects on the implementation of EMPs for submission to PIU and MPRDC and further submission to ADB for disclosure on the ADB website

4. Contractor's Responsibilities

i. Ensure that adequate budget provisions are made for implementing all mitigation measures specified in the EMP
ii. Participate in training and awareness programs on implementation of environment safeguards
iii. Identify further needs for conduction of on the job or subject specific training during project implementation by the CSC or MPRDC or PIU
iv. Obtain necessary environmental permisson etc. from relevant agencies as specified by EARF for project road works, quarries, hot-mix plant etc. prior to commencement of civil works contracts
v. Implement all mitigation measures as given in the EMP in the contract documents
vi. Ensure that all workers, site agents, including site supervisors and management participate in training sessions organized by the PIU, MPRDC or CSC.
vii. Ensure compliance with environmental statutory requirements and

contractual obligations

viii. Respond promptly to grievances raised by the local community or any stakeholder and implement environmental corrective actions or additional environmental mitigation measures as necessary.

ix. Based on the results of EMP monitoring, cooperate with the PIU and CSC to implement environmental corrective actions and corrective action plans, as necessary.

5. ADB's Responsibilities

i. Review REA checklist and endorse or modify the project classification proposed by the MPRDC;

ii. Review IEE reports, including this environmental assessment and review framework, and disclose draft and final reports through ADB's website as required;

iii. Issue subproject's approval based on the respective IEE reports;

iv. Monitor implementation of environment safeguard requirements under the project through due diligence missions;

v. Provide assistance to MPRDC, if required, in carrying out its responsibilities for implementing environment safeguards and for building capacity for safeguard compliance;

vi. Review and approve semi-annual environmental monitoring reports submitted by MPRDC and disclose them on the ADB website

vii. Monitor MPRDC's commitments under EARF

F. Institutional Capacity Building

204. Training and Awareness: MPRDC have been managing its environmental and social obligation through Sr. manager (environment & social) who report to GM .Following training and awareness programme is proposed:

i. 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

ii. 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

205. Grievances related to the implementation of the project, particularly regarding the environmental management plan will be acknowledged of the project, particularly regarding the complainant with corrective action proposed. The outcome shall also form part of six monthly compliances report to ADB. Complaints maybe lodged verbally directly to the contractor or CSC or PIU at the site level. To the extent possible efforts will be made by the contractor, CSC or PIU to

address these complaints immediately on site. Only those complaints that cannot be addressed immediately at the site level will be submitted to the Grievance Redress Committee (GRC). Necessary assistance for completing the complaint form or lodging a written complaint.

206. Grievances related to the implementation of the project, particularly regarding the environmental management plan will be acknowledged, evaluated, and responded to the will be made to illiterate complainants vy the respective receiver of the complaint. 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.

207. The State level GRC will comprise of the:

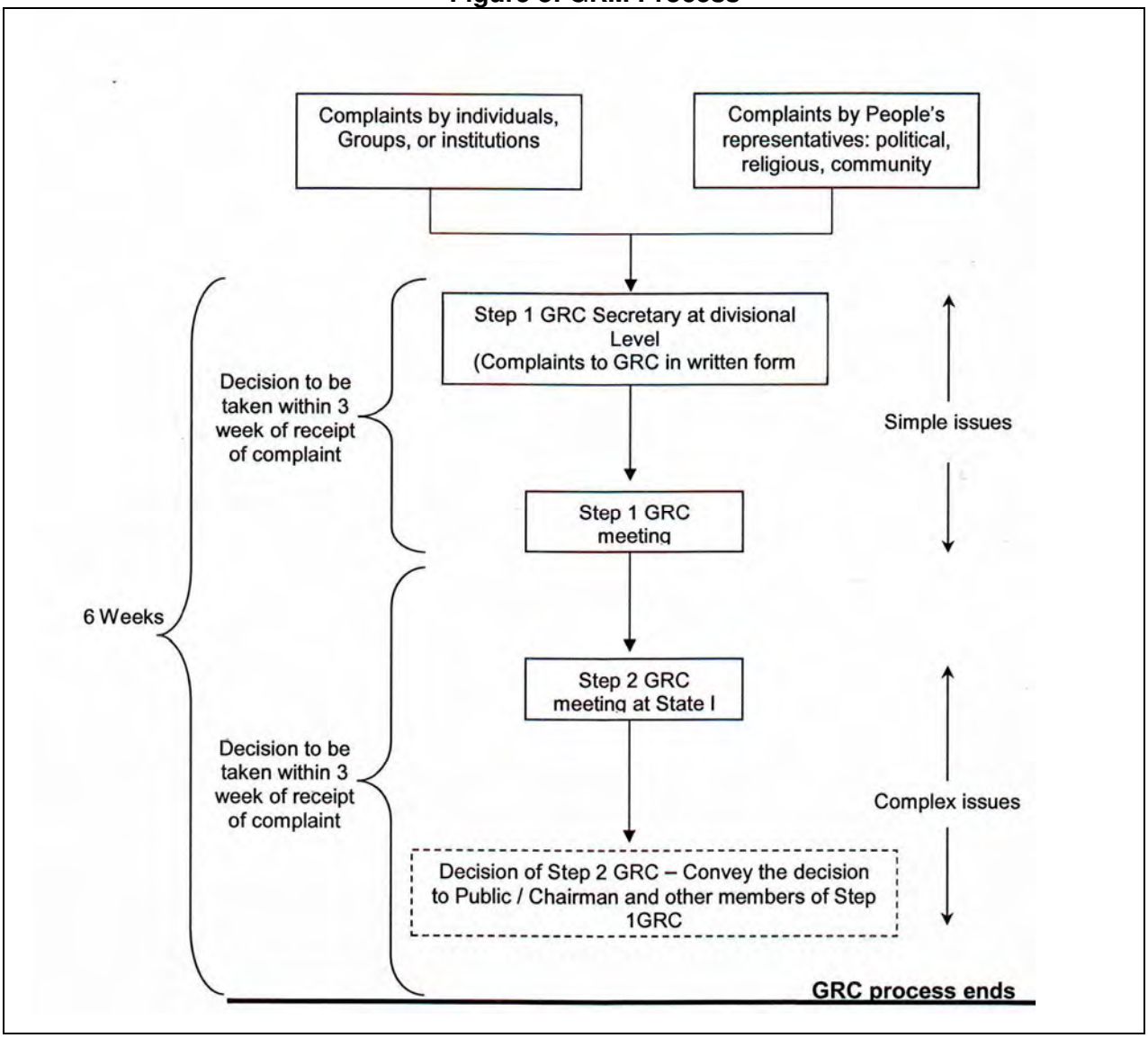
i. General Manager, MPRDC, Bhopal
ii. Superintended Engineer, PWD, Bhopal
iii. DGM, MPRDC, Bhopal
iv. Manager (Environment & Social), MPRDC, Bhopal

208. 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 Zila Parisad /District Council.
iii. Two representatives of affected persons including vulnerable groups and women in the committee.

209. 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.

Figure 8: GRM Process



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

210. The cost of environment management, monitoring & Training programme is given in Table 7.1.

Table 36: Cost of Environment Management, Monitoring and Training Programme

S.No.	Parameters / Components	Parameter to be monitored	Guidelines	Unit Cost	Total Cost(Rs)
1	Ambient Air Monitoring: 3 times in a year for 3 years or construction period at 3 sites	PM10, PM2.5, SO2, NOx & CO	High Volume samplers to be used and located 50 m from the onstruction site	9000/-	243000/-
2	Water Monitoring: 3 times in a year for 3 years or construction period At 3 locations	PH, BOD, COD, DO, TDS, MM, NO3 and Coliform	Analyse as per the standard methods for examination of water and waste water	5000/-	135000/-
3	Noise Monitoring: 3 times in a year for 3 years or construction period , 3 locations	Noise levels on dB (A) scale	Using an integrated noise level meter kept at a distance of 15 m from the construction site	3000/-	81000/-
	Total Monitoring Cost				**459000.00**
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 Two tankers in a days for 240 Days		IRC Code of Practice and MoSRT&H manual	Rs2000/- per day per tanker	960000/-
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)				**1068000/-**
9.	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)				**16,77,000/-**

VIII. CONCLUSIONS AND RECOMMENDATIONS

211. 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

212. 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

213. 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.

214. 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:

i. About 193 trees need to 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.
ii. 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.
iii. 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.
iv. 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.
v. Along the project stretch, few religious structures are located. Appropriate design options are exercised to minimize the loss of such structures.
vi. The social issues are addressed through Social management plans as per SPS of ADB.

C. Irreplaceable Resources

215. 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

216. 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

217. 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 low. People, however expressed the desire of minimizing the tree cutting.

F. Recommendations

218. 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.

219. 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 office.

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 : Nirtala-Mandi Bamora (MDR) Road**
Sector Division	**South Asia Transport and Communication**

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		X	No archaeological protected monument or cultural heritage site in located within the road,
Protected Area		X	No protected area is located close to roads and nearby
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			
Encroachment on historical/ cultural areas; disfiguration of landscape by road embankments,		X	The topography of project road is mainly plain. There is no encroachment of historical places. However, some small

Screening questions	Yes	No	Remarks
cuts, fills, and quarries?			temples exist along the project road which may get impacted. 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 25 to 30 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 cutting of 193 roadside trees is involved. Attempts have been made to minimizing the cutting of trees while finalizing the road widening options.
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?		X	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 stabilization, 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		Localized air pollution level is likely to increase for short duration during construction period due to construction movement and asphalt vehicle 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. Dust separation measures like spraying of

Screening questions	Yes	No	Remarks
			water on unpaved vehicle movement areas are proposed to minimize dust generation.
Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?	X		Workers may get exposed to dust and noise during construction activities. However, the exposure levels are likely to be short and insignificant. Workers will be provided requisite PPEs to minimize 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 and equipment operational noise. These noise levels will be impulsive in nature and its impact will be confined within a 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 a 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		X	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 (SPS09) separately in a Resettlement Plan.
Dislocation and compulsory resettlement of people living in right-of-way?		X	No displacement of people involved.
Disproportionate impacts on the poor, women, and children, indigenous peoples or other vulnerable groups?			No such impact anticipated.
Other social concerns relating to inconveniences in living conditions in the project areas that may trigger cases of upper respiratory	X		No such concern is expected. Concern may arise during construction stage due to increase in ambient air pollution level, which is expected to be localized and

Screening questions	Yes	No	Remarks
problems and stress?			temporary in nature. This aspect will effectively controlled with the proposed dust suppression and other mitigation measures. As such people at large are supportive of the project and are least bothered about above air pollution concern 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 minimize the impact suitable traffic management plan will be designed and implemented 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 solid waste disposal (through composting), facilities will be made at each construction camp. Awareness will be created amongst the workers 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 use and rehabilitation plan.
Accident risks associated with increase vehicular traffic leading to accidental spills of toxic materials and loss of life?	X		Adequate safety measures will be adopted to avoid accidents during construction and operation stages. Measures like signage, speed control, crash barriers will be taken close to sensitive locations such as schools, temples, or hospitals.
Increased noise and air pollution resulting from traffic volume?	X		Increase in noise and air pollution is expected during the construction phase but it is likely to be confined within a few meters of either side of the road. Adequate mitigation measures will be adopted to minimize 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 passes through open agricultural land, which will provide adequate dispersion to vehicular emission.
Increased risk of water pollution	X		This possibility is minimal but cannot be

Screening questions	Yes	No	Remarks
from oil, grease and fuel spills, and other materials from vehicles using the road?			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 minimize 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 workers will be hired locally. One construction camp is proposed per package with expected workers population of only 60-70, This is unlikely to 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 sourced. No explosives or chemicals are likely to be used. Bitumen waste if any generated during construction will either be recycled or disposed off in a controlled manner.
Community safety risks due to both accidental and natural causes, especially where the structural elements on 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 and decommissioning.		X	No such impacts are anticipated. Adequate awareness will be created amongst people and workers through information disclosure, safety signage, and 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.

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

i. 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.
ii. 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.
iii. 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.
iv. 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

i. 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.
ii. 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;
iii. 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.
iv. 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.
v. 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 FOR NIRTALA MANDI BAMORA ROAD

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
A. Design and Construction Stage								
1. Alignment								
1.1 Pavement damage and inadequate drainage provisions in habitat areas	• Selection of suitable pavement design in habitat areas 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 habitat's houses • Provision of adequate no of cross drainage pattern around the alignment	Design requirement	• All habitat areas throughout the alignment	During the design stage		Included in construction cost	Design consultant	SQC/MPRDC
1.2 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 sign boards near schools, hospitals,	Design requirement	• All Ghats, portions and places where height of embankment is more than 3.0m	During the design stage		Included in construction cost	Design consultant	SQC/MPRDC

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
	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							
2. Natural Hazards								
2.1 Protection for damage from Earthquake	• Design considering relevant IRC guidelines for earthquakes in bridges		Throughout the stretch	Incorporation of IRC guidelines in earthquake in bridge design	Review of bridge design	Project preparation cost	Design Consultant	MPRDC (SQC)
2.2 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/bridge to increase their carrying capacity	IRC: 34 Recommendation for road construction in waterlogged area and IRC: 75 and MORT&H guidelines for Design of High Embankments	All the existing culverts/bridges	Designof both cross & side drains, no. of slab/box culverts of Hume pipes		Included in construction cost	Design consultant	MPRDC (SQC)
3. Shifting of utility structures								
3.1 Disruption of utility services to local community	• All telephone and electrical poles/wires and underground cables should be shifted before start of construction • Necessary permission and payments should be made	Project requirement	Throughout the corridor	Utility Shifting plan Complaints from local people Status of local utility services	Interaction with concerned utility authorities and local public	Included in construction	Contractor/SQC	MPRDC (SQC/CSC)

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
	to relevant utility service agencies to allow quick shifting and restoration of utility services • Local people must be informed through appropriate means about the time of shifting of utility structures and potential disruption of services if any							
B. Construction Stage								
1. Air Quality								
1.1 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	MORT&H specifications for Road and Bridge works Air (P and CP) Act 1974 and Central Motor and Vehicle Act 1988	Throughout project corridor	PM10 level measurements Dust pollution or complaints of locals	Standards CPCB methods Observations Public consultation	Included in project cost	Contractor	MPRDC (SQC)/CSC
1.2 Emission of air pollutants (HC, SO2, NOX, CO etc) from vehicles due to traffic congestion and use of	• Regular maintenance of machinery and equipment • Batching, asphalt mixing	The Air (Prevention and Control of Pollution) Act 1981 (Amended 1987) and Rules	Asphalt mixing plants, crushers, DG sets locations	Monitoring of ambient air quality of checking PUC certificates	Standards CPCB methods	Included in project cost	Contractor	MPRDC (SQC)/CSC

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
equipment and machinery	plants and crushers at downwind (1km) direction from the nearest settlement • 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	1982						
2. Noise								
2.1 Noise from construction vehicle, equipment and machinery	• All equipment to be timely serviced and properly maintained • Bottlenecks to be removed • Construction equipment machinery to be fitted with silencers and maintained properly • Only IS approved equipment shall be used for construction activities • Timing of noisy construction activities shall	Legal requirement Noise Pollution (Regulation and Control) Rules, 2000 and amendments thereof + Clause No. 501.8.6 MORT&H Specifications for Road and Bridge Works	Throughout project section especially at construction sites, residential and identified sensitive locations	Noise levels measurements Complaints from local people	As per Noise rule, 2000 Consultation with local people	Included in Project Cost Plantation cost is separate	Contractor	MPRDC (SQC)/CSC

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
	be done during nighttime and weekends near sensitive receptors such as schools and temples, concurrent noisy operations may be separated to reduce the total noise generated, and if possible, re-route traffic during constructions 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 multilayered plantation to serve as mitigation option for operation phase • Honking restrictions near sensitive areas • PPEs to workers • Noise monitoring as							

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
	per EMoP							
3. Land and Soil								
3.1 Land use change and loss of productive/top soil	• Non-agricultural areas to be used as borrow areas to the extent possible • If using agricultural land, top soil to be preserved and laid over wither on the embankment slope for growing vegetation to protect soil erosion	Project requirement	Throughout the project section and borrow areas	Borrow pit of locations Top soil storage area	Review of borrow area plan, site visits	Included in construction cost	Contractor	MPRDC (SQC)/CSC
3.2 Slope failure and Soil erosion due to Construction activities, earthwork, and cut and fill, stockpiles etc.	• Bio-turfing embankments to protect slopes • Slope protection by providing frames, dry stone pitching, 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 specification. Care should not be taken that the slope gradient shall not be greater than 2.1 • The earth stock piles to be provided with	IRC: 56-1974 recommended practice for 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	Throughout the entire project road especially along hilly areas	Occurrence of slope failure or erosion issues	Review of design and documents and site observation	Included in Construction Cost	Design consultant and Contractor	MPRDC (SQC)/CSC

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
	gentle slopes to prevent soil erosion							
3.3 Borrow area management	• Non-productive, barren lands, upland shall be used for borrowing earth with the necessary permission/ 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 pts (IRC 10:1961) • Borrow areas not to be dug continuously • To the extent borrow areas shall be sited away from habituated areas. Borrow areas shall be leveled with salvaged material or other	IRC Guidelines and borrow areas and for quarries (Evironmental Protection Act and Rules, 1986; Water Act, Air Act) + Clause No. 305.2.2 MORT&H Specification for Road and Bridge works Guidelines V for Borrow Areas management	Borrow sites location	Existence of borrow areas in inappropriate unauthorized locations Poor borrow area management practices Incidents of accidents Complaints from local people	Review of design documents and site observation	Included in construction cost	Design consultant and Contractor	MPRDC (SQC)/CSC

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
	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. Rehabilitation of the borrow areas as per Guidelines for redevelopment of Borrow Areas.							
3.4 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 Specification for Road and Bridge works Guidelines VI for Quarry Areas Management	Quarry area locations	Existence of licenses for all quarry areas from which materials are being sourced Existence of a quarry redevelopment plan Complaints from local people	Review of design documents, contractor documents and site observation	Included in Construction Cost	Contractor	MPRDC (SQC)/CSC
3.5 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	Design requirement	Parking areas. Haulage roads and construction yards	Location of approach and haulage roads Presence of destroyed/	Site observation	Included in construction cost	Contractor	MPRDC (SQC)/CSC

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
	ROW to avaoid 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.			compacted agricultural land or land which has not been restored to its original condition				
3.6 Contamination of soil due to leakage/ spillage of oil, bituminous and no bituminous debris generated from demolition and road construction	• Construction vehicles and equipment will be maintained and refueled in such a fashion that oil/ diesel spillage does not contaminate the soil • Fuel storage and refueling sites to be kept away from drainage	Design requirement	Fuelling station, construction sites, and construction camps and disposal location	Quality of soil near storage area Presence of spilled oil or bitumen in project area	Site observation	Included in construction cost	Contractor	MPRDC (SQC)/CSC

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
	channels • All excavated materials from roadway, shoulders, verges, drains, cross drainage will be used for backfilling embankments, filling pits, and landscaping • 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 • Unusable and non-bituminous debris materials should be suitably disposed of in an environmentally acceptable manner at pre-designated disposal locations, with approval of the concerned authority. The							

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
	bituminous wastes shall be disposed in secure landfill sites only in environmentally accepted manner. MOSRTH guidelines should be followed							
4. Water Resources								
4.1 Sourcing of water during construction	• Requisite permission shall be obtained for abstraction of groundwater from Central Groundwater Authority • Arrangements shall be made by contractor that the water availability and supply to nearby communities remain unaffected.	-	Throughout the Project section	Approval from competent authority Complaints from local people on water availability	Checking of documentation Talk to local people	Included in construction cost	Contractor	MPRDC (SQC)/CSC
4.2 Disposal of water during construction	• Provisions shall be made to manage construction waste water in an environmentally sensitive manner. Waste water will be reused for construction and irrigation purposes only. No-runoff water will be discharged to	Clause No. 1010 EP Act 1986 MORT&H Specifications for Road and Bridge Works	Throughout the Project Section	Design of road side drains Existence of proper drainage system for disposal for waste water	Standards methods Site observation and review of documents	Included in construction cost	Contractor	MPRDC (SQC)/CSC

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
	existing pond used for domestic and recreational purposes.							
4.3 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 level shall be raised above HFL level wherever road level is lesser than HFL	Design requirement, Clause No. 501.8.6 MORT&H Specifications	Near all drainage channels, river crossings, etc.	Design of road side drains	Review of design documents Site observation	Included in construction cost	Contractor	MPRDC (SQC)/CSC
4.4 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 stockpiles for possible reuse as surfacing of slopes where they have to be re-vegetated • Earthworks and	Design requirement, Clause No. 501.8.6 MORT&H Specification for Road and Bridge works (CP and CP) and worldwide best practices	Near all water bodies, river embankment slopes	Siltation of rivers, streams, ponds and other water bodies in project area	Field observation	Included in construction cost	Contractor	MPRDC (SQC)/CSC

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
	stone works to be prevented from impeding natural flow of rivers, streams and water canals or existing drainage system							
4.5 Deterioration in Surface water quality due to leakage from vehicles and equipment and waste from construction camps	• No vehicles or equipment should be parked or refueled 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 and warehouse personnel will be trained in immediate response for spill containment and eventual clean-up. Readily available, simple to understand	The Water (Prevention and control of Pollution) Act, 1974 and amendment thereof	Water bodies refueling stations, construction camps	Water quality of ponds, streams, rivers, and other water bodies in project Presence of oil floating in water bodies in project area	Conduction of water quality tests as per the monitoring plan Field observation	Included in construction cost	Contractor	MPRDC (SQC)/CSC

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
	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 monitored periodically							
5. Flora and Fauna								
5.1 Vegetation loss due to site preparation and construction activities	• Minimize tree cutting to the extent possible • Roadside trees to be removed • Compensatory plantation at 1:10 basis and additional plantation as per the IRC guidelines in consultation with the Forest Department • Regular maintenance of all trees planted • Provision of LPG in construction camp as fuel	Forest Conservation Act 1980 + IRC SP: 21 and IRCSP:66	Throughout project corridor	ROW width Number of trees for felling	Review of relevant Documents 193 Tree cutting permit, Compensatory plantation plan Field observations	Road side plantation cost is included in the project cost	Relevant agency specialized in afforestation	MPRDC (SQC)/CSC

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
	source to avoid tree cutting, wherever possible • Plantation 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 • In the event of design changes during the construction stages additional assessments including the possibility to save tres shall be made by the							

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
	EA • Roadside Plantation Strategy as per IRC specifications including manuring • Control use of perticides/ fertilizers							
6. Construction Camps								
6.1 Impact associated with location	• The contractor, no later than 30 days after the issuance of the Notice to Proceed will prepare and submit a Health and Safety Plan to the Engineer (CSC) for review and approval. This H&S will have the following measures. • All camps should maintain a minimum distance from the following: 500m from habitation	Design requirement	All construction camp	Location of campsites and distance from habitation, forest areas, water bodies, through traffic route and other construction camps	On site observation Interaction with workers and local community	Included in construction cost	Contractor ad EO	MPRDC (SQC)/CSC
6.2 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	The Building and other construction workers (Regulation of Employment and Conditions Act 1996 and the Water4 (Prevention and Control of Pollution) Act	All construction camps	Camp health records Existence of proper first aid and kit in camp site Complaints from local people	Camp records Site observation Consultation with local people living mearby	Part of the construction costs	Contractor	MPRDC (SQC)/CSC

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
	approval of SQC. • The contractor will maintain necessary living accommodation and ancillary 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 in the camp • Waste disposal facilities such as dust bins must be provided in the camps and regular disposal of waste must be carried out. • 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	1974 and amendments thereof						

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
	regulations. • No alcoholic liquor or prohibited drugs will be imported to sell, give, barter to the workers of the host community. • Awareness raising to immigrant workers/local community on communicable and sexually transmitted diseases. • Good practices in waste minimization and pollution prevention: pollution prevention to include good housekeeping and operating practices, first-in-first-out (FIFO) principle; buy-back by the suppliers of all containers and drums and waste segregation							
7.	**Management of Construction Waste/Debris**							
7.1 Selection of Dumping Sites	• Unproductive/ wastelands shall be selected for dumping sites. • Away from residential areas and water bodies • Dumping sites	Design requirement and MORT&H guidelines	At all dumping sites	Location of dumping sites Public complaints	Field survey and interaction with local people	Included in construction cost	Contractor	MPRDC (SQC)/CSC

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
	have adequate capacity equal to the amount of debris generated • Public perception and consent/ approval from the village Pachayats and other concerned authorities has to be obtained before finalizing the location							
7.2 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 and non-bituminous debris materials should be suitably disposed of in	MORT&H guidelines	Throughout the project corridor	Percentage of reuse of existing surface material Method and location of disposal site of construction debris	Contractor records Field observation Interaction with local people	Included in construction cost	Contractor	MPRDC (SQC)/CSC

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
	an environmentally acceptable manner 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 in an environmentally accepted manner subject prior approval by the Panchayat and other concerned authorities.							
8. Traffic Management and Safety								
8.1 Management of existing traffic and safety	• Temporary traffic diversion shall be planned by the contractor	Design requirement and IRC SP:55	Throughout the project corridor especially at intersections	Traffic management plan Safety signs on	Review traffic management plan	Included in construction cost	Contractor	MPRDC (SQC)/CSC

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
	and approved by the "Engineer". • The traffic control plans shall contain details of diversions; traffic safety arrangements during construction; safety measures for night time traffic and precautions for transportation of hazardous materials. Traffic control plans shall be prepared in line with requirements 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 stretched where it is not possible to pass the traffic on the part width of existing carriageway, temporary paved diversions will			site Number of traffic accidents	Field observation of traffic management and safety system Interaction with people			

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
	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 the "Engineer". • Use of adequate signages to ensure traffic management and safety. Conduct regular safety measures.							
8.2 Pedestrians, animals movement	• 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 movements is expected. • To avoid the need for cattle underpasses, some of the	Design requirement and IRC: 27-1984 Report Containing Recommendation of IRC Regional Wrkshops on Highway Safety IRC:SP:32-1988 Road safety for Children IRC:SP 44 1994 Highway IRC:SP:55-2001 Guidelines for Safety n Construction Zones The Building and other	Near habitation on both sides of schools, temples, graveyards, construction sites, haulage roads, diversion sites	Road signage & Drainage as per IRC guideline Complaints from local people	Field observation interaction with local people	*Included in construction cost*	Contractor	MPRDC (SQC)/CSC

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
	proposed culverts near habitations may be widened to facilitate cattle movement.	construction workers Act 1996 and Cess Act of 1996 Factories Act 1948						
8.3 Safety of Workers and accident risk from construction activities	• The Contractor, no later than 30 days after the issuance of the Notice to Proceed will prepare and submit a Health and Safety Plan to the Engineer (CSC) for review and approval. This H&S will have the following measures: • 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,		Construction sites	Availability of Safety gears to workers Safety signage Training records and safety Number of safety related accidents	Site observation Review records on safety training and accidents Interact with construction workers	Included in construction cost	Obligation of Contractor	MPRDC (SQC/CSC

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
	gangway, stairwells, excavations, trenches and safe means of entry and egress shall be compiled with. • Provision of PPEs to workers • Provision of a readily available first and 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. • Good practices in waste minimization and pollution prevention: pollution prevention to include good housekeeping and operating practices, first-							

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
	in-first-out (FIFO) principle; buy-back by the suppliers of all containers and drums and waste segregation							
8.4 Accident risk to local community	• Restrict access to construction sites to authorized personnel • Physical separation must be provided for movement and vehicular and human traffic • Adequate signage must be provided for safe traffic movement		Construction sites	Safety signs and their location Incidents of accidents Complaints from local people	Site inspection Consultation with local people	Included in construction cost	Contractor	MPRDC (SQC)/CSC
9.	**Site restoration and rehabilitation**							
9.1 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, culvert, road-side areas, camps, hot mix plant sites, crushers, batching plant	Project requirement	Throughout the project corridor, construction camp sites and borrow areas	Clean and restored camp sites Presence/absence of construction material/debris	Site observation Interaction with locals Issue completion certificate after restoration of all sites are found satisfactory	Included in construction cost	Contractor	MPRDC (SQC)/CSC

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
	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 this regard							
C. Operation stage								
1. Air quality								
1.1 Air pollution 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 • Technological and behavioral changes	Environmental Protection Act 1986; The Air (Prevention and Control of Pollution) Act 1981	Throughout the Corridor	Ambient air quality (PM10, CO, NOx) Survival rate of trees planted	As per CPCB requirements Site inspection	Included in Operation/ Maintenance cost		MPRDC (SQC)

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
	• Road signs shall be provided reminding the motorist to properly maintain their vehicles to economize on fuel consumption and protect the environment							
2. Noise								
2.1 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 sped 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 reduction	Noise Pollution (Regulation and Control) Rules, 2000 and amendments thereof	Sensitive receptors	Noise levels	Noise monitoring as per noise rules, 2000 Discussion with people in sensitive receptor sites	Included in Operation/ Maintenance cost		MPRDC (SQC)

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
	measures while constructing a building close to the road							
3. Land and Soil								
3.1 Soil erosion at embankment during heavy rainfall	• 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							
4. Water resources/Flooding and Inundation								
4.1 Siltation	• Regular checks shall be made for soil erosion and turfing conditions of river training structure for its effective maintenance	Project requirement	Near surface water bodies	Water quality	Site observation	Included in Operation/ Maintenance		MPRDC (SQC)
4.2 Water logging due to blockage of drains, culverts or streams	• Regular visual checks and cleaning of drains 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	Project requirement	Near surface water bodies	Presence of flooded areas or areas with water stagnation	Site observation	Included in operation/ maintenance		MPRDC (SQC)

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
	stagnant water bodies							
4.3 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 requirement	Flood prone sections	Incidents of flooding and road inundation with details on chainage	Field observation interaction with local community	Included in Operation/ Maintenance cost		MPRDC (SQC)
5. Flora								
5.1 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	Forest Conservation Act 1980	Project tree plantation sites	Minimum of 70% of tree survival	Records and fields observations	Included in operation/ maintenance cost		MPRDC (SQC)
6. Maintenance of Right of Way and Safety								
6.1 Accident Risk due to uncontrolled growth of vegetation	• Efforts shal 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	Presence of and extent of vegetation growth on either side of road	Visual inspection Accident records	Included in operation/ maintenance cost		MPRDC (SQC)
6.2 Accident risks associated with traffic movement	• Traffic control measures including speech limits will be enforced strictly	IRC:SP-55	Throughout the Project route	Police records on accident Condition and existence of safety	Review accident records Site	Included in operation/ maintenance cost		MPRDC (SQC)

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
	• Further encroachment of squatters within the ROW will be prevented • No school or hospital will be allowed to be established beyond the stipulated planning line as per relevant local law • 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			signs, rumble strips etc on the road Presence/ absence of sensitive receptor structures inside the stipulated line as per relevant local law	observations			
6.3 Transport of Dangerous hazardous material	• Existence of spill prevention and control and emergency responsive		Throughout the project stretch	Status of emergency system – whether operational or not	Review of spill prevention and mergency response system	Included in operation/ maintenance cost		MPRDC (SQC)

Environmental Issue/Component	Remedial Measure	Reference to laws/guidelines	Location	Time Frame/ Monitoring Indicators	Monitoring Methods	Mitigation Cost	Institutional Responsibility	
							Implementation	Supervision
	system • Emergency plan for vehicles carrying hazardous material							

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

a. The “Project engineer” or “the engineer” is the team of Construction Supervision Consultants (CSC) responsible for approving the plans, engineering drawing, release of payments to contractor etc. on behalf of the employer (MPRDC). It is usually the team leader of the CSC that takes the responsibility of signing approval documents on behalf of the CSC team.

b. The “environmental officer” is the environmental specialist under the CSC who is responsible for providing recommendations to the CSC team leader for approving activities specific to environment safeguards on behalf of “the engineer”.

Appendix-4: Monitoring Frequency

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 5 sites	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	Sindhu river tributaries and ground water at construction camp sites	3 times in a year for 3 years or construction period At 5 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 , 5 locations	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 carrying hazardous materials	-	PIU through an approved agency	PIU, MPRDC

Environmental Components	Monitoring			Location	Frequency	Institutional Responsibility	
	Parameters	Special Guidance	Standards			Implementation	Supervision
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)($\mu g/m^3$)	Annual Average* 24 Hours**	50 80	20 80
2.	Oxides of Nitrogen (NOx) ($\mu g/m^3$)	Annual Average* 24 Hours**	40 80	30 80
3.	Particulate Matter (Size Less Than 10 □m) or PM_{10} ($\mu g/m^3$)	Annual Average* 24 Hours**	60 100	60 100
4.	Particulate Matter (Size Less Than 2.5 □m) or $PM_{2.5}$ ($\mu g/m^3$)	Annual Average* 24 Hours**	40 60	40 60
5.	Ozone O_3 ($\mu g/m^3$)	8 Hours* 1 Hours**	100 180	100 180
6.	Lead (Pb) ($\mu g/m^3$)	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) ($\mu g/m^3$)	Annual Average* 24 Hours**	100 400	100 400
9.	Benzene (C_6H_6) ($\mu g/m^3$)	Annual*	5	5
10.	Benzo (a) Pyrane (BaP) particulate phase only ($\mu g/m^3$)	Annual*	1	1
11.	Arsenic (As) ($\mu g/m^3$)	Annual*	6	6
12.	Nickel (Ni) ($\mu g/m^3$)	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

Sn.	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
Sn.	**Parameters**	**Essential Standards**	**Relaxed Standards**
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}	

Note: A-Desirable or essential

B-Relaxable under certain circumstances such as no alternate source being Available.

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.
2. Night time shall mean from 10.00 p.m. to 6.00 a.m.
3. 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.
4. Mixed categories of areas may be declared as one of the four above-mentioned categories by the competent authority.

APPENDIX-8:DETAILS OF PARTICIPANTS AND PUBLICS CONSULTANTS PHOTOGRAPH


08/07/2014


08/07/2014


08/07/2014


08/07/2014

Details of Participants of Public Consultation/FGD

Village: निवल्ला
Block/District: खोरई, सागर
Date:

S.No.	Name	Cast (Gen, OBC, SC, ST)	BPL Card (Y/N)	Signature
	Sunanda Nayak	Gen	No	[signature]
	श्रीमती गीता त्रिपाठी आं.बा.का.	"	Y	गीता त्रिपाठी
	" बबली राय (आशा)	"	Y	बबली
	" सीया रानी अहिरवार	SC	Y	[thumbprint] सीया रानी
	श्री संजय पटेरिया	"	Y	[signature]
	श्रीमती चंदा बाई	"	Y	चंदाबाई
	" जानकी बाई कुर्मी	OBC	NO	जानकी
	" ऊषा बाई अहिरवार	SC	Y	ऊषा
	" अहिल्या बाई कुर्मी	OBC	Y	अहिल्या

Details of Participants of Public Consultation/FGD

Village: सरखेड़ी
Block/District: सागर - खुरई
Date: 08/07/2014

S.No.	Name	Cast (Gen, OBC, SC, ST)	BPL Card (Y/N)	Signature
	श्रीमति अनीता सोमकुंवर	Gen	✓	अनीता
	" अरुणा नायक	-"-	✓	अरुणा नायक
	" आजाद रानी	-"-	✓	आजाद रानी
	" सुमन अहिरवार	SC	✓	सुमन अहिरवार
	" कुसुम रानी	Gen	✓	कुसुम रानी
	" प्रित रानी	Gen	✓	प्रित रानी
	" कुँवर बाई	SC	✓	कुवर बाई
	" शशी रैकवार	OBC	✓	शशी
	" मुन्नी बाई	SC	✓	मुन्नी

Details of Participants of Public Consultation/FGD

Village: रहलवारा
Block/District: खुरई - सागर
Date:

S.No.	Name	Cast (Gen, OBC, SC, ST)	BPL Card (Y/N)	Signature
	श्री बारेलाल साहू			बारेलाल साहू
	" कपूर सिंग	ST		कपूरसिंह
	" राजासिंह राजपूत	Gn		नवधाप्रसाद
	" नरबदा प्रसाद अहिरवार	SC		
	श्रीमती मूर्ति बाई राजपूत	Gn		[illegible]
	" मलका बाई राजपूत	Gn		[illegible]
	" राम बाई चढार	SC		[illegible]
	" रामसखी बाई अहिरवार	SC		
	" कुसुम लोधी	OBC		
	" मोती बाई ठाकुर	Gn		मोतीबाई
	श्री हुमन सिंग चढार			हुमन
	" रतन अहिरवार			रतनलाल
	" सोनू चढार			सोनू चढार
	" रूप सिंग राजपूत			रूपसिंह
	" राजासिंगराजपूत			राजा

Details of Participants of Public Consultation/FGD

Village: पामोरा
Block/District: खुरई – सागर
Date: 8/

S.No.	Name	Cast (Gen, OBC, SC, ST)	BPL Card (Y/N)	Signature
	श्री रामकरण सिंह रघुवंशी	Gn	N	रामकरण सिंह
	" कल्याण सिंह रघुवंशी	"	N	कल्याण सिंह
	" बद्रीप्रसाद शर्मा	"	N	बद्रीप्रसाद शर्मा
	" संजय शर्मा	"	N	संजय शर्मा
	" अनिल रघुवंशी	"	N	अनिल रघुवंशी
	" अरविन्द रघुवंशी	"	N	अरविन्द रघुवंशी
	" दोटे लाल प्रजापति	OBC	Y	दोटेलाल
	" चरण सिंह	"	Y	चरणसिंह
	" सिन्धु विश्वकर्मा	"	Y	सिन्धु विश्वकर्मा
	" पुरुषोत्तम विश्वकर्मा	"	Y	पुरुषोत्तम विश्वकर्मा
	" अंकित ~~सिंह~~ रघुवंशी	Gn	N	
	सागर कुमार	"	N	–
	राजाभाई अहिरवार	SC	Y	[illegible]
	सुशील प्रजापति	OBC	N	सुशील
	अफजल खान	"	N	अफजल खान
	नन्दु रघुवंशी	Gn	N	नन्दु सिंह

Details of Participants of Public Consultation/FGD

Village: चंनसरा
Block/District: खुरई – सागर
Date:

S.No.	Name	Cast (Gen, OBC, SC, ST)	BPL Card (Y/N)	Signature
	श्री संग्राम सिंह ठाकुर (सरपंच)	OBC	N	संग्राम सिंह
	॥ अर्जुन सिंह ठाकुर	OBC	BPL	अर्जुन सिंह
	~~॥ मन्ने सिंह ठाकुर~~			
	॥ नंदकुलाम बालू सिंह ठाकुर	OBC	N	नंदकुलाम सिंह
	॥ पदलाद सिंह	OBC	Y	पदलाद सिंह
	॥ फुदेवेन्द्र सिंह	OBC	N	फुदेन्द्र
	॥ राघवेन्द्र सिंह	OBC	N	~~Rgt~~
	॥ सचेन्द्र सिंह	OBC	N	~~Sachen~~
	॥ धर्मेन्द्र सिंह	OBC	N	~~Dharm~~
	॥ देवेन्द्र सिंह	OBC	N	राघवेन्द्र
	॥ कमला सिंह	OBC	Y	कमला देवी
	॥ राम सिंह	OBC	Y	राम सिंह
	॥ वीर सिंह	OBC	Y	वीर सिंह
	॥ लाखन सिंह	OBC	N	लखन
	॥ केवट सिंह	OBC	N	[illegible]
	॥ सरदार सिंह	OBC	N	[illegible]
	॥ भैरव सिंह 9926350990	OBC	N	भैरव सिंह
	॥ देवेन्द्र सिंह	OBC	Y	~~Ravindra~~

APPENDIX-9: GRM PROCEDURES 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 रोड डेव्हलपमेंट 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/अतिक्रमणधारी /फेरी वाला है। तथा वह 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, रोड निर्माण से प्राप्त होने वाले लाभ को समझ लिया है एवं रोड 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 रोड 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 व्यवसायिक इकाईयों को नुकसान से बचाने के लिये सभी संभव सावधनियां पूर्वक कार्य करेगा।

7- यह कि प्रथम पक्ष द्वारा द्वितीय पक्ष को यह आश्वासन दिया जाता है कि वह 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 –.....

(गवाह/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

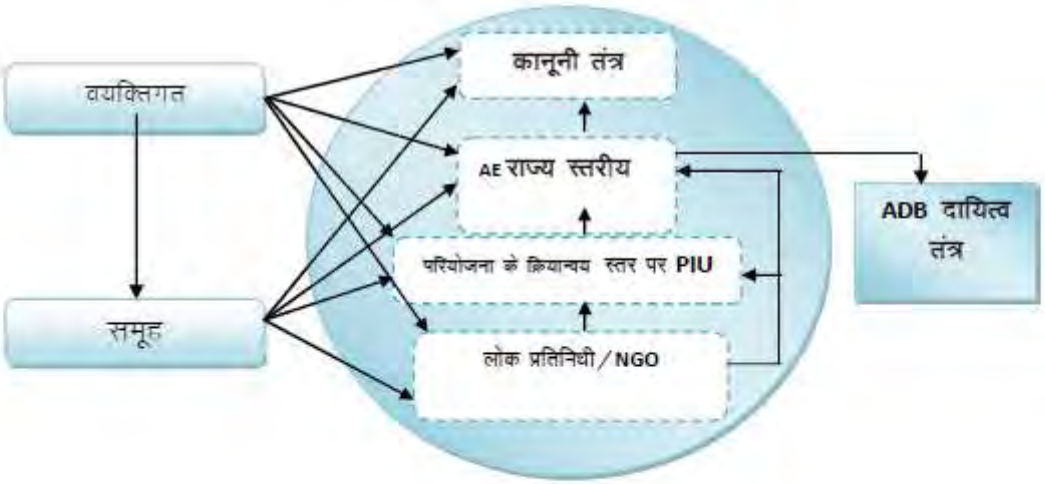
5.1 सड़क निर्माण परियोजना से संबंधित विशेष शिकायत निवारण तंत्र (GRM) स्थापित किया जायेगा जिसके तहत विस्थापित व्यवसायिक इकाईयों, संबंधित शिकायतो, सामाजिक तथा पर्यावरण संबंधित शिकायतों का निराकरण करने की सुविधापरियोजना स्तर पर प्रदान की जायेगी, यह तंत्र सामाजिक तथा पर्यावरण संबंधी समस्या, शिकायत या शकाओं 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 नज़र अंदाज करना नही है बल्कि जन साधारण को निर्माण से होने वाले लाभ को बताना तथा पारदर्शिता के साथ समस्या तभा 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 मा. न्यायालय के आदेश पूर्व बाहयकारी 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 प्रतिष्टित व्यक्ति, जन प्रतिनिधी, जिला परिषद प्रतिनिधी, कमजोर तबके के व्यक्ति तथा 2 महिला प्रतिनिधी शमिल 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 शिकायतोंव 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 स्वामित्व अधिकारी से संबंधित विवादो के अलावा यह समिति समस्त पुर्नवास स्थानांरतण, 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										