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Green National Highways Corridor Project

Environmental Management Framework

A Guidance Document to deal with Environmental Issues during Planning, Design and Construction of Roads Under the Project

Revised Draft Version

November 30, 2019

Ministry of Road Transport and Highways
Government of India

List of Acronyms

AMSL	Above Mean Sea Level
ASI	Archaeological Survey of India
BOD	Biological Oxygen Demand
BP	*Bharatmala Pariyojana*
BOQ	Bill of Quantities
CCE	Chief Controller of Explosives
CGWB	Central Ground Water Board
CoI	Corridor of Impact
CPCB	Central Pollution Control Board
CO	Carbon Monoxide
CO2	Carbon Dioxide
COD	Chemical Oxygen Demand
CoI	Corridor of Impact
COP	Conference of the Parties
COPA	Conditions of Particular Application
CPCB	Central Pollution Control Board
CSC	Construction Supervision Consultant
CSR	Corporate Social Responsibility
CWW	Chief Wildlife Warden
dB(A)	Decibel (A)
DEAC	District Expert Appraisal Committee
DEIAA	District Level Environmental Impact Assessment Authority
DFO	Divisional Forest Officer
DPR	Detailed Project Report
E-coli	Escherichia coli
EC	Environmental Clearance
EHS	Environmental, Health and Safety
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EMF	Environment Management Framework
EMP	Environment Management Plan
EO	Environmental Officer
ESR	Environmental Screening Report
FIDIC	Fédération Internationale Des Ingénieurs-Conseils
GHG	Green House Gas
GNHCP	Green National Highways Corridor Project
GoI	Government of India
IAHE	Indian Academy of Highway Engineers
ICB	International Competitive Bidding
IRC	Indian Roads Congress
IS	Indian Standards
K	Potassium
Km	Kilometer
LPI	Logistics Performance Index
m	Meter

MDR	Major District Road
MoEFCC	Ministry of Environment, Forest and Climate Change, Govt. of India
MoRTH	Ministry of Road Transport and Highways, Govt. of India
MT	Metric Ton
N	Nitrogen
NAAQS	National Ambient Air Quality Standards
NBWL	National Board for Wildlife
NCB	National Competitive Bidding
NGHM	National Green Highways Mission
NGO	Non-Governmental Organization
NH	National Highways
NHDP	National Highways Development Program
NHAI	National Highways Authority of India
NHIIP	National Highway Interconnectivity Improvement Project
NOC	No Objection Certificate
NO_2	Nitrogen Dioxide
ODR	Other District Road
OP	Operational Policies
P	Phosphorous
PAP	Project Affected Person
Pb	Lead
PCU	Passenger Car Units
PDO	Project Development Objective
PIC	Project-in-Charge
PIU	Project Implementation Unit
PM10	Particulate Matter 10
PM2.5	Particulate Matter 2.5
PMC	Project Management Cell
PWD	Public Works Department
RAP	Resettlement Action Plan
RO	Regional Officer, MoRTH
RoW	Right of Way
SBD	Standard Bidding Document
SEAC	State Expert Appraisal Committee
SEIAA	State Level Environmental Impact Assessment Authority
SH	State Highways
SIA	Social Impact Assessment
SO_2	Sulphur Dioxide
SPCB	State Pollution Control Board
TA	Technical Assistance
ToR	Terms of Reference
WB	The World Bank
WMM	Wet Mix Macadam

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Executive Summary

E.1 Background

1. India's road network of 5.48 million kilometers is the second largest and most dense[1] in the world. It carries 65 percent of freight traffic, 85 percent of the total passenger traffic in the country and comprises of a primary network of 116,000 km of National Highways (NH), a secondary network of 160,000 km of State Highways (SH) along with Major and Other District Roads (MDR & ODR), and a tertiary network of Rural Roads. The responsibility for planning, construction and maintenance of the primary network lies with the Ministry of Road Transport and Highways (MoRTH), Govt. of India. The MoRTH also formulates national policies and legislations governing road transport.

2. In the last sixty years, the vehicle population grew at a Compound Annual Growth Rate (CAGR) of 10.8 percent putting pressure on the road network. The current passenger traffic is 12,000 Billion passenger-kilometer (BPKM) and it is projected to grow at an annual rate of 15 percent and become 168,000 BPKM by 2032. The current freight traffic is 2,000 Billion ton-kilometer (BTKM) and it is projected to grow at an annual rate of 9.7 percent and become 13,000 BTKM by 2032. In contrast with these growth rates, the NH network, which comprise only 2 percent of the total road network but carries about 40 percent of the road traffic, has grown at a rate of only 2.2 percent over the last sixty years and about 40 percent of the network is in poor condition.

3. In 1998, the Govt. of India (GoI) launched the NHDP covering 56,000 km of NH for development, spread across 7 phases. It is the biggest program (of value about $50 billion) so far that has been taken up by MoRTH primarily through the National Highways Authority of India (NHAI), an independent entity under the aegis of the same ministry. It also consisted of four/six laning of the Golden Quadrilateral (the highways connecting the four metros of Delhi, Mumbai, Chennai and Kolkata) and the North-South and East-West Corridors.

4. The national highways not covered under the NHDP form a part of non-NHDP network. Most of the roads that form this network are of poor quality and capacity (single/intermediate/two-lane width) and thereby present unsafe and poor traveling conditions. In the recent years, the Govt. of India has launched some specific programs to develop these roads as these connect the hinterland of the country and are key to the government's objective of equitable and inclusive growth. These programs among others include the National Highways Interconnectivity Improvement Project (NHIIP), funded by the World Bank and is currently under implementation.

5. Considering that the sector still faces major challenges in terms of efficient movement of goods, the MoRTH has recently launched the *Bharatmala Pariyojana* Program (BPP) which aims to enhance effectiveness of already built infrastructure; support multi-modal integration, bridging infrastructure gaps for seamless movement; augment inclusiveness by connecting 550 districts through highway linkages; improvement of Logistics Performance Index (LPI) of the country and; creation of jobs. It envisages development of about 26,000 km of economic corridors; 8,000 km of Inter-Corridors; 7,500 km of Feeder Roads; 1,800 km of Expressways; 1,300 km of Port-

[1] At 1.66 km/sq km of area, which is higher than that of USA, China, Japan and Russia

Connectivity Roads; 2,000 km of Coastal Roads; 2,000 km of International Connectivity Roads; 3,300 km of border roads; 28 ring roads; 35 logistic parks; and improvement of 66 congestion points and 125 choke points.

E.2 Green National Highways Corridor Project

6. Creation of infrastructure to meet the burgeoning transport demand has resulted in improved connectivity in India but a lot needs to be done for seamless movement of traffic and efficient movement of logistics. Focusing primarily on ramping up connectivity of the NH network, little attention has been given on enhancing effectiveness of the infrastructure being built.

7. Most of the non-NHDP network is not built on a trunk transport and feeder route corridor-based approach. In addition to capacity constraints, poor maintenance and disregard for extreme and routine climatic impacts on the built infrastructure are directly affecting Vehicle Operating Costs. Consequently, the cost of movement of logistics in India is one of the highest (about 14 percent of GDP as against about 8-9 percent in developed countries). The road network is not integrated well with other modes of transport resulting in choke points especially around cities and at main intersections. An integrated approach based on enabling the seamless flow of freight and passengers through transport network needs to be built.

8. The Green National Highways Corridor Project (GNHCP) through its support to the Govt. of India's *Bharatmala Pariyojana*, will promote the vision of enhancing effectiveness of the transport network of India with cost and natural resources efficiency and safe high capacity highways. The list of roads (sub-projects) identified for inclusion in this project are given below:

National Highway Sections Proposed for Inclusion under GNHCP

S.No.	State	Highway	Section	Length (in kms)	Districts	Contract Packages (No.)
1.	Andhra Pradesh	NH-516E	Bowada to Vizianagram	26.94	Vishakhapatnam and Vijaynagaram	1
2.	Andhra Pradesh	NH-516E	Paderu to Araku	49.37	Vishakhapatnam	2
3.	Andhra Pradesh	NH-516E	Koyyuru to Paderu	133.43	Vishakhapatnam	3
4.	Himachal Pradesh	NH-707	Poanta Sahib to Gumma	94.99	Sirmaur, Shimla	4
5.	Himachal Pradesh	NH-707	Gumma to Fediz	9.80	Shimla	1
6.	Himachal Pradesh	NH 70	Hamirpur to Mandi	109.42	Hamirpur, Mandi	3
7.	Rajasthan	NH-158	Ras-Beawar-Mandal	116.75	Pali, Ajmer, Rajsamand and Bilwara	3
8.	Uttar Pradesh	NH-730C and NH-731K	Bewar to Pilibhit	183.43	Mainpuri, Faroukhabad, Shahjahanpur and Pilibhit	4
9.	Uttar Pradesh	NH-92	Bewar to Ettawa	57.35	Ettawa	2

9. The operation is also aligned with the Government of India's objective of eliminating poverty and ensuring access to minimum standard of basic needs for all citizens through investing in growth enablers transport and connectivity Infrastructure. The basic proposition includes strengthening of road pavement in addition to widening to two-lane/two-lane with paved

shoulder standards and promoting/ demonstrating green and resilient approaches while doing so.

10. The project includes upgradation, improvement and maintenance of about **782 kms**[2] of selected existing national highways (**nine sub-projects**) in the states of **Andhra Pradesh, Himachal Pradesh, Rajasthan** and **Uttar Pradesh.** These sections traverse through 15 districts and are likely to be processed for bidding through 23 different contract packages.

11. The proposed stretches of the national highways will be designed and implemented as corridors considering: (a) removal of choke points; (b) facilitating seamless movement of traffic and; (c) demonstrating resource efficiency, climate resilience, green and safety aspects in road design and construction. The design/Detailed Project Reports, Contract Documents and the Environmental Management Plans for these corridors could serve as models for the rest of the *Bharatmala Pariyojana*. Support to the National Green Highway Mission of the MoRTH will also be provided under this project.

E.3 Project Development Objective

12. The Project Development Objective (PDO) is to develop green and safe National Highway Corridors and enhancing the institutional capacity of Ministry of Road Transport and Highways (MoRTH) in mainstreaming green technologies. The proposed main indicators of the PDO will include the following:

    a) Natural resource efficiency gains in project highways

    b) Reduced carbon emissions in construction of project highways

    c) Climate resilience aspects incorporated in construction of project highways

    d) Reduced Vehicle Operating Costs on project highways

    e) Reduction of fatalities on project highways

    f) Policy, regulation and systems developed for mainstreaming the green solutions

E.4 Project Components

13. The proposed Project will systematically institutionalize the development of green and safe NHs by implementing pilots, broadening the knowledge base and creating the capability to design, implement and maintain green and safe highways. The institutionalization process will be realized by:

(a) Mainstreaming in NH development, the green innovation aspects, namely:

- enhancing efficient use of scarce natural resources
- reducing GHG emissions from construction and maintenance of highways, and
    - making the highways climate resilient;

(b) Enhancing the road safety management of NHs; and

(c) Building the policy framework for green highways development. Based on the foregoing,

[2] The small variation in total length (about 5 kms) mentioned in different project documents is on account of reference to existing vs. design lengths, which primarily varies due to provision of bypasses and realignments.

and in line with the PDO, this operation will have the following three components.

Component A: Green Highway Corridor Improvement and Maintenance

Total Cost: US$ 1,001 million, including IBRD USD 423.95 million

14. This component includes upgradation and maintenance for 5 years of about 782 km of selected existing National Highways in the states of Rajasthan, Himachal Pradesh, Uttar Pradesh and Andhra Pradesh as Green Highways and includes pilots demonstrating resource efficiency, climate resilience, green and safety aspects. These highways will be designed and implemented as corridors to remove choke points and support seamless movement of traffic. The design and contract documents and the Environmental Management Plans that would be prepared for these pilot corridors could serve as models for the rest of the Bharatmala Pariyojana.

15. This component will include: (a) civil works for construction and maintenance; (b) consulting services for supervision during construction and maintenance periods; (c) consultants/non-governmental organizations to assist the MoRTH in the implementation of the Resettlement Action Plans; (d) consulting services for overall project management (Project Management Consultant); (e) a Technical Audit Consultancy for independent verification of Disbursement Linked Indicators and to perform an annual integrated performance audit covering, among others, engineering designs, management of environmental and social mitigation plans, quality assurance, and compliance with loan and contract conditions; (f) a Road User Satisfaction Survey consultant to carry out baseline, midterm, and end stage users' perception of the positive/negative changes that the project brings about; and (g) land acquisition, resettlement & rehabilitation, shifting of utilities, implementation of Environmental Management Plans, tree cutting, afforestation and agency charges. The loan would provide 50 percent of the construction cost of civil works and 80 percent of cost of construction supervision during the construction period, the Project Management Consultancy and the Technical Audit Consultancy. All the remaining costs will be met through the government funds.

Component B: Institutional Capacity Enhancement

(Total Cost: US$ 34.5 million, including IBRD US$ 27.6 million)

16. This component will support capacity enhancement of MoRTH in its pursuit to conserve natural resources, improve climate vulnerability of National Highways network and reduce greenhouse gas (GHG) emissions from the transport sector, inter alia, by developing policies, guidelines and strategies, training, and mainstreaming the resource efficiency, climate resilience, green and safety aspects in the design, construction and maintenance of highways. This component will have the following five sub-components.

    (a) Sub-component B1: Development of a Climate Adaptation Policy, guidelines and mainstreaming climate resilience in National Highways design and construction processes (Total US$ 8 million, IBRD US$ 6.4 million): This sub-component will support disaster risk and impact assessment of about 5,000 km of the National Highway network, preparation of a Climate Adaptation Policy, updating key standards and manuals, and mainstream climate resilience in project design and implementation.

    (b) Sub-component B2: Development of policy, regulation and systems to reduce emissions from transport services (Total US$ 2 million, IBRD US$ 1.6 million): This involves

undertaking a study to map the freight volume and movement pattern on the entire National Highway network and identify constraints for efficient use of trucks, designing physical and digital freight management platforms for freight consolidation and interoperability, and recommend complementary innovative logistics solutions as well as transport operators' and regulators' coordination mechanism.

(c) Sub-component B3: Research and Development for mainstreaming resource efficiency and green solutions in National Highways design and construction processes (Total US$ 21 million, IBRD US$ 16.8 million): This sub-component will support systematic monitoring and evaluation, and documentation of results of the pilot works undertaken in the project for a period of five years through reputed educational/research institutions or universities and inputs provided for updating relevant standards and manuals.

(d) Sub-component B4: Development of guidelines and model documents for mainstreaming green and safe highways (Total US$ 1 million, IBRD US$ 0.8 million): This sub-component will support identifying gaps and documenting good practices in the design, implementation and maintenance stages for mainstreaming green and safe highways and preparation of documents, such as the template Terms of Reference for design and supervision of construction, bidding documents and project management process of the EPC contracts, including options for involvement of private sector in innovations in the design and construction aspects.

(e) Sub-component B5: Mainstreaming green and safe highways initiatives in the development of highways (Total US$ 2.5 million, IBRD US$ 2 million): This sub-component will support MoRTH in mainstreaming green and safe initiatives by replicating these in about 2,500 km of National Highway network.

Component C: Road Safety

(Total Cost: US$ 59 million, including IBRD US$ 47.2 million)

17. This component will support capacity enhancement of the MoRTH in road safety management inter alia in the areas of crash database, operationalization of the lead agency for road safety, strengthening safety enforcement and emergency medical response on the National Highways, capacity building and training. This component will have the following four sub-components.

(a) Sub-component C1. Support to the Integrated Road Accident Database Management System and the National Highway Safety System (Total US$ 37.5 million, IBRD US$ 30 million): This sub-component will support the ongoing road safety activities under the National Highways Interconnectivity Improvement Project, upon its closure, in development and implementation of (a) the Integrated Road Accident Database Management System for recording and analysis of road accidents, (b) the National Highway Safety System for road safety enforcement, and (c) updating codes and manuals.

(b) Sub-component C2. Support to operationalization of the National Road Safety Board (Total US$ 3 million, IBRD US$ 2.4 million): This sub-component will support the operationalization of the National Road Safety Board, and support its activities in the initial startup phase, through expert support as part of an interim secretariat. The activities will include (a) monitoring and evaluation, (b) drafting of rules for the MVAA, and (c) data analysis and recommendations.

(c) Sub-component C3. Strengthening highway patrol and emergency response along the project corridors (Total US$ 16.5 million, IBRD US$ 13.2 million): This sub-component will support establishment of combined enforcement and emergency response outposts at critical locations to improve enforcement and post-crash care. These outposts will be equipped with patrol vehicles, advanced life-saving ambulances, cranes, tow trucks, communication system, and surveillance and other enforcement equipment to deter speeding, drink driving and other risky user behaviors.

(d) Sub-component C4: Capacity building & training (Total US$ 2 million, IBRD US$ 1.6 million). This sub-component will support training and capacity building of the officials of MoRTH, implementing agencies of MoRTH, and the NRSB in road safety management, crash investigation, safety audit, and monitoring and evaluation

E.5 Project Benefits and Beneficiaries

18. The National Highways proposed for upgradation and maintenance have configuration of a single or intermediate or non-standard two-lane pavements. Several sections of the highways proposed under the project have poor horizontal and vertical geometrics, distressed or weak pavements, inadequate capacity, narrow and/or weak cross-drainage structures, steep gradients, formation levels below the High Flood Levels, poor riding quality and black spots prone to accidents. The scope of work under upgradation will include widening of formation width, pavement strengthening and widening, rehabilitation of existing structures, construction of new pavement, structures, drainage facilities, bypasses, realignments, improvement of junctions, provision of road safety features and maintenance for a period of five years after the construction.

19. The project will promote more efficient use of construction materials, which may help change practices in the sector, both within and outside India. Highway administration agencies, professional societies, and the academia will use the research outcomes to adopt resource efficient, energy efficient and GHG emission reducing design and construction standards. Moreover, the reduction in GHG emission will contribute to some degree in the coping-up mechanisms to deal with global warming risks.

20. The designs will incorporate road safety measures which include improvement of junctions, pedestrian facilities (footpaths, guardrails, crossings etc.), crash barriers, speed calming measures (rumble strips, barriers), street lighting, signs and markings, improvement of both horizontal and vertical geometrics of the road alignment, widening of all narrow culverts, improvement of sight distance, replacement of railings/parapets of existing bridges with crash barriers, and parapet walls. To ensure these provisions are implemented, these will be duly embedded in the contract documents, ensuring obligatory implementation as a payable item. Additionally, the contract documents will stipulate road safety audit by an independent Safety Consultant, inclusion of a Qualified Safety Officer and a Safety Supervisor in the Contractor's working team, monthly reports with construction safety checklist, reporting of accidents, maintenance of insurances for the Contractor's personnel and third-party, and penalties for not attending to repair of damaged safety items.

E.6 Project Cost and Financing

21. The total project cost is USD 1095.75 million, out of which USD 500 million is IBRD financing and

the balance USD 595.75 million would be contribution of Government of India. The table below summarizes the financing by components. The total loan of US$500 million will be disbursed based on achievement of results linked to DLIs (in addition to statements of expenditure).

22. The lending instrument is an Investment Project Financing (IPF) with Disbursement Linked Indicators (IPF-DLI). Disbursements will be triggered by the documented execution of eligible expenditures and verification of achievement of the Disbursement Linked Indicators. The DLIs are aimed to provide incentives for achieving results. These are aligned with the PDO and results indicators and will disburse upon achievement of key results. Two factors have been considered in allocation of amounts against individual DLIs: (a) relative importance of the indicator in the entire set of indicators and; (b) the need to match disbursements with cash flows on project activities.

23. The eligible expenditure consists of project related investments (goods, works, non-consulting services, consulting services, training and operating costs) in the GNHCP project. These investments will include (a) cost of construction of National Highway infrastructure and their operational and maintenance costs during the project life time, (b) incentive scheme for private sector contractors, DPR consultants et al for fitting their design, construction and maintenance schedules with resource efficient and green technology, (c) technical assistance to support research and development and mainstreaming of resource efficiency and green solutions in design, construction and maintenance of National Highways by MoRTH, (d) improving road safety in design, construction, operation and maintenance of National Highways, some unfinished components of ongoing NHIIP project will be taken up (iRAD, NHSS) (e) project management support including office improvement, consultant/staff hiring and compensation, capacity on research and design for resource resilience and green solutions mainstreaming, office improvement, modern technological monitoring tools etc.

E. 7 Environment Management Framework

24. In a situation, where sub-projects traversing multiple districts are located across four states with varying geographical, topographical and socio-economic conditions, a need was felt to prepare a document that will 'guide' the planning, design and construction elements of sub-projects and help in harmonizing environment management principles/approaches during preparation and execution of various sub-projects. In this context, an Environment Management Framework has been prepared for the project. To adequately cover and address the social issues, a separate/stand-alone Resettlement Policy Framework (RPF) has been prepared.

Purpose and Objectives of Environment Management Framework

25. Good environmental management practices are essential and integral elements of sound project preparation and implementation. From this perspective, more specifically, the Environment Management Framework (EMF) seeks to:

1) Establish clear procedures and methodologies for environmental planning, review, approval and implementation of sub-projects to be financed under the Project.

2) To provide practical guidance for planning, designing and implementing the environmental management measures.

3) Specify appropriate roles and responsibilities, and outline the necessary reporting

procedures, for managing and monitoring environmental and related social concerns and;

4) Determine the institutional arrangements, including those related to training and capacity building needed to successfully implement the provisions of the EMF.

26. The application and implementation of the EMF therefore, will:

1) Support the integration of environmental aspects into the decision-making process of all stages related to planning, design, execution, operation and maintenance of sub-projects, by identifying, avoiding and/or minimizing adverse environmental and related social impacts early-on in the project cycle.

2) Enhance the positive/sustainable environmental and social outcomes through improved/ sensitive planning, design and implementation of sub-project activities.

3) Minimize environmental degradation as a result of either individual sub-projects or through their indirect, induced and cumulative effects, as much as possible.

4) Protect human health and

5) Minimize impacts on cultural property.

27. The application of EMF during planning/design and its implementation during the construction stage will also support the achievement of compliance with applicable laws and regulations as well as with the requirements of relevant Bank policies on environmental aspects.

Key Contents of the Environment Management Framework

28. The framework describes the principles, objectives and approach to be followed for selecting, avoiding, minimizing and/or mitigating the adverse environmental impacts that are likely to arise as a result of sub-project interventions. The framework details out the various policies, guidelines and procedures that should be integrated during the planning, design and implementation cycle of the project. It also outlines the indicative management measures required to effectively address or deal with the key issues that have been identified. The required institutional arrangements, including those for monitoring, training and capacity building for effective environment management have also been outlined as a part of this framework. More specifically, the Environmental Management Framework includes the following:

1) Information on GoI's environmental legislations, standards and policies and World Bank safeguard policies that are relevant in the over-all project context.

2) Process to be followed for environmental screening to guide decision-making about proposed sub-projects.

3) Steps and process to be followed for conducting environmental impact assessment and preparation of Environmental Management Plans for selected sub-projects.

4) Preliminary assessment of anticipated environmental impacts in the context of broad/known project interventions.

5) Generic environment management measures to avoid, minimize and mitigate anticipated impacts.

6) Institutional arrangements for environment management, including monitoring and reporting.

E.8 Policy, Legal and Administrative Framework

29. All proposed sub-projects under GNHCP are to be consistent with applicable laws, regulations, notifications that are relevant in the context of the proposed sub-project interventions. It is the responsibility of the various Project Implementing Entities to ensure that proposed activities are consistent with the regulatory/legal framework, whether national, state or municipal/local. Additionally, since the project has been proposed for financial assistance from the World Bank, it will be ensured that various interventions/activities are consistent with the operational policies and guidelines of the said international institution. The section below summarizes the applicable regulatory framework to the over-all context of GNHCP.

Key Applicable National Laws and Regulations

30. Salient features of some key laws, including amendments thereof, pertaining to environment, health and safety aspects that are applicable to proposed interventions under GNHCP are given below:

a) Environment (Protection) Act, 1986, and as amended

b) The Environment (Protection) Rules, 1986 and as amended

c) Environmental Impact Assessment Notification, 2006 and subsequent amendments

d) State Tree Preservation Act and/or Tree Cutting Rules, as may be in force

e) Water (Prevention and Control of Pollution) Act, 1974, and as amended

f) The Water (Prevention and Control of Pollution) Rules, 1975

g) State Groundwater Act and Rules, as may be in force and the Guidelines for Groundwater Abstraction, 2012

h) Air (Prevention and Control of Pollution) Act, 1981, and as amended

i) The Air (Prevention and Control of Pollution) Rules, 1982

j) Noise Pollution (Regulation and Control) Rules, 2000, and as amended

k) The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996

l) Construction and Demolition Waste Management Rules, 2016

m) Hazardous and Other Wastes (Management and Handling) Rules, 2016

n) The Explosives Act 1884 and the Explosives Rules, 2008

o) The Mines Act, 1952 and as amended; the Minor Mineral and Concession Rules, as amended and; the State Mineral (Rights and Taxation) Acts as may be in force

Other Applicable National Laws and Regulations

31. Other key laws, including amendments thereof, pertaining to environment, health and safety aspects that are applicable to proposed interventions under GNHCP include:

a) The Water (Prevention and Control of Pollution) Cess Act, 1977, as amended

b) The Water (Prevention and Control of Pollution) Cess Rules, 1978, as amended

c) Easement Act, 1882, as amended

d) Wetland (Conservation and Management) Rules 2017

e) Public Liability Insurance Act, 1991, as amended

f) The Public Liability Insurance Rules, 1991, as amended

g) Notification for use of Fly Ash - November 3, 2009 and its amendment on January 25, 2016

h) Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996

i) Manufacture, Storage and Import of Hazardous Chemicals (Amendment) Rules, 2000, as amended

j) Solid Waste Management Rules, 2016, as amended

k) Plastic Waste Management Rules, 2016, as amended

l) Batteries (Management and Handling) Rules, 2001, as amended

m) Petroleum Rules, 2002, as amended

n) Gas Cylinder Rules, 2004, as amended

o) The Insecticides Act, 1968 and Insecticides Rules, 1971 and as amended

p) Motor Vehicle Act, 2019 (and State Motor Vehicle Act as may be in force)

q) Motor Vehicle Rules, 2019 (and State Motor Vehicle Rules as may be in force)

32. Environmental issues during road construction stage generally involve equity, safety and public health issues. The following laws will also apply to GNHCP:

a) Workmen's Compensation Act 1923: The Act provides for compensation in case of injury by accident arising out of and during employment.

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

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

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

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

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

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

Applicable World Bank Policies

33. The objective of World Bank's environmental safeguard policies is to prevent and mitigate undue harm to people and the environment in the development process. These policies provide guidelines for the identification, preparation, and implementation of programs and projects. The following operational policies are relevant in context of GNHCP from an environmental viewpoint:

Applicable Safeguard Policies of the World Bank

World Bank Policy	Description	Applicability	Measures to be Taken
Environmental Assessment OP 4.01	This policy is triggered if a project is likely to have significant adverse environmental impacts in its area of influence. For Category A projects, a comprehensive EIA is required with emphasis on integrating environmental measures in project planning, design, implementation and operation.	The project is likely to have impacts on the environmental components such as on roadside tree plantation, water bodies, water supply sources, sensitive receptors located along the roads and hill slopes in addition to air and water quality.	• Application of EMF in project planning, DPR preparation and project implementation. • EIAs and corridor specific EMPs to be prepared. • Integration of EHS requirements and EMPs in the bidding documents (through schedules) to provide enabling mechanisms for required enforcement.
Natural Habitats OP 4.04	This policy supports the protection, maintenance and rehabilitation of natural habitats. The Bank doesn't finance projects that involve the conversion of designated critical Natural Habitats.	Some projects are likely to be in proximity to sensitive natural habitats with wildlife crossing or movement. While most of the road corridors are not located within protected domains, one sub-project in Uttar Pradesh may require bridge construction over a protected habitat.	• Use of environmental screening tool to identify issues/concerns upstream in the decision-making process. • Conducting detailed EA to determine the nature and magnitude of impacts on sensitive and/or ecologically rich areas. • Appropriate measures to deal with such findings to be incorporated in the engineering design and the bidding documents, including exclusion from the project, if application (in design/DPR) and implementation (during construction) is not found in adherence to norms.

World Bank Policy	Description	Applicability	Measures to be Taken
Forests OP 4.36	Policy covers all projects that affect natural or planted forests, whether positively or negatively.	Some projects are in close proximity to or traverse forest areas. This includes avenue plantation declared as 'protected' such as in Uttar Pradesh. All sub-projects will need diversion of small linear strips of forest land.	• Avoidance and minimization of forest land uptake by appropriate methods in the engineering design; • Forest Clearances prior to award of works; • Use of EMF and EMPs to address impacts as necessary • Compensatory Afforestation.
Pest Management OP 4.09	The policy promotes use of biological or environmental control methods and reduces reliance on synthetic chemical pesticides. It also sets conditions on the acquisition and use of pesticides.	The proposed project includes promulgation of National Green Highways Policy, which has a thrust on tree plantation for creating carbon-sink and employment. In such a case, use of pest control methods is envisaged.	• Requirements of a PMP for such plantation works and other soft landscaping activities are to be integrated in the EMPs, depending upon the nature and scale of propositions • Selection of pesticides must have negligible adverse human health impacts • Pesticides to be labeled, handled, stored and applied according to standards acceptable to the Bank.
Physical Cultural Resources OP 4.11	Assist in preserving PCR and in avoiding their destruction or damage. Physical Cultural Resource includes resources of archaeological, paleontological, historical, architectural, religious (including graveyards and burial sites), aesthetic, or other cultural significance.	Implementation of sub-projects is likely to affect religious structures of local significance. Also, since civil works are involved, 'chance finds' at work sites is a likely impact that would have to be accounted and managed.	• Identification during screening • Detailed assessment during EIA/SIA studies • Avoiding damage to PCRs with appropriate planning at design stage. • Shifting and enhancement of local religious structures after consultation and consent with the concerned stakeholders/communities. • Integration of appropriate provisions in the Contract Documents, including clauses dealing with 'chance finds'.

World Bank Policy	Description	Applicability	Measures to be Taken
Access to Information	• The policy governs public accessibility of information in the Bank's possession. The Bank allows access to any information in its possession that is not on a list of exceptions. • Documents such as EMF, all EIAs and EMPs will be disclosed both by the Borrower and the Bank. • The policy requires the Borrower to consult Project Affected People and local NGOs through various phases of the project cycle. It requires that groups being consulted be provided on-time, comprehensible and easily accessible information.	For each sub-project road, comprehensive consultations have been/are being carried out during the planning and design stages, to determine the baseline conditions and issues; locally viable mitigation measures for addressing environmental impacts; consensus on engineering designs especially where realignments and bypasses are concerned and to provide for community and stakeholder involvement in designing sub-project propositions.	• Consultations during the screening exercises. • Where reports from the consultations have been found to be insufficient, the Bank has provided further guidance for additional consultations with regard to ensuring representativeness in both number and categories of stakeholders, prior notification and methodology to adopt in order to ensure usefulness of the consultations in terms of design, planning, implementation, supervision and maintenance of the road corridors under the project. • Consultations seeking consensus on road engineering designs where realignments and bypasses are proposed. • Make EA summary available in public domain (in local language) before project appraisal.

E.9 Potential Environmental Issues and Impacts

34. Based on the findings from the screening exercises carried out for all roads, assessments for five sub-projects and preliminary assessment for remaining four sub-projects, the environmental category for the project has been classified as 'A'. The following section summarizes the likely environmental impacts that could arise and presents possible ways of addressing them:

Probable Adverse Impacts

35. The proposed expansion of the project roads and associated improvement works is likely to create adverse environmental impacts, particularly in case of road corridors that will involve realignments and bypasses, requiring land beyond the existing right of way (RoW). The direct, indirect and induced adverse impacts resulting as a result of upgrading of the project roads (Component 1) may cause adverse environmental impacts in the project area. The proposed

expansion of the project roads and associated rehabilitation works will have varying levels of impacts on the surrounding environment.

36. Project activities, if not properly managed and mitigated, could have adverse environmental impacts. These may include:

    a) Felling of roadside trees;

    b) Adverse impacts on water resources (water bodies/public water supply sources);

    c) Impairment to or worsening of the local/regional drainage;

    d) Issues related to cutting of slopes and management of debris (for hill/mountainous roads)

    e) Construction phase impacts, including those related to camp site operation, pollution from plants, machinery, and vehicles and disposal of debris/other construction wastes;

    f) Potential impacts on material sources and common property resources located along the road;

    g) Impact on environmentally sensitive receptors (such as schools and health facilities) located along the road corridors from increased noise and air pollution during the construction and operation stages; and

    h) Potential for poorly planned or managed development induced by the improved roads.

37. Uptake of fertile agricultural land, increased traffic from upgraded roads causing safety concerns for road-users and road-side residents, occupational health related risks faced by construction workers and construction stage nuisances such as dust and noise are a few other adverse impacts that are likely to arise on account of planned project interventions. Potential long-term impacts could include changes in land use patterns (from agriculture, natural habitats to real estate, or other non-farming purposes) and changes in occupational patterns.

38. More so, diversion of forest land is required for widening of the road for sub-projects such as NH-516E, NH-158, NH-70 and NH-707. For the other sub-projects (NH-92, NH-730C and NH-731K), plantation along the avenue declared as 'protected forest' will also be affected due to cutting of trees for proposed road expansion/upgrading.

39. By and large, no roads have been proposed for financing in ecologically sensitive habitats such as national parks, tiger/elephant reserves and sanctuaries, except one bridge in NH-92 (Uttar Pradesh) that crosses over a protected area in River Chambal. However, the presence of wildlife habitats and/or crossings outside the protected environs has been identified in some cases. In case of NH-707 and NH-516E, the impact on wildlife in forest areas along/close to the road needs to be addressed through appropriate measures in the engineering design and through enabling provisions in the contract documents to avoid any unwarranted issues during the construction stage.

40. If not properly designed, improved roads could also have safety concerns during the operation phase, especially since design speed improvements are a key desired outcome of the project.

41. No significant change in the macro-climatic parameters (precipitation, temperature and wind) is envisaged due to the project but cutting of roadside trees, laying of paved surface and other construction activities are likely to temporarily affect the micro-climate.

42. India is the sixth most vulnerable nation to climate change impacts, according to a risk index released at COP23 by Berlin-based NGO German watch. In 2016, the country reported the

highest number of deaths due to extreme weather (2,119 fatalities) and suffered losses of more than INR 1.4 trillion (USD 21 billion) in property damage. This is almost 1% of India's GDP of USD 2.5 trillion, and almost equivalent to the country's whole health budget. It is important to ensure that the transport infrastructure that is created is resilient to the impacts of disasters and climate change induced extreme events. Already, many of the roads and bridges across the country get washed away during floods and sudden cloud bursts causing loss of critical road access to communities and costly repairs of the road infrastructure. The service life of the roads subjected to such events is also low, necessitating frequent reconstruction and maintenance. Weaknesses in engineering designs, construction quality and inadequate maintenance of the existing road network exacerbate the impact of climate/natural disaster events. Unless these aspects are addressed through appropriate infrastructure planning and engineering design in the on-going/new highway programs of the GoI, roads and highway infrastructure stand an increasing risk of losses and damages from these future weather-related events and disasters. Current IRC codes and guidelines do not adequately incorporate these aspects in planning and design. It may be useful to pilot construction of such climate resilient roads along with the use of new materials or technology and monitor the performance so that these aspects can then be mainstreamed into road construction.

43. Pavements are still designed traditionally, without the use of alternate materials. Consequently, natural resources required for road construction such as soil, aggregates and sand are becoming scarce – and increasingly being brought in over large distances from the construction site, leading to spiraling construction costs. The externalities associated with these could be minimized by use of local and marginal materials and industrial byproducts and green technologies by appropriately integrating them into the design of pavements and embankments. This can also generate economic benefits (up to about 25 percent reduction in construction cost specifically in areas where good quality stone is not locally available).

44. The details on the specific nature, magnitude and scale of such impacts will be covered in the analysis/assessment (EIA) for five sub-projects, for which design/DPRs have been prepared. For the remaining four road corridors, the same will be presented in the sub-project EIAs and EMPs once the engineering designs/DPRs are prepared and associated field assessments as part of environment impact studies are completed.

Potential Positive Impacts

45. The proposed project will contribute to positive economic growth both locally in the project area and at the regional level by removing barriers to connectivity. Since most of the sub-projects serve as lifelines in the backward/less developed areas, the over-all positive project outcome of the project is expected to be beneficial.

46. The project is expected to have positive impacts in terms of providing better connectivity and improved access to population in less developed or remote areas to more advanced socio-economic centers. Local businesses and inhabitants in the area of influence of the project roads as well as users of the project roads will be direct beneficiaries of the project. These people will have improved access to higher service level highways and transport services. Benefit will also accrue from the savings in travel time and transportation costs. Other expected positive outcomes of the project include improved access to a larger number of economic opportunities, better health services, facilities and higher levels of education, and improved road safety.

47. The strengthened human capital from enhanced habitation connectivity and increased access

to employment centers is an important benefit that is expected from the project. Since a substantial part of the project road development is expected to be within the existing Right of Way (RoW), improvements are likely to outweigh the temporary disruptions to the surrounding environment.

E.10 Key Principles for Minimizing/Managing Adverse Impacts

48. The over-all environment management strategy for the project involves: (i) an Environment Management Framework (EMF) for the over-all project to guide each key stage of the project cycle (this document); (ii) Environment Screening to identify key issues including those related to biodiversity/wildlife and consider those in the selection and design of sub-projects and; (iii) preparation of Environmental Impact Assessment (EIA) along with preparation of Corridor-specific Environment Management Plan (EMP) for each sub-project to be financed under the project. An independent review of these documents has been/is being conducted concurrently by the Project Management Consultants (PMC) (appointed for NHIIP, also financed by the World Bank and currently under implementation) in order to ensure compliance with the World Bank Safeguard policies.

49. In order to avoid and minimize adverse environmental and social impacts at sub-project level, the following principles will be adopted for alignment finalization:

a) The proposed right of way for bypasses will be 30 meters if the projected traffic is less than 15,000 PCUs in 2030 and 45m if the traffic is more than 15,000 PCUs in 2030.

b) The alignment as far as possible will be confined to the available/existing right of way in forest areas. In case of exception, both options (within the existing right of way and the alignment proposal with forest land diversion) would be analyzed before a final decision is made.

c) The corridor of impact (CoI) for the project will broadly range between 15m to 18 m to fit the typical cross sections, space for drains, roadside furniture and utilities. However, in specific locations, CoI of less than 15m will also be considered to minimize the impact on environmental and social features. Whereas, in urban areas, if the available land width is found more than the required to fit the cross section, entire available space may be paved from building line to building line to facilitate parking, provision of utility ducts etc.

d) Decision on bypasses and realignments is to be taken based on a comparison of options with or without the proposed change in design on a case to case basis.

50. Biodiversity protection and management also forms the core of the over-all environment management approach in the project. There are two key elements of this strategy: (i) avoidance of impacts on critical/ecologically significant natural habitats through a carefully designed screening mechanism and; (b) comprehensive assessment and appropriate design of remaining sub-projects in cases where some diversion of forest land is required and/or where some wildlife corridors/habitats are involved.

E.11 Measures to Avoid/Minimize and Mitigate Environmental Impacts

51. The key mitigation measure for the impacts on trees is the provision of compensatory afforestation of at least twice the number of trees cut, in compliance with the Forest (Conservation) Act, 1980, which would be executed by the Forest Department of concerned

state.

52. In addition to this, the Environmental Management Plans (EMPs) will provide for measures addressing construction-stage impacts such as: (a) air and noise pollution including dust generated from material transport, crushers, and asphalt plants; (b) water and soil pollution from spills of fuel, lubricants, and construction camp wastes; (d) operation and rehabilitation of borrow pits, quarries, and construction camps; (e) traffic safety and management; (f) worker's health and safety and; (g) debris management.

53. Slope stabilization measures using vegetative material are to be proposed as part of design interventions to reduce soil erosion, siltation of water bodies and road maintenance cost apart from improving road aesthetics.

54. Saving water bodies/ponds adjacent to the roads, where these are in use has to be included as part of the engineering design. Other mitigation measures to be provided include the provision of toe wall protection for selected water bodies and provision for compensating the storage volume, in case such protection is not possible. Additional enhancement measures need to be proposed for selected locations based on site conditions and needs.

55. Since the project focuses on the safety of road users among other aspects, design of the roads shall include special provisions close to the settlements like traffic calming measures with signage, pedestrian crossings and other such interventions required in the site's context. In addition, safe road use orientation training for people, especially children, living in the project area and in schools along the proposed roads is to be explored.

56. The identified potential adverse impacts can be largely mitigated through engineering designs, good construction practices accompanied by site-specific mitigation measures. These environmental management measures must be made a part of designs/DPRs. For impacts that are to be directly undertaken by the Contractor, relevant portions of the Environmental Management Plan will form a part of the bidding/contract document.

57. Further, integration of environmental concerns, specifically resource efficiency, green road elements and climate resilience within the design is an innovative feature of the project design. It has had clear benefits, for instance, with respect to use of alternative material – such as ash from power plants for the construction of embankment wherever it was found to be appropriate.

58. Recycled material from roadway cuts will be used in the project resulting in corresponding reduction in requirement of natural resources typically required for construction.

59. Climate change related impacts have been identified and where possible suitable mitigation measures are to be included as part of the design.

60. Surface runoff that may increase due to increase in the paved surface and overloading of existing drainage facilities can create localized flooding or water logging. For this, improvement of both longitudinal and cross drainage shall be done to avoid such problems. Additional culverts are to be designed to minimize erosion/flooding impacts. This includes provisions of cross drainage structures in place of causeways. Water harvesting structures will be included in the project design for ensuring groundwater recharge along all roads. Recharge pits for runoff water shall be constructed to facilitate the infiltration of water into the ground.

61. Bio-engineering measures are to be integrated into design, specifically to manage the risks of failure from cut slopes and damage caused by construction debris during development of hill

roads.

62. Other mitigation/enhancement measures such as the option of solid/vegetative noise barriers for sensitive receptors and avenue tree plantation (in addition to compensatory afforestation) have to be considered depending on the site's context.

63. In summary, the designs are to confirm with the relevant codes of the Indian Roads Congress and will include green road aspects of natural resource efficiency, use of local materials and stabilization (cement, lime) techniques, use of cut material for embankment filling and pavement layers, use of industrial by-products/wastes (fly ash, waste plastic), recycling (asphalt and granular pavement), use of bio-engineering solutions (for treatment of embankment slopes and rehabilitation of dumping sites), water conservation (redevelopment/enhancement of ponds, water harvesting structures, water channelization structures to protect stream bed and store storm runoff), treatment/s for landslide zones, borrow area rehabilitation, plantation and use of renewable energy sources for lighting (solar).

64. Corridor specific EMP's will be prepared in line with the EIA findings. The EMP will include mitigation/management measures to address the environmental impacts and these will be appropriately incorporated in the bid documents. The EMPs are to be provided with the necessary budget to carry out the required environmental works and monitoring.

65. The sub-project specific EMPs that have been prepared for GNHCP should be specific to the site conditions and proposed engineering interventions. They should clearly and concisely describe adverse impacts, selected management measures to bring it to an acceptable level and timelines for implementing the given measures. They are to cover the following:

    a) Potential Adverse Impacts Identified and Mitigation measures to be adopted, together with conditions within which one or other measure would apply and their integration with phases operations of road construction – Design, Pre-construction, Construction/ Implementation and Operation

    b) Enhancement plans for positive impacts

    c) Monitoring Plan with indicators, mechanisms, frequency, locations,

    d) Budgetary allocations for all the above activities

    e) Institutional arrangements for each activity and mitigation measures

    f) Implementation schedules for each activity and its integration with the sub-project implementation timelines

    g) Reporting procedures, including for redressing grievances related to environmental issues

E.12 Institutional Arrangements for Environmental Management

66. The environmental management requirements/guidelines/plans need to be applied and implemented at all stages of the project. This requires an institutional mechanism to deal with various processes and requirements at each stage. Within the institutional framework proposed for the project, preparation, implementation, supervision and monitoring of environment functions, particularly the Environment Management Plans (EMP), will be carried out at the three levels - national center, state level and the project/community level with an inbuilt mechanism for coordinating activities between the said levels.

Implementation Structure

67. MoRTH is currently implementing the National Highways Inter-connectivity Improvement Project (NHIIP), which is also a Bank funded project for improving selected National Highway segments in states of Bihar, Odisha, Rajasthan, Karnataka and West Bengal. The implementation arrangements for GNHCP will be the same as that for the ongoing World Bank funded NHIIP.

68. The Externally-Aided Projects Cell (EAP-Cell) at MoRTH, supported by a Project Management Consultants (PMC), will have the overall project implementation responsibility. Both these entities are familiar and well exposed to World Bank's safeguard policy requirements on environment. This set-up will include a team comprising an Executive Engineer (EE) designated as an Environment and Social Officer (ESO) and a suitable number of technical and secretarial staff. The EE will ensure that all project activities are complied as per the EMF and EMPs. The PMC will include an Environment Specialist, to work with the EAP's team. The PMC will be responsible for training, guidance, and recommendations for handling policy and implementation issues at the state and sub-project levels to comply with the EMF and requirements laid out in the EMPs.

69. In each project state, there will be an Environment Officer who will coordinate the preparation/implementation of EMPs. He/she will ensure that these comply with requirements laid out in the EMF for GNHCP and are implemented in accordance to provisions laid out in the contract documents. Finally, for each project road, the PIU will oversee day to day implementation of environment, health and safety plan, including on issues pertaining to tree cutting, plantation works, utility relocation and worksite safety management.

70. The Construction Supervision Consultant/Independent Engineer's team will have Environment and Safety personnel for day-to-day supervision and monitoring. The Environmental and Safety Officer on the Contractor's team are to ensure compliance with the environmental contractual clauses and will report on progress or challenges to the Construction Supervisory team, as per the requirements/obligations stated in the Contract Document.

71. Technical Audit Consultants would oversee the implementation of environment management, health and safety related aspects. This will determine whether the sub-projects are complying with regulatory performance standards and approved safeguard instruments. It entails a systematic, documented and periodic review of project implementation and could be a useful tool to improve project management performance on EHS aspects. MoRTH will be responsible for monitoring safeguards issues during implementation until the end of the design lifetime.

Readiness Criteria, including Disclosure of Documents

72. The civil works contracts will be taken up for procurement based on a set of Readiness Criteria to avoid a variety of slippages that have routinely affecting similar projects. Use of such a filter is expected to minimize delays in sub-project implementation in the post-award phases and serve as an incentive to participating states to expedite various preparation and pre-construction activities under their jurisdiction. The Readiness Criteria includes a combination of technical, environmental, social and statutory requirements, which would have to be met prior to key procurement events, i.e., invitation of bids and award of contracts, as listed below:

Prior to Invitation of Bids

1) Final Detailed Project Report (DPR) is approved by MoRTH
2) Application for Forest Land diversion is submitted to the Forest Department.
3) Tree Cutting estimates are prepared and sanctioned by MoRTH
4) All estimates of the line agencies involved with shifting of utilities are approved by MoRTH
5) General Arrangement Drawings for RoB (if any) is approved by the Railways
6) 3D notification for acquisition of land is published.
7) EMP provisions are integrated in the Bidding Document/Schedules

Prior to Award of Contract

1) Safeguard documents/instruments, cleared by the Bank, along with the translation of executive summary in vernacular, are disclosed at least 120 days before award of works
2) Permission for forest land diversion is obtained
3) Consultancy contract for RAP-implementation awarded and its personnel mobilized
4) Supervision Consultancy Contract is awarded, and its personnel mobilized
5) Compensation for land owners and R&R assistance to eligible PAPs paid for milestone 1
6) Milestone 1 is made encumbrance-free

Monitoring Arrangements for Effective Environmental Management

73. In order to ensure that the proposed mitigation measures have the intended results and comply with GoI and World Bank requirements, the EMF prepared for GNHCP provides guidance on developing an environmental performance monitoring program. The monitoring program consists of performance indicators, reporting formats and necessary budgetary provisions, most of which have been embedded in the estimates for civil works. For each environmental indicator, the plan specifies the parameter/s to be monitored, location, frequency and duration of monitoring. It also specifies the applicable standards, implementation and supervision responsibilities.

74. The application and implementation of EMF/EMPs will be closely monitored (using parameters prescribed in the EMPs) by qualified specialists (including those on the Independent Engineer's team) who will report on a regular basis. A third-party audit/review agency will also be selected by MoRTH to evaluate the level of compliance with environment, health, and safety requirements and will share its reports. A comprehensive assessment report on environmental performance will be prepared by MoRTH at mid-term and end-term.

75. The project will develop electronic Project Management System (ePMS) that will help monitor physical and financial progress, backed with real time photos showing key construction aspects along with EMP/EHS compliance.

Environmental Management Framework

Chapter 1
PROJECT BACKGROUND

1.1 Introduction

India's road network of 5.48 million kilometers is the second largest and most dense[3] in the world. It carries 65 percent of freight traffic, 85 percent of the total passenger traffic in the country and comprises of a primary network of 116,000 km of National Highways (NH), a secondary network of 160,000 km of State Highways (SH) along with Major and Other District Roads (MDR & ODR), and a tertiary network of Rural Roads. The responsibility for planning, construction and maintenance of the primary network lies with the Ministry of Road Transport and Highways (MoRTH), Govt. of India. The MoRTH also formulates national policies and legislations governing road transport.

In the last sixty years, the vehicle population grew at a Compound Annual Growth Rate (CAGR) of 10.8 percent putting pressure on the road network. The current passenger traffic is 12,000 Billion passenger-kilometer (BPKM) and it is projected to grow at an annual rate of 15 percent and become 168,000 BPKM by 2032. The current freight traffic is 2,000 Billion ton-kilometer (BTKM) and it is projected to grow at an annual rate of 9.7 percent and become 13,000 BTKM by 2032. In contrast with these growth rates, the NH network, which comprise only 2 percent of the total road network but carries about 40 percent of the road traffic, has grown at a rate of only 2.2 percent over the last sixty years and about 40 percent of the network is in poor condition.

In 1998, the Govt. of India (GoI) launched the NHDP covering 56,000 km of NH for development, spread across 7 phases. It is the biggest program (of value about $50 billion) so far that has been taken up by MoRTH primarily through the National Highways Authority of India (NHAI), an independent entity under the aegis of the same ministry. It also consisted of four/six laning of the Golden Quadrilateral (the highways connecting the four metros of Delhi, Mumbai, Chennai and Kolkata) and the North-South and East-West Corridors.

The national highways not covered under the NHDP form a part of non-NHDP network. Most of the roads that form this network are of poor quality and capacity (single/intermediate/two-lane width) and thereby present unsafe and poor traveling conditions. In the recent years, the Govt. of India has launched some specific programs to develop these roads as these connect the hinterland of the country and are key to the government's objective of equitable and inclusive growth. These programs among others include the National Highways Interconnectivity Improvement Project (NHIIP), funded by the World Bank and is currently under implementation.

Considering that the sector still faces major challenges in terms of efficient movement of goods, the MoRTH has recently launched the *Bharatmala Pariyojana* Program (BPP) which aims to enhance effectiveness of already built infrastructure; support multi-modal integration, bridging infrastructure gaps for seamless movement; augment inclusiveness by connecting 550 districts through highway linkages; improvement of Logistics Performance Index (LPI) of the country and; creation of jobs. It envisages development of about 26,000 km of economic corridors; 8,000 km of Inter-Corridors; 7,500 km of Feeder Roads; 1,800 km of Expressways; 1,300 km of Port-Connectivity Roads; 2,000 km of Coastal Roads; 2,000 km of International Connectivity Roads; 3,300 km of border roads; 28 ring roads;

[3] At 1.66 km/sq km of area, which is higher than that of USA, China, Japan and Russia

35 logistic parks; and improvement of 66 congestion points and 125 choke points.

A World Bank financed study supported MoRTH in formulation of this program. Phase 1 of this program, which is to develop 24,800 km of these highways in the next five years at a cost of $108 billion, has already been approved by the government and MoRTH has started its implementation.

1.2 Green National Highways Corridor Project

Creation of infrastructure to meet the burgeoning transport demand has resulted in improved connectivity in India but a lot needs to be done for seamless movement of traffic and efficient movement of logistics. Focusing primarily on ramping up connectivity of the NH network, little attention has been given on enhancing effectiveness of the infrastructure being built.

Most of the non-NHDP network is not built on a trunk transport and feeder route corridor-based approach. In addition to capacity constraints, poor maintenance and disregard for extreme and routine climatic impacts on the built infrastructure are directly affecting Vehicle Operating Costs. Consequently, the cost of movement of logistics in India is one of the highest (about 14 percent of GDP as against about 8-9 percent in developed countries). The road network is not integrated well with other modes of transport resulting in choke points especially around cities and at main intersections. An integrated approach based on enabling the seamless flow of freight and passengers through transport network needs to be built.

The Green National Highways Corridor Project (GNHCP) through its support to the Govt. of India's *Bharatmala Pariyojana*, will promote the vision of enhancing effectiveness of the transport network of India with cost and natural resources efficiency and safe high capacity highways. The list of roads (sub-projects) identified for inclusion in this project are given below:

National Highway Sections Proposed for Inclusion under GNHCP

S.No.	State	Highway	Section	Length (in kms)	Districts	Contract Packages (No.)
1.	Andhra Pradesh	NH-516E	Bowada to Vizianagram	26.94	Vishakhapatnam and Vijaynagaram	1
2.	Andhra Pradesh	NH-516E	Paderu to Araku	49.37	Vishakhapatnam	2
3.	Andhra Pradesh	NH-516E	Koyyuru to Paderu	133.43	Vishakhapatnam	3
4.	Himachal Pradesh	NH-707	Poanta Sahib to Gumma	94.99	Sirmaur, Shimla	4
5.	Himachal Pradesh	NH-707	Gumma to Fediz	9.80	Shimla	1
6.	Himachal Pradesh	NH 70	Hamirpur to Mandi	109.42	Hamirpur, Mandi	3
7.	Rajasthan	NH-158	Ras-Beawar-Mandal	116.75	Pali, Ajmer, Rajsamand and Bilwara	3
8.	Uttar Pradesh	NH-730C and NH-731K	Bewar to Pilibhit	183.43	Mainpuri, Faroukhabad, Shahjahanpur and Pilibhit	4
9.	Uttar Pradesh	NH-92	Bewar to Ettawa	57.35	Ettawa	2

The operation is also aligned with the Government of India's objective of eliminating poverty and ensuring access to minimum standard of basic needs for all citizens through investing in growth enablers transport & connectivity Infrastructure. The basic proposition includes strengthening of road pavement in addition to widening to two-lane/two-lane with paved shoulder standards and promoting/ demonstrating green and resilient approaches while doing so.

The project includes upgradation, improvement and maintenance of about **782 kms**[4] of selected existing national highways (**nine sub-projects**) in the states of **Andhra Pradesh, Himachal Pradesh, Rajasthan** and **Uttar Pradesh.** These sections traverse through 15 districts and are likely to be processed for bidding through 23 different contract packages.

The proposed stretches of the national highways will be designed and implemented as corridors considering: (a) removal of choke points; (b) facilitating seamless movement of traffic and; (c) demonstrating resource efficiency, climate resilience, green and safety aspects in road design and construction. The design/Detailed Project Reports, Contract Documents and the Environmental Management Plans for these corridors could serve as models for the rest of the *Bharatmala Pariyojana*. Support to the National Green Highway Mission of the MoRTH will also be provided under this project.

1.3 Project Development Objective

The Project Development Objective (PDO) is to develop green and safe National Highway Corridors and enhancing the institutional capacity of Ministry of Road Transport and Highways (MoRTH) in mainstreaming green technologies. The proposed main indicators of the PDO will include the following:

- Natural resource efficiency gains in project highways
- Reduced carbon emissions in construction of project highways
- Climate resilience aspects incorporated in construction of project highways
- Reduced Vehicle Operating Costs on project highways
- Reduction of fatalities on project highways
- Policy, regulation and systems developed for mainstreaming the green solutions

1.4 Project Components

The proposed Project will systematically institutionalize the development of green and safe NHs by implementing pilots, broadening the knowledge base and creating the capability to design, implement and maintain green and safe highways. The institutionalization process will be realized by:

(a) Mainstreaming in NH development, the green innovation aspects, namely:

- enhancing efficient use of scarce natural resources
- reducing GHG emissions from construction and maintenance of highways, and
- making the highways climate resilient;

(b) Enhancing the road safety management of NHs; and

(c) Building the policy framework for green highways development. Based on the foregoing, and in line with the PDO, this operation will have the following three components.

[4] The small variation in total length (about 5 kms) mentioned in different project documents is on account of reference to existing vs. design lengths, which primarily varies due to provision of bypasses and realignments.

Component A: Green Highway Corridor Improvement and Maintenance

Total Cost: US$ 1,001 million, including IBRD USD 423.95 million

This component includes upgradation and maintenance for 5 years of about 782 km of selected existing National Highways in the states of Rajasthan, Himachal Pradesh, Uttar Pradesh and Andhra Pradesh as Green Highways and includes pilots demonstrating resource efficiency, climate resilience, green and safety aspects. These highways will be designed and implemented as corridors to remove choke points and support seamless movement of traffic. The design and contract documents and the Environmental Management Plans that would be prepared for these pilot corridors could serve as models for the rest of the *Bharatmala Pariyojana*.

This component will include: (a) civil works for construction and maintenance; (b) consulting services for supervision during construction and maintenance periods; (c) consultants/non-governmental organizations to assist the MoRTH in the implementation of the Resettlement Action Plans; (d) consulting services for overall project management (Project Management Consultant); (e) a Technical Audit Consultancy for independent verification of Disbursement Linked Indicators and to perform an annual integrated performance audit covering, among others, engineering designs, management of environmental and social mitigation plans, quality assurance, and compliance with loan and contract conditions; (f) a Road User Satisfaction Survey consultant to carry out baseline, midterm, and end stage users' perception of the positive/negative changes that the project brings about; and (g) land acquisition, resettlement & rehabilitation, shifting of utilities, implementation of Environmental Management Plans, tree cutting, afforestation and agency charges. The loan would provide 50 percent of the construction cost of civil works and 80 percent of cost of construction supervision during the construction period, the Project Management Consultancy and the Technical Audit Consultancy. All the remaining costs will be met through the government funds.

Component B: Institutional Capacity Enhancement

(Total Cost: US$ 34.5 million, including IBRD US$ 27.6 million)

This component will support capacity enhancement of MoRTH in its pursuit to conserve natural resources, improve climate vulnerability of National Highways network and reduce greenhouse gas (GHG) emissions from the transport sector, inter alia, by developing policies, guidelines and strategies, training, and mainstreaming the resource efficiency, climate resilience, green and safety aspects in the design, construction and maintenance of highways. This component will have the following five sub-components.

Sub-component B1: Development of a Climate Adaptation Policy, guidelines and mainstreaming climate resilience in National Highways design and construction processes (Total US$ 8 million, IBRD US$ 6.4 million): This sub-component will support disaster risk and impact assessment of about 5,000 km of the National Highway network, preparation of a Climate Adaptation Policy, updating key standards and manuals, and mainstream climate resilience in project design and implementation.

Sub-component B2: Development of policy, regulation and systems to reduce emissions from transport services (Total US$ 2 million, IBRD US$ 1.6 million): This involves undertaking a study to map the freight volume and movement pattern on the entire National Highway network and identify constraints for efficient use of trucks, designing physical and digital freight management platforms for freight consolidation and interoperability, and recommend complementary innovative logistics solutions as well as transport operators' and regulators' coordination mechanism.

Sub-component B3: Research and Development for mainstreaming resource efficiency and green solutions in National Highways design and construction processes (Total US$ 21 million, IBRD US$ 16.8 million): This sub-component will support systematic monitoring and evaluation, and documentation of results of the pilot works undertaken in the project for a period of five years through reputed

educational/research institutions or universities and inputs provided for updating relevant standards and manuals.

Sub-component B4: Development of guidelines and model documents for mainstreaming green and safe highways (Total US$ 1 million, IBRD US$ 0.8 million): This sub-component will support identifying gaps and documenting good practices in the design, implementation and maintenance stages for mainstreaming green and safe highways and preparation of documents, such as the template Terms of Reference for design and supervision of construction, bidding documents and project management process of the EPC contracts, including options for involvement of private sector in innovations in the design and construction aspects.

Sub-component B5: Mainstreaming green and safe highways initiatives in the development of highways (Total US$ 2.5 million, IBRD US$ 2 million): This sub-component will support MoRTH in mainstreaming green and safe initiatives by replicating these in about 2,500 km of National Highway network.

Component C: Road Safety

(Total Cost: US$ 59 million, including IBRD US$ 47.2 million)

This component will support capacity enhancement of the MoRTH in road safety management inter alia in the areas of crash database, operationalization of the lead agency for road safety, strengthening safety enforcement and emergency medical response on the National Highways, capacity building and training. This component will have the following four sub-components.

Sub-component C1. Support to the Integrated Road Accident Database Management System and the National Highway Safety System (Total US$ 37.5 million, IBRD US$ 30 million): This sub-component will support the ongoing road safety activities under the National Highways Interconnectivity Improvement Project, upon its closure, in development and implementation of (a) the Integrated Road Accident Database Management System for recording and analysis of road accidents, (b) the National Highway Safety System for road safety enforcement, and (c) updating codes and manuals.

Sub-component C2. Support to operationalization of the National Road Safety Board (Total US$ 3 million, IBRD US$ 2.4 million): This sub-component will support the operationalization of the National Road Safety Board, and support its activities in the initial startup phase, through expert support as part of an interim secretariat. The activities will include (a) monitoring and evaluation, (b) drafting of rules for the MVAA, and (c) data analysis and recommendations.

Sub-component C3. Strengthening highway patrol and emergency response along the project corridors (Total US$ 16.5 million, IBRD US$ 13.2 million): This sub-component will support establishment of combined enforcement and emergency response outposts at critical locations to improve enforcement and post-crash care. These outposts will be equipped with patrol vehicles, advanced life-saving ambulances, cranes, tow trucks, communication system, and surveillance and other enforcement equipment to deter speeding, drink driving and other risky user behaviors.

Sub-component C4: Capacity building & training (Total US$ 2 million, IBRD US$ 1.6 million). This sub-component will support training and capacity building of the officials of MoRTH, implementing agencies of MoRTH, and the NRSB in road safety management, crash investigation, safety audit, and monitoring and evaluation

1.5 Project Benefits and Beneficiaries

The National Highways proposed for upgradation and maintenance have configuration of a single or intermediate or non-standard two-lane pavements. Several sections of the highways proposed under the project have poor horizontal and vertical geometrics, distressed or weak pavements, inadequate capacity, narrow and/or weak cross-drainage structures, steep gradients, formation levels below the

High Flood Levels, poor riding quality and black spots prone to accidents. The scope of work under upgradation will include widening of formation width, pavement strengthening and widening, rehabilitation of existing structures, construction of new pavement, structures, drainage facilities, bypasses, realignments, improvement of junctions, provision of road safety features and maintenance for a period of five years after the construction.

The project will promote more efficient use of construction materials, which may help change practices in the sector, both within and outside India. Highway administration agencies, professional societies, and the academia will use the research outcomes to adopt resource efficient, energy efficient and GHG emission reducing design and construction standards. Moreover, the reduction in GHG emission will contribute to some degree in the coping-up mechanisms to deal with global warming risks.

The designs will incorporate road safety measures which include improvement of junctions, pedestrian facilities (footpaths, guardrails, crossings etc.), crash barriers, speed calming measures (rumble strips, barriers), street lighting, signs and markings, improvement of both horizontal and vertical geometrics of the road alignment, widening of all narrow culverts, improvement of sight distance, replacement of railings/parapets of existing bridges with crash barriers, and parapet walls. To ensure these provisions are implemented, these will be duly embedded in the contract documents, ensuring obligatory implementation as a payable item. Additionally, the contract documents will stipulate road safety audit by an independent Safety Consultant, inclusion of a Qualified Safety Officer and a Safety Supervisor in the Contractor's working team, monthly reports with construction safety checklist, reporting of accidents, maintenance of insurances for the Contractor's personnel and third-party, and penalties for not attending to repair of damaged safety items.

The primary beneficiary will be the population living within the influence area and the users of the road. The main benefit will be from efficient transportation and logistics services, which will be available at a lower transportation cost. Access to higher level of social services will take shorter time. The population will have reduced exposure to dust pollution from damaged road surfaces that can cause severe respiratory health problems. The enhanced levels of road safety measures will also save lives.

The industry, agri-business, and service providers will benefit from the improved travel time and logistics through lower cost of transportation of goods and people. The project will create job opportunities for communities living in the influence area and for those involved in construction industry. Improvement of road condition will also help in supporting tourism. The project will also have positive impacts on the vulnerable population, such as women as the developed roads will improve accessibility to social, education and medical facilities, including pre and post-natal health care for themselves and their children. It will generate employment opportunities for women, and they can also get involved in small-scale road-side commercial operations.

1.6 Project Cost and Financing

The total project cost is USD 1095.75 million, out of which USD 500 million is IBRD financing and the balance USD 595.75 million would be contribution of Government of India. The table below summarizes the financing by components. The total loan of US$500 million will be disbursed based on achievement of results linked to DLIs (in addition to statements of expenditure).

The lending instrument is an Investment Project Financing (IPF) with Disbursement Linked Indicators (IPF-DLI). Disbursements will be triggered by the documented execution of eligible expenditures and verification of achievement of the Disbursement Linked Indicators. The DLIs are aimed to provide incentives for achieving results. These are aligned with the PDO and results indicators and will disburse upon achievement of key results. Two factors have been considered in allocation of amounts against individual DLIs: (a) relative importance of the indicator in the entire set of indicators and; (b) the need

to match disbursements with cash flows on project activities.

Project Cost and Financing (USD Million)

Project Components	Project Cost	IBRD financing	IBRD financing (in %)
1. Green Highway Corridor Improvement and Maintenance	1001	423.95	42.35%
2. Institutional Capacity Enhancement	34.5	27.6	80%
3. Road Safety	59	47.2	80%
4. Front End Fee	1.25	1.25	0.25%
Total Project Cost	**1095.75**	**500**	**45.63%**

The eligible expenditure consists of project related investments (goods, works, non-consulting services, consulting services, training and operating costs) in the GNHCP project. These investments will include (a) cost of construction of National Highway infrastructure and their operational and maintenance costs during the project life time, (b) incentive scheme for private sector contractors, DPR consultants et al for fitting their design, construction and maintenance schedules with resource efficient and green technology, (c) technical assistance to support research and development and mainstreaming of resource efficiency and green solutions in design, construction and maintenance of National Highways by MoRTH, (d) improving road safety in design, construction, operation and maintenance of National Highways, some unfinished components of ongoing NHIIP project will be taken up (iRAD, NHSS) (e) project management support including office improvement, consultant/staff hiring and compensation, capacity on research and design for resource resilience and green solutions mainstreaming, office improvement, modern technological monitoring tools etc.

1.7 Need of Green and Resilient Highways

Connectivity and efficiency are not the only requirements a transport network operation must fulfil, the third requirement is that of managing the 'externalities', *i.e.* the collateral damage suffered by the society or the cost imposed on it because of development and operation of the road network. The externalities, which are difficult to be quantitatively estimated, are health hazards (*e.g.* due to pollution), short and long-term effects of environmental degradation (*e.g.* depletion of natural resources) and adverse socio-economic impacts. Transport sector contributes 13 % of Global Green House Gas (GHG) emissions and three fourths of transport-related emissions are from road traffic. With an expanding NH network, it is expected that the emissions because of construction and maintenance activities would continue to rise. It will be critical to ensure that these emissions are limited by adopting construction and maintenance practices/ technologies/materials that are green *i.e.* resource efficient and low in terms of carbon footprint.

Pavements are still designed traditionally, without the use of alternate materials. Consequently, natural resources required for road construction such as soil, aggregates and sand are becoming scarce – and increasingly being brought in over large distances from the construction site, leading to spiraling construction costs. Given its scale, the BPP would only exacerbate these issues across the country. The externalities associated with these could be

minimized by use of local and marginal materials and industrial byproducts and green technologies by appropriately integrating them into the design of pavements and embankments.

The MoRTH has already launched a National Green Highways Mission (NGHM) following the promulgation of 'Green Highways Policy' in September 2015. The NGHM's objectives include developing a systematic framework for integrated green corridor development along NHs and building resilient ecosystems in form of green corridors for combating climate change effects through GHG sequestration. The GoI plans to carry out plantation along the NHs with participation of the local communities, farmers, NGOs, private sector, government agencies and Forest Departments (state level).

India is highly vulnerable to climate change risks and successive, increasingly frequent, extreme climate-related events have disrupted economic activity. India is the 6th most vulnerable nation to climate change impacts, according to a risk index released at COP23 by Berlin-based NGO German watch. It is important to ensure that the transport infrastructure that is created is resilient to the impacts of disasters and climate change induced extreme events. Weaknesses in engineering designs, construction quality and inadequate maintenance of the existing road network exacerbate the impact of these events. Unless these aspects are addressed through appropriate infrastructure planning and engineering design in the on-going/new highway programs of the GoI, roads and highway infrastructure stand an increasing risk of losses and damages from these future weather-related events and disasters. It may be useful to pilot construction of such climate resilient roads along with the use of new materials or technology and monitor the performance so that these aspects can then be mainstreamed into road construction.

1.8 Purpose and Objectives of Environment Management Framework

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

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

The application and implementation of the EMF therefore, will:

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

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

1.9 Key Contents of the Environment Management Framework

The framework describes the principles, objectives and approach to be followed for selecting, avoiding, minimizing and/or mitigating the adverse environmental impacts that are likely to arise due to the project. The framework details out the various policies, guidelines and procedures that need to be integrated during the planning, design and implementation cycle of the Bank-funded project. It also outlines the indicative management measures required to effectively address or deal with the key issues that have been identified. The required institutional arrangements for effective environment management have also been outlined as a part of this framework.

Specifically, the Environmental Management Framework includes the following:

- Information on country's environmental legislations, standards and policies and World Bank safeguard policies that are relevant in the over-all project context.
- Process to be followed for environmental screening to guide decision-making about proposed sub-projects
- Steps and process to be followed for conducting environmental impact assessment and preparation of Environmental Management Plans for selected sub-projects
- Preliminary assessment of anticipated environmental impacts in the context of broad/known project interventions.
- Generic environment management measures to avoid, minimize and mitigate anticipated impacts
- Institutional arrangements for environment management, including monitoring and

reporting.

1.10 Application of the EMF

The EMF needs to be integrated into the preparation and implementation stages of the various project components. It is an essential ingredient aligned with the project/sub- project activities and is to be followed through the entire project cycle from planning, including site identification; design; implementation and operation/maintenance to attain the above outlined purpose and objectives.

1.11 Revision/Modification of the EMF

The EMF will be an “up-to-date‟ or a “live document‟ enabling revision, when and where necessary. Unexpected situations and/or changes in the project or sub-component design would therefore be assessed and appropriate management measures will be incorporated by updating the Environment Management Framework. Such revisions will also cover and update any changes/modifications introduced in the legal/regulatory regime of the country/ state. Also, based on the experience of application and implementation of this framework, the provisions and procedures would be updated, as appropriate in consultation with the World Bank and the implementing agencies/ departments.

Chapter 2
POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

This chapter serves as a reminder that all activities under the proposed project must be consistent with all applicable laws, regulations, notifications that are relevant in the context of the proposed project interventions. It is the responsibility of the various Project Implementing Entities to ensure that proposed activities are consistent with the regulatory/legal framework, whether national, state or municipal/local. Additionally, it is also to be ensured that activities are consistent with World Bank's Operational Policies and guidelines. This section is not a legal opinion on the applicability of the law but serves as guidance in the application of the law to the current project context.

2.1 Key Applicable National Laws and Regulation

The applicable environmental rules and regulations are summarized and furnished in the table below:

Summary of Environmental Legislation Applicable to the Proposed Project

S. No.	Act / Rules	Purpose	Reason for Applicability	Authority
1.	Environment (Protection) Act- 1986	To protect and improve overall environment	It is umbrella legislation for environmental protection and management. Various notifications, rules and schedules are promulgated under this act.	MoEF&CC, SPCB
2.	Environmental Impact Assessment Notification, 2006 & subsequent activities	Prior environmental clearance for designated activities for Category A and B projects under Environmental Impact Assessment Notification, 2006 & subsequent amendments	The project roads do not require clearance under the preview of EIA Notification, 2006 and subsequent amendments. However, for opening of new borrow areas and stone quarry, prior environmental clearance is required from SEIAA/DEIAA.	SEIAA/ DEIAA

S. No.	Act / Rules	Purpose	Reason for Applicability	Authority
3.	Notification for use of Fly ash, November 3, 2009 and its amendment on 25th January 2016	Promote utilization of fly ash and discourage use of top soils within a radius of 300 km of a thermal power plant for construction or even approval of design for construction of roads or flyover embankments.	Utilization of fly ash from the Coal Based Thermal Power Plants located within 300 km. Fly ash can provide technically viable, environmentally sound & cost-effective alternative to natural borrow soil.	MORTH
4.	Forest Conservation Act, 1980	To check deforestation by restricting conversion of forested areas into non- forested areas	The road passing through forest area, require prior forest clearance for diversion of forest land for non-forest use.	Dept. of Forest/MOEF& CC
5.	The Schedule Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006	Recognition of Forest Rights of Schedule Tribes and Other Traditional Forest Dwellers along the sub project roads.	In case any schedule tribes and other traditional forest dwellers, have been given forest rights for forest land to be diverted for the project road.	District Authority/ Forest Department
6.	The Wildlife Protection Act, 1972	To protect wildlife, if occurred along the project	This act is applicable for wildlife protection in the Wildlife Sanctuary, National Park, wildlife corridors, etc.	NBWL, MOEF&CC

S. No.	Act / Rules	Purpose	Reason for Applicability	Authority
7.	Air (Prevention and Control of Pollution) Act, 1981	To control air pollution & controlling emissions of air pollutants as per the prescribed standards.	This act is applicable for construction phase to control stack/fugitive emissions and to manage ambient air quality at project site and ancillary activities like crusher plant, hot mix plant, concrete batch mix plant, WMM Plants, DG Set etc, for the road The NAAQ standards for Ambient Air Quality have been promulgated by the MoEF&CC for various land uses.	SPCB
8.	Water Prevention and Control of Pollution) Act, 1974	To control water pollution by controlling discharge of liquid pollutants as per the prescribed standards	This act is applicable for construction phase of the roads to manage to liquid effluent discharges from worker camp, concrete batch mix plant, etc.	SPCB
9.	Noise Pollution (Regulation and Control) Rule 2000	The standards for noise for day and night have been promulgated by the MoEF&CC for various land uses.	This act will be applicable for all construction equipment/ plant and machinery including vehicles deployed for construction of the proposed roads to regulate ambient noise levels This act will be applicable to regulate noise nuisance during	SPCB

S. No.	Act / Rules	Purpose	Reason for Applicability	Authority
			construction phase.	
10.	Hazardous and Other Wastes (Management, & Trans-boundary Movement) Rules, 2016 and amended thereof	Protection to the general public against improper handling and disposal of hazardous wastes	The rules will be applicable to used oil generated from construction equipment/ machinery during construction works. The rule includes storage, handling, transportation procedures and requirements for safe disposal of hazardous wastes.	SPCB
11.	Construction and Demolition Waste Management Rules, 2016	Safe disposal and management of construction and demolition wastes	This rule shall be applicable to generation of wastes resulting from demolition of road sections, bridge and culvert structures and scarifying of surface of existing road and from road construction activities.	Local Municipal Corporation
12.	Solid Waste Management Rules 2016	Collection and disposal of municipal solid waste	This rule is applicable to all forms/types of solid waste generated at construction activities, camp site, plant sites, etc..	Local Municipal Corporation
13.	Guidelines to Regulate and Control Ground Water Extraction in India, 2019	Regulate and control ground water extraction for various purpose.	NOC/Permission will be required for withdrawal of ground water infrastructure and other projects	CGWA

S. No.	Act / Rules	Purpose	Reason for Applicability	Authority
14.	Mines and Minerals (Development and Regulation) Amendment Act, 2015	This act has been notified for safe and sound mining activity for borrow earth, sand and stone.	The construction of project road will require aggregate through mining from quarries and earth from borrow areas.	DEIAA/ SEIAA
15.	Minor Mineral and concession Rules, 2015	For opening new borrow / quarry	Regulate use of minor minerals like stone, soil, river sand etc.	District Collector, DEIAA/ SEIAA
16.	Ancient Monuments and Archaeological Sites and Remains Act, 1958	Protection of Archaeological Monuments Sites and Remains	Applicable for archaeological monuments located within 300m of the sub-project and chance finds.	Archaeological Survey of India
17.	Explosive Act, 1984	An Act to regulate the manufacture, possession, use, sale, [transport, import and export] of Explosives	If contractor open stone quarry and use explosive for stone quarrying for sub projects.	Chief Controller of Explosives
18.	The Building and Other Construction Workers (regulation of employment and conditions of service) Act, 1996	To regulate the employment and conditions of construction workers and to provide for their safety, health and welfare measures and for other matter incidental thereto	To ensure safety and welfare measures for workers employed at construction sites. Compliance to provisions of health and safety measures for the construction workers in conformity with BOCW rule is necessary during construction stage.	State Labour Department

S. No.	Act / Rules	Purpose	Reason for Applicability	Authority
19.	Bonded Labour System (Abolition) Act, 1976 along with Rules, 1976	An Act to provide for the abolition of bonded labour system with a view to preventing the economic and physical exploitation of the weaker sections of the people and for matters connected therewith or incidental thereto.	Contractors shall employ numbers of Labours during Construction Phase. Contractor will ensure that there is no Bonded Labour by him or sub-contractors.	State Labour Department
20.	Contract Labour (Regulation and Abolition) Act 1970 along with rules, 1971	The Object of this regulation is to prevent exploitation of contract labour and also to introduce better conditions of work.	Contractors shall employ numbers of work-force during Construction Phase. The Act applies to the Principal Employer of an Establishment and the Contractor where in 20 or more workmen are employed even for one day during preceding 12 months as Contract Labour.	State Labour Department
21.	Employees Provident Funds and Miscellaneous Provisions Acts 1952 along with EPF Scheme Rules and Forms	It is a beneficent piece of social welfare legislation aimed at promoting and securing the well-being of the employees	It is applicable to contractors, employing Workman more than 20 persons during Construction Phase	State Labour Department

S. No.	Act / Rules	Purpose	Reason for Applicability	Authority
22.	Employees State Insurance Act 1948 along with Rules and Regulations	Protect the interest of workers in contingencies such as sickness, maternity, temporary or permanent physical disablement, death due to employment injury resulting in loss of wages or earning capacity. The Act also guarantees reasonably good medical care to workers and their immediate dependents.	It is applicable to contractors, employing labours for construction works which will include both men and women.	State Labour Department
23.	Equal Remuneration Act, 1976 along with allied Rules	An Act to provide for the payment of equal remuneration to men and women workers and for the prevention of discrimination, on the ground of sex, against women in the matter of employment and for matters, connected therewith or incidental thereto.	It is applicable to contractors, employing labour for construction works which will include both men and women.	State Labour Department

S. No.	Act / Rules	Purpose	Reason for Applicability	Authority
24.	Inter State Migrant Workmen (Regulation of Employment and Conditions Service Act	Act of the Parliament of India enacted to regulate the condition of service of inter-state labourers in Indian labour law. The Act's purpose is to protect workers whose services are requisitioned outside their native states in India. Whenever an employer faces shortage of skills among the locally available workers, the act creates provision to employ better skilled workers available outside the state	It is applicable to the contractor employing workers from other states also.	State Labour Department
25.	Minimum Wages Act 1948 along with Central Rules 1950	To ensure that workman gets at least minimum wages as fixed by Govt. Minimum wages sets the lowest limit below which wages cannot be allowed to sink.	Under this act, payment of minimum wages for workers employed for construction works will be ensured.	State Labour Department

S. No.	Act / Rules	Purpose	Reason for Applicability	Authority
26.	Central Motor Vehicle Act 2019	The Act provides in detail the legislative provisions regarding licensing of drivers/ conductors, registration of motor vehicles, control of motor vehicles through permits, special provisions relating to state transport undertakings, traffic regulation, insurance, liability, offences and penalties.	This rule is applicable for drivers/ conductors of vehicles, registration of motor vehicles, control of motor vehicles through permits, traffic regulations, control of pollution from vehicles, insurance, liability, penalties for violation and offences of traffic rules.	Motor Vehicle Department

The following paragraphs highlight some salient features of select laws, which have a particularly important bearing on the design and implementation of the proposed project.

1. Environment (Protection) Act, 1986 and EIA Notification, 2006

The Environment (Protection) Act, 1986 was introduced as an umbrella legislation that provides a holistic framework for the protection and improvement to the environment. In terms of responsibilities, the Act, the associated Rules and notifications issued time to time requires environmental clearances to be sought for specific types of new / expansion projects (addressed under Environmental Impact Assessment Notification) and for submission of an environmental statement to the State Pollution Control Board annually.

As per EIA Notification 2006 and amendments thereafter, the MOEF&CC forms a State Level Environment Impact Assessment Authority (SEIAA) and District Level Environmental Assessment Authority (DEIAA). All projects and activities are broadly categorized into two categories as Category A and B.

All projects or activities included as Category "A" in the Schedule of EIA Notification 2006 and amendments thereafter, shall require prior environmental clearance from the MoEF&CC on the recommendations of an Expert Appraisal Committee (EAC) constituted for appraisal of the environmental clearance for projects.

All projects or activities included as Category „B" in the Schedule, will require prior environmental clearance from the State Environment Impact Assessment Authority (SEIAA) and District Level Environment Impact Assessment Authority (DEIAA).

The SEIAA/DEIAA shall base its decision on the recommendations of a State/District level Expert Appraisal Committee (SEAC/DEAC) as to be constituted for in this notification.

Environment Clearance Procedure

As per the EIA Notification dated 14th September 2006 and amended on August 22, 2013, the requirement of environmental clearance for the road project as given below:

Category-A: i) New National Highway, ii) Expansion of National Highways greater than 100 km, involving additional right of way greater than 40 ma along existing alignment and 60 m for bypasses and realignments.

Category-B: (i) All New State Highway Projects ii) State Highway expansion projects in hilly terrain (above 1,000m AMSL) and or ecologically sensitive area"

General Condition: any project or activity specified in Category B will be treated as Category A if located in whole or in part within 10.0 km from the boundary of: i) protected areas notified under the Wild Life (protection) Act, 1972, ii) Critically polluted areas as notified by the Central Pollution Control Board from time to time, iii) Notified Eco-sensitive areas, and iv) Inter State Boundaries and International Boundaries.

For obtaining prior environmental clearance, online application is submitted (both for Category A and B projects) on PARIVESH portal (https://parivesh.nic.in/) of MoEF&CC. **PARIVESH** (**P**ro **A**ctive and **R**esponsive facilitation by **I**nteractive and **V**irtuous **E**nvironmental **S**ingle window **H**ub) is a web based, role based workflow application which has been developed for online submission and monitoring of the proposals submitted by the proponents for seeking Environment, Forest, Wildlife and CRZ Clearances from Central (MOEF&CC), State (SEIAA) and district level (DEIAA) authorities. It automates the entire tracking of proposals which includes online submission of a new proposal, editing/updating the details of proposals and displays status of the proposals at each stage of the workflow.

2. Forest (Conservation) Act, 1980

The Forest (Conservation) Act, 1980 pertains to the cases of diversion of Reserved, Protected, Unclassified and other forest areas. Depending on the size of the forest area to be diverted forest clearance are obtained from DFO (less than 1 ha), State Govt., Regional Office of MOEF&CC and MOEF&CC.

Restrictions and clearance procedure proposed in the Forest (Conservation) Act applies wholly to the natural forest areas, even in case the protected/designated forest area does not have any vegetation cover.

Feedback from the environmental screening exercise indicates that the some roads will require diversion of forest lands across various forest categories – reserve forests, protected forests such as notified roadside plantations, unclassified and other forest area. Under the Forest Conservation Act (1980) and Forest Conservation Rules (2003) forest land diversion

and tree felling on forest lands (including notified protected road-side plantations) requires a Forest Clearance and tree cutting permission from the State, and/or Central Government. Having adopted proactive environmentally conscious engineering design for road re-alignments, rehabilitation and up-gradation works, the potential result would be/should be relatively minimal diversion of forest and tree felling.

Forest Clearance Procedure

For obtaining prior forest clearance, online application is submitted on PARIVESH portal (https://parivesh.nic.in/) of MoEF&CC. It automates the entire tracking of forest proposals which includes online submission of a new proposal, editing/updating the details of forest proposals and displays status of the proposals at each stage of the workflow.

3) Water and Air (Prevention and Control of Pollution) Acts

Water Act and Air Acts provide for the prevention and control of water and air pollution respectively. These acts empower the State Pollution Control Boards to collect effluent and stack emission samples, entry to industrial units for inspection, power to prohibit on use of any water bodies for waste disposal and creation of new discharge outlets, provide consents to set up and operate certain facilities likely to create air and water pollution including power to give directions and prosecuting offenders.

The Air and Water Act are particularly applicable to civil works activities. All construction work contractors need to obtain the Consent-To-Establish and Consent-To- Operate for plants i.e. concrete batching plant, WMM plants, stone crushers and hot mix plants required for the construction of roads. The prior Consents need to be obtained from the SPCB. Wherein the existing plants are used to procure the construction materials, the contractor shall ensure that all applicable consents are obtained for operating the plants/equipment.

4) Wetland (Conservation and Management) Rules 2017

These rules shall apply to the wetlands or wetlands complexes, namely: (a) wetlands categorised as 'Wetlands of International Importance' under the Ramsar Convention; (b) wetlands as notified by the Central Government, State Government and Union Territory Administration.

The wetlands shall be conserved and managed in accordance with the principle of 'wise use' as determined by the Wetlands Authority. The activities, which are prohibited within the wetlands, are (i) conversion for non-wetland uses including encroachment of any kind; (ii) setting up of any industry and expansion of existing industries; (iii) manufacture or handling or storage or disposal of construction and demolition wastes, hazardous substances, electronic waste covered. solid waste dumping, discharge of untreated wastes and effluents, poaching, etc.

5) Ancient Monuments and Archaeological Sites and Remains Rules, 1959

As per the Act, area within a radius of 100m and 300m from the “protected monuments” are designated as “protected area” and “controlled area” respectively. No development activity (including construction of road) is permitted in the “protected area” and all development

activities likely to damage the protected property are not permitted in the "controlled area" without prior permission of the Archaeological Survey of India (ASI). Protected property entails the site/remains/ monuments are protected by ASI or the State Department of Archaeology.

Activities in such protected areas, then the implementing agency needs to undertake the protected areas should not be undertaken. If activities are to be done in the controlled area of protected site, necessary clearances from ASI will be obtained.

2.2 Key Statutory Clearance Requirements – Construction Stage

During the construction stage, some of the key statutory requirements that need to be obtained by the Contractor as part of mobilization (pre-construction) have been listed in the table given below.

Key Statutory Clearances to be Obtained by the Contractor

S. No.	Clearance/Consents Required for	Statute under which clearance is required	Statutory Authority
1.	Stone Quarry and Borrow Area for Sand and Earth	EIA Notification 2006 and subsequent amendment there after	DEIAA/SEIAA
2.	Hot mix plants, Crushers and Batch Mix Plants	Air (Prevention and Control of Pollution) Act, 1981	State Pollution Control Board
3.	Storage, Handling And Transport of Hazardous Wastes	Hazardous and Other Waste (Management and Transboundary Movement) Rules 2016	State Pollution Control Board
4.	Storage and Handling Fuel Oil (Like High Speed Diesel)	Manufacture, Storage and Import of Hazardous Chemical (Amendment) Rules, 2000	Chief Controller of Explosives (CCE)
5.	Location, discharge of emission, sewage/waste water discharge from plant, labour camps and crushers sites	Water (Prevention and Control of Pollution) Act, 1974 & Air (Prevention and Control of Pollution) Act, 1981	State Pollution Control Board
6.	Permission for Withdrawal of Groundwater for Construction	Guidelines to Regulate and Control Ground Water Extraction in India (With effect from 01.06.2019	Central Ground Water Authority (CGWA)
7.	Disposal of Bituminous Wastes	Construction and Demolition (C&D) Waste Management Rules, 2016	Local Civic Body

2.3 Applicable World Bank Policies

The World Bank's environmental and social safeguard policies (ten of them) are a cornerstone of its support to sustainable poverty reduction. The objective of these policies is to prevent and mitigate undue harm to people and the environment in the development process. These policies provide guidelines for the identification, preparation, and implementation of programs and projects. The following operational policies are relevant in context of the Project from an environmental viewpoint:

Applicable Safeguards Policies of the World Bank

World Bank Policy	Description	Applicability	Measures to be incorporated
Environmental Assessment OP 4.01	This policy is triggered if a project is likely to have significant adverse environmental impacts in its area of influence. For Category A projects, a comprehensive EIA is required with emphasis on integrating environmental measures in project planning, design, implementation and operation.	The project may have impacts on the environmental components such as on water bodies, trees, and hill slopes.	Application of EMF in project planning, DPR preparation and project implementation. Integration of EHS requirements in standard bidding documents will provide enabling mechanism for required enforcement.
Natural Habitats OP 4.04	This policy supports the protection, maintenance and rehabilitation of natural habitats. The Bank doesn't finance projects that involve the conversion of designated critical Natural habitats.	Some projects are likely to be in close proximity to sensitive natural habitats.	Development of environmental screening tool and conducting the said exercise to determine the nature and magnitude of impacts on sensitive and ecologically critical areas. Appropriate measures to deal with such findings, including exclusion of some project roads, as may be necessary.

World Bank Policy	Description	Applicability	Measures to be incorporated
Forests OP 4.36	Policy covers all projects that affect natural or planted forests, whether positively or negatively.	Some projects are in close proximity to or traverse forest areas and may need forest land diversion.	Avoidance and/or minimization of forest uptake by appropriate methods in the engineering design; Forest Clearances prior to award of works; Use of EMF to address impacts as necessary; Compensatory Afforestation.
Physical Cultural Resources (PCR) OP 4.11	Assist in preserving PCR and in avoiding their destruction or damage. PCR includes resources of archaeological, paleontological, historical, architectural, religious (including graveyards and burial sites), aesthetic, or other cultural significance.	Implementation of sub-projects is likely to affect religious structures of local significance. Also, since civil works are involved, 'chance finds' at work sites is a likely impact that would have to be accounted and managed.	Avoiding the destruction or damage to physical cultural resources. Shifting and enhancement of community structures after consultation and consent.
Pest Management OP 4.09	The policy promotes use of biological or environmental control methods and reduces reliance on synthetic chemical pesticides. It also sets conditions on the acquisition and use of pesticides.	The proposed project includes promulgation of National Green Highways Policy, which has a thrust on tree plantation for creating carbon-sink and employment. In such a case, use of pest control methods is envisaged.	Requirements of a PMP for such plantation works and other soft landscaping activities are to be integrated in the EMPs, depending upon the nature and scale of propositions Pesticides to be labeled, handled, stored and applied according to standards acceptable to the Bank.

World Bank Policy	Description	Applicability	Measures to be incorporated
Consultation and Disclosure Requirements (BP 17.50)	The policy requires the borrower to consult Project Affected People and local NGOs through the various phases of the project: before EIA TORs are finalized and when the draft EIA is available. It requires that groups being consulted be provided on-time, comprehensible and easily accessible information before consultations. The policy also requires that the borrower to make the EA summary available in the state (in a local language) and a public places to all the stakeholders prior to appraisal.	For each sub-project road, comprehensive consultations will be required during the design, planning and implementation stages: to determine the baseline conditions/ issues; locally viable mitigation measures for addressing environmental impacts; consensus on engineering designs especially where realignments and bypasses are concerned; community involvement/ support for supervising and monitoring project implementation.	Feasibility/DPR consultants have carried out consultations during the screening exercises. Where reports from the consultations have been found to be grossly insufficient, the Bank has provided further guidance for additional consultations with regards to ensuring representativeness in both number and categories of stakeholders, prior notification and methodology to adopt in order to ensure usefulness of the consultations to both the affected groups and the borrower in terms of design, planning, implementation, supervision and maintenance of the roads projects. Another important dimension of the consultations is with seeking consensus on road engineering designs where realignments and bypasses are concerned.

i. Environmental Assessment (OP 4.01)

Environmental Assessment is used in the World Bank to identify, avoid, and mitigate the potential negative environmental impacts associated with Bank's lending operations early-on in the project cycle. The policy states that Environment Assessment (EA) and mitigation plans are required for all projects having significant adverse environmental impacts or involuntary resettlement. Assessment should include analysis of alternative designs and sites, or consideration of "no option" and require public participation and information disclosure before the Bank approves the project.

In World Bank operations, the purpose of Environmental Assessment is to improve decision making, to ensure that project options under consideration are sound and sustainable, and that potentially affected people have been properly consulted and their concerns addressed.

The World Bank's environmental assessment policy and recommended processing are described in Operational Policy (OP)/Bank Procedure (BP) 4.01: Environmental Assessment.

ii. Natural Habitat (OP 4.04)

The policy implementation ensures that Bank-supported development projects consider the conservation of natural habitats, in order to safeguard their unique biodiversity and ensure the sustainability of the environmental services and products which natural habitats provide to human society.

This policy is applicable when a project (including any subproject under a sector investment or financial intermediary loan) with the potential to cause significant conversion (loss) or degradation of natural habitats, whether directly (through construction) or indirectly (through human activities induced by the project).

iii. Forest (OP 4.36)

The implementation of the policy ensures that envisaged forest sector activities and other Bank sponsored interventions which have the potential to impact significantly upon forested areas:

(a) Do not encroach upon significant natural forest areas that serve important social, environmental or local economic purposes.

(b) Do not compromise the rights of local communities to continue their traditional use of forests in a sustainable fashion.

(c) Do not finance commercial logging operations, in the case of primary tropical moist forest, nor any purchase of equipment for this purpose.

iv. Physical Cultural Resources (OP 4.11)

The World Bank Policy OP/BP 4.11 defines physical cultural resources as movable or immovable objects, sites, structures, groups of structures, natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be located in urban or rural settings, and may be above or below ground, or under water. Their cultural interest may be

at the local, provincial or national level, or within the international community.

The Bank assists countries to avoid or mitigate adverse impacts on physical cultural resources from development projects that it finances. The impacts on physical cultural resources resulting from project activities, including mitigating measures, may not contravene either the borrower's national legislation, or its obligations under relevant international environmental treaties and agreements.

The borrower addresses impacts on physical cultural resources in projects proposed for Bank financing, as an integral part of the environmental assessment (EA) process.

2.4 Applicable MoRTH and IRC Specifications

All road works in India are to be in accordance with the MoRTH specifications for Road and Bridge works and guidelines of Indian Roads Congress (IRC). The MoRTH specifications have special provisions towards protection of environment under Clause 501, Annexure A and the contractor is to satisfy the provisions. Apart from the Annexure A to clause 501, there are provisions for control of erosion, drainage, dust suppression, borrow area and haul road management under relevant sections. Provisions of clause 501 Annexure A, cover the environmental aspects as:

General	The contractor shall take all necessary measures and precautions to carry out the work in conformity with the statutory and regulatory environmental requirements. The contractor shall take all measures and precautions to avoid nuisance or disturbance from the work. It shall be precautionary measures than abatement measures taken after generation of nuisance. In the event of any spoil, debris, waste or any deleterious material from site being deposited on adjacent land, the same shall be removed and affected area shall be restored to its original state.
Air	The contractor to devise and arrange methods to control dust, gaseous or other airborne emissions in such a way that adverse impacts on air quality are minimized. Dust shall be minimized from stored material and stockpiles by spraying water. Covering of material likely to generate dust during transportation is to be covered with tarpaulin. Spraying of water on haul roads, if found necessary.
	The contractor shall prevent any interference with supply/abstraction of water resources. Water used for dust suppression shall be reused after settlement of material in collected water. Liquid waste products to be disposed off such that it does not cause

Water	pollution. No debris is to be deposited or disposed into/adjacent to water courses.
Control of wastes	No uncontrolled disposal of wastes shall be permitted. The contractor shall make specific provisions for disposal of all forms of fuel and engine oil, all types of bitumen, cement, surplus aggregate, gravels, bituminous mixtures etc. conforming to local regulations and acceptance of the engineer
Noise	The contractor shall use all necessary measures to reduce noise from construction equipment and maintain all silencing equipment in good condition.
Emergency Response	The contractor shall plan and provide for remedial measures in case of occurrence of emergencies as spillages of oil, bitumen or chemicals.

In addition to the above conditions, avoidance measures and control of activities having potential for generation of environmental impacts are devised. These include:

Section 111	Precautions for safeguarding the environment
Clause 201.2	Preservation of Property/Amenities during clearing and grubbing
Clause 301.3.2	Stripping and storing of topsoil for reuse during excavation for roadway and drains
Clause 302.4	Restriction on timings for blasting operations
Clause 304.3.6	Public safety near towns/villages where excavation is carried out
Clause 305.2.2.2	Locations of borrowing and relevant regulations
Clause 305.3.3	Stripping and storing of topsoil at borrow locations
Section 306	Soil erosion and sedimentation control
Clause 407.4.2	Provisions for turfing on median and islands
Section 517	Recycling of bituminous pavement and excavated material
Clause 701.2.1	Use of geo-textiles for control of soil erosion
Section 810	Use of Metal beam crash barriers for safety, relevant regulations and specifications
Clause 2501	Precautions during river training works

2.5 Other Relevant Technical Guidance Materials and Standards

The guidelines endorsed by MoEF&CC for the application of Environmental Protection Act, 1986 for Highway Projects (including the Environmental Impact Assessment Guidance Manual for Highways, February 2010) and World Bank's operational policies on environment shall be adopted/followed for the environment screening, conducting EIA and preparing/

implementing the EMP.

2.6 IRC Codes Applicable with Respect to Environment

Key Indian Road Congress (IRC) Codes applicable for the sub project roads with respect to environment are given below:

S. No.	IRC Code Theme	Year	Purpose
1.	Recommendations for Road Construction in Areas Affected by Water Logging, Flooding and/or Salts Infestation	IRC:34-2011	Construction in water logged areas
2.	Recommended Practice for Construction of Earth Embankments and Sub-Grade for Road Works (First Revision)	IRC:36-2010	Issues relating to Borrow pits
3.	Guidelines for Pedestrian Facilities	IRC: 103 -1988	Safety of pedestrians
4.	Recommended Practice for Recycling of Bituminous Pavements	IRC:120-2015	For recycling of bituminous pavements
5.	Guidelines for Use of Construction and Demolition Waste in Road Sector	IRC:121-2017	Use of Construction and Demolition Waste in Road Sector
6.	Guidelines on Landscaping and Tree Plantation	IRC:SP:21-2009	Landscaping and Tree Plantation along of the road
7.	Guidelines on Road Drainage	IRC: SP: 42-1994	Drainage
8.	Highway Safety Code	IRC: SP: 44-1994	Highways safety
9.	Guidelines for Use of Flyash in Road Embankments	IRC:SP:58-2001	Use of Flyash in Road Embankments
10.	Guidelines for Use of Geotextiles in Road Pavements and Associated Works	IRC:SP:59-2002	Use of Geotextiles in Road Pavements and Associated Works
11.	Guidelines for Soil and Granular Material Stabilization Using Cement Lime and Fly Ash	IRC:SP-89-2010	Soil and Granular Material Stabilization Using Cement Lime and Fly Ash
12.	Guidelines on Requirements for Environmental Clearance for Road Projects	IRC:SP-93-2017	Requirements for Environmental Clearance for Road Projects
13.	Guidelines for the use of Waste	IRC:SP-98-2013	Use of waste plastic in hot

S. No.	IRC Code Theme	Year	Purpose
	Plastic in Hot Bituminous Mixes (Dry Process) in Wearing Courses		bituminous mixes (dry process) in wearing courses
14.	Use of Cold Mix Technology in Construction and Maintenance of Roads Using Bitumen Emulsion	IRC:SP-100-2014	Use of Cold Mix Technology in Construction and Maintenance of Roads Using Bitumen Emulsion
14.	Interim Guidelines for Warm Mix Asphalt	IRC:SP-101-2014	Warm Mix Asphalt
15.	Guidelines on Preparation and Implementation of Environment Management Plan	IRC:SP-108-2015	Preparation and Implementation of EMP

2.7 Environmental Standards

Environmental standards applicable to the sub projects under GNHCP are as given below:

- National Ambient Air Quality Standards, 2009
- Ambient Noise Standards
- Stack Emissions of CPCB for Hot Mix Plant
- Discharge Standards of CPCB for Disposal of Treated Sewage
- Drinking Water Quality Standards-IS:10500:2012
- CPCB Standards for Surface Water Use

2.8 Ascertaining Applicability of Policy and Regulatory Requirements

The applicability of any of the national/state level regulation and World Bank safeguard policy needs to be ascertained separately for each sub project/road considered in the GNHCP as each law/rule/regulation has its own legal implication and process for compliance. The regulatory framework as described in this EMF as serves as a guiding document and a quick point of reference on the applicable regulatory framework.

The precise applicability of the regulations will ultimately depend on the location, proposed intervention and design of the sub-project and this will be determined during the detailed (sub-project specific) environmental assessment exercise. Should there be any changes in the provisions in the various acts rules or notifications enacted by the Government of India/concerned state Government during implementation of the project, then compliance to the amended rules and regulations as applicable on the sub-projects will become mandatory.

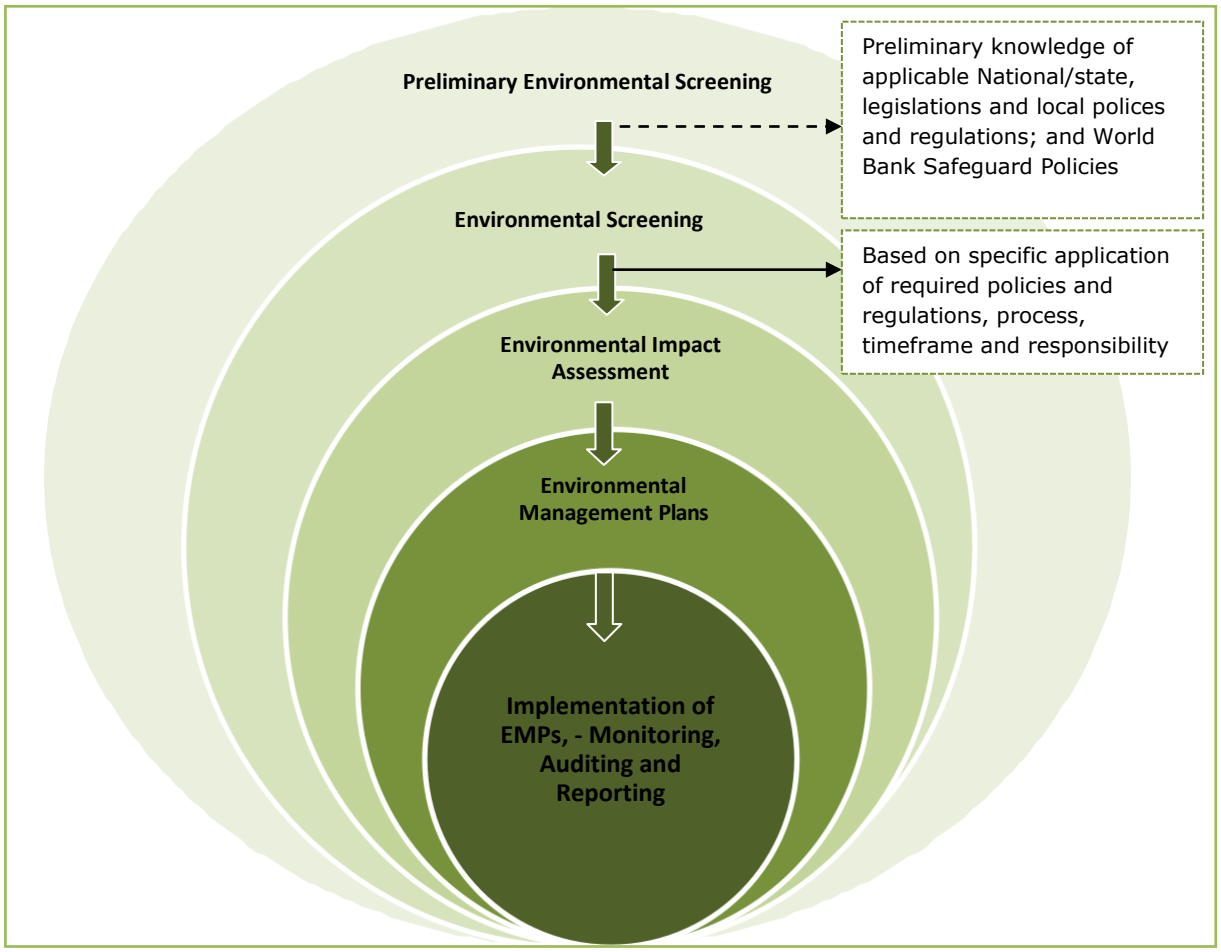
Chapter 3
ENVIRONMENTAL MANAGEMENT - APPROACH AND TOOLS

The chapter describes the principles and approach to be followed for selecting, avoiding, minimizing and/or mitigating the adverse environmental impacts that are likely to arise due to the project. Each of the sub-projects proposed under the project will follow the approach suggested here to achieve the objectives of environmental management.

3.1 Key Steps to be Followed

A comprehensive environmental management approach for the project will involve the following key steps and processes:

1. Preliminary Environmental Screening
2. Detailed Environmental Screening
3. Environmental Impact Assessment
4. Environmental Management Plans
5. Environmental Monitoring (including Audits) and Reporting



The following section aims to provide a description of the environment management approach and tools to evaluate the potential impacts from the proposed project interventions. The Environment Management tools aim to support at the early stages of planning and decision-making and selection of environmental measures including mitigation/technologies based on the nature and scale of identified potential impacts.

Step 1: Preliminary Environmental Screening

This step will involve an initial desk review of the available information about the road and the sub-project area. A preliminary environment and social screening format would be filled-up using such available information and field visits would be undertaken to understand the general overview in context of the scope of the proposed operation. The exercise will help in identifying the key/significant potential environmental impacts and in determining the project specific context and the focus required for carrying out the detailed environmental screening exercise.

Without narrowing the focus of the detailed field investigations/assessments, having this knowledge provides an early sense on the spatial and temporal dimension about the likely issues on-hand.

Step 2: Environmental Screening

Detailed screening exercise is the second step in the EMF process. The purpose of environmental screening is to get an overview of the nature, scale and magnitude of the issues in order to determine the project feasibility and further if findings permit, it allows for proper scoping of the detailed EIA and SIA that would be subsequently carried out. After identifying key issues, the applicability of the Bank's environment safeguard policies is to be established along with Country's regulatory requirements. Based on this, boundaries and focus areas for the EIA along with the use of specific instruments would be determined.

The key sub-steps involved in the screening process are outlined below:

- Ascertain presence of any environmentally sensitive areas (as detailed in screening checklist) through primary/secondary information.
- Confirm applicability of regulations and policies in context of broad sub-project interventions.
- Conduct reconnaissance site visits for ground truthing and incorporate required/ additional information in the screening format.
- Obtain details about land availability and broad categories of ownership (forest / govt./ private)
- Preparation of a screening report as per the structure provided in Annex.

The outcome of the screening process will help select and/or prioritize the various investments and where required, start the clearance process in a timely manner.

Safeguards screening usually consist of checking and identifying environmental risks, impacts and opportunities and the requisite measures that are applicable within the local context for

addressing them. The findings from the screening will be used to determine ecological and as well as economic viability of the sub-projects. Particular focus will be required for the proposed realignments and bypasses.

To ensure well targeted field assessment during the screening process, the World Bank has prepared a Guidance Note for use by the Consultants and the respective state executing agencies that outlines the steps and key data that is to be collected for determining the feasibility of the sub-project from an environmental stand point. The note provides detailed guidelines for collecting information on environmental, natural, biological, and physical and socio-economic conditions without which it becomes cumbersome to determine the likely potential impacts that may result from the project interventions. The process enables proper targeting of issues requiring further technical research and in-depth assessments during the EIA preparation. Without the proper screening, deficient planning and engineering design of sub-projects using unreliable information can result in weak arrangements to conserve critical natural ecosystems and may result in creating adverse environmental impacts.

Key outputs of the detailed environmental screening would include:

- determination (with a degree of confidence), of all national and state and local regulations and policies that will apply to the sub-projects
- preliminary judgment on the sub-project category per the EIA Notification, 2006 (including subsequent amendments)
- decision on the environmental categorization (A, B, or C) in line with World Bank's safeguards policies; and
- process, timeframe and responsibilities for securing the requisite clearances and permissions per GoI guidelines.

It is critical at this stage for Consultants to review the list of applicable legislations or polices and regulations with the project proponent and the World Bank first to diffuse inconsistencies in understanding and second, to mobilize assistance both at the central and state levels to facilitate applications process.

Based on the screening results, a decision can be made on whether the sub-project road would require clearance, consents and permissions and further field assessments and studies or not. The Guidance note also gives an outline for presenting data with necessary explanation for recording likely environmental impacts.

The screening process enhances implementation by screening out or enhancing acceptability of sub-project proposals on the basis of environmental criteria. Apart from the screening of sub-projects for proposed inclusion in the project (GNHCP), the results/findings from this exercise would be used to determine the scope of Environmental (Impact) Assessment requirement.

Step 3: Environmental Impact Assessment

An EIA consists of a comprehensive study that involves thorough documentation of existing conditions, and identification of impacts with a comparison of alternative project design options including without the project option. If implemented early, the EIA can be an excellent "preventative tool". Usually, EIA has three objectives: assist decision makers in getting a clear picture of the potential impact on the overall environmental quality; provision of impact prevention and enhancement of benefits and minimization of impacts in the long term; and provide a forum that allows direct input from stakeholders in the managements of the project. Towards this end, the MoEF&CC has developed an EIA Guidance Manual for Highways, which will be used along with WB‟s operational policy notes.

Ideally, an EIA will have:

- A general information on highway project, requisite environmental clearance process and a gist of the project component
- the location of the road corridor, map and topographical sheets including the potential benefits and need for the project, description of alignment options, implementation schedule and the projected costs for the project
- characterize the relevant features of the current ("baseline") state of the receiving environment biological, physical and socioeconomic description of the corridor and the region
- description of the potential interactions between the intervention and the baseline environment
- analysis of alternatives with particular reference to location of project corridor and the applicable engineering technologies
- management measures to avoid, mitigate, compensate and monitor any potentially significant adverse impacts and cost of management measures in an environmental management plan
- summarize significant concerns and recommend needed actions to address each concern
- Conclusion – stating that either (a) the EIA is the completed environmental assessment for the intervention or (b) further assessment work is required and will be incorporated in a revised EIA. For example, project roads that would need follow up biodiversity assessments to track changes will be stated in the EIA
- Disclosure of the Consultants that prepared the EIA

The GoI EIA Guidance Manual for Highways clearly outlines the contents and comprehensive description of the chapters in an EIA. The manual also provides sample ToRs for EIAs, international best practice on road construction and management, codes of practices as advocated by the International Road Congress, India (IRC).

Key steps will include the following:

- Define the scope of the EIA: In this case, the scope of the EIA study will be shaped by the findings from the environmental screening exercise and the TORs prepared by the MORTH. Where relevant, the World Bank OP's will supplement/guide the information to be added and process to be followed.
- Characterize the project interventions (type of project, location, need for the project, alignments, utilities to be shifted, activities, schedules, estimated budget, etc.),
- Building on findings from screening exercise, identify likely interactions between the project and the environment especially where project roads are abutted by critical forest and river ecosystems
- Establish an effective stakeholder participation program
- Identify key environmental issues and assess range and potential severity of impacts on the existing environment (adverse; and beneficial, direct and indirect) by (i) project phase; (ii) engineering technologies and other non-built infrastructure mechanisms to be used and (ii) by ecological component, community and other sub-units of the study area
- Assess the risks and implications of improper operation, failures, disasters and other (lower probability) events
- Consider the implication of project alternatives with and without the interventions with respect to both location and technologies. Where realignments and bypasses are being considered, assess the feasible design options with inputs from the potential project affected people incorporated
- Prepare an EMP, which is implementable program of measures to avoid, mitigate, manage and monitor adverse impacts and enhance benefits.
- Assess the residual impacts remaining after implementation of EMP measures

The following is the recommended table of contents of EIA:

- Executive summary
- Introduction
- Project Description
- Policy, Legal and Institutional Framework
- Description Environment (Baseline Data)
- Anticipated Environmental Impacts
- Analysis of Alternatives
- Consultations with Key Stakeholder
- Environmental Management Plan
- Annexures

The model outline does not explicitly provide section/subsection headings for many of EIA activities. Therefore DPR/feasibility consultants will create their own customized outline from this model that provides sections/subsections for EIA activity undertaken for the sub-project road under consideration.

Step 4: Preparation of Environmental Management Plan (EMP)

EMP is the next step in the EIA process after identifying potential impacts. It involves the identification and development of measures aimed at avoiding, mitigating, offsetting and/or reducing impacts to levels that are environmentally acceptable during implementation and operation of the project road. EMPs provide an essential link between the impacts predicted and mitigation measures specified within the EIA and implementation and operation activities.

Certain activities/interventions will have an impact on the natural environment, the scale of which would depend on the existing baseline conditions along the corridor and thus would require a specific plan to institute and monitor mitigation measures and take desired actions in a timely manner. An EMP must be sub-project specific, clearly describing adverse impacts and mitigation actions to be taken. The magnitude and temporal scale of the sub-project road will determine the contents/coverage of the EMP. Depending on extent of issues that are to be avoided, minimized and/or mitigated, the EMP will have concrete/specific mitigation actions, timelines and responsible persons.

For each sub-project road, an EMP should address the following:

- Mitigation, enhancement, protection and compensation measures for each phase including design pre-construction, construction, operation and maintenance
- Mitigation performance monitoring (i.e. monitoring the operation and maintenance of mitigation measures and their targeted impacts)
- PAP participation arrangements by project development phase
- Disaster management contingency plan where applicable especially in areas with potential flooding, earthquake zones
- Institutional arrangements for implementation, monitoring and reporting
- Cost estimates for all EMP activities
- Standard construction environmental safeguards clauses for engineering and civil works

For developing the EMP, DPR consultants will consider findings from the stakeholder/ public consultation process, including suggestions from domain experts and Project Affected People (PAP) and vulnerable people. For GNHCP project roads, a standalone EMP will be needed for a sub-project.

For Category A projects, World Bank guidelines require detailed EMPs. EMPs for the respective roads projects would be prepared using guidelines provided in the Annex C of OP 4.01 of the World Bank safeguards.

Below are the proposed elements of an EMP:

Identified Impacts and Description of Mitigation Measures: Under this sub-heading, the EMP will describe the identified impacts that may result from the project interventions. With reference to each impact, it will describe feasible and cost effective measures to minimize impacts to acceptable levels. This section will also provide details on the conditions under which the mitigatory measures will be implemented whether as a routine or in the event of contingencies. The EMP will also distinguish between type of solution proposed (structural & non structural) and the phase in which it should become operable. Measures that can be taken to avoid, minimize or mitigate the extent of environmental damage have been detailed out in the annex.

Enhancement Plans: Positive impacts or opportunities arising out of the project will be identified during the EA process. Some of these opportunities can be further developed to draw environmental benefits to local communities within the project road corridor and the sub-region. The EMP will identify such opportunities and develop a plan to systematically harness any such benefit.

Monitoring Plan: In order to ensure that the proposed mitigatory measures have the intended results and comply with GoI and World Bank requirements, an environmental performance monitoring program will be included in the EMP with the following suggested details:

- Monitoring indicators to be measured for evaluating the performance of each mitigatory measure. Indicators should include principles adopted for alignments, applicable GoI engineering standards for road widening, etc)
- Monitoring mechanisms and methodologies
- Monitoring frequency
- Monitoring locations
- Expected cost of monitoring
- Responsibility

Institutional Arrangements: Institutions/parties responsible for implementing mitigatory measures and for monitoring their performances will be clearly identified along with any legal instruments that define their obligations. Where necessary, mechanisms for institutional co-ordination will be identified as often monitoring tends to involve more than one institution.

Implementation Schedules: Timing, frequency and duration of mitigation measures with links to overall implementation schedule of the project will be specified.

Reporting Procedures: Feedback mechanisms to inform the relevant parties on the progress and effectiveness of the mitigatory measures and monitoring itself will be specified. Guidelines on the type of information wanted and the presentation of feedback information will also be highlighted.

Cost Estimates: Implementation of mitigatory measures mentioned in the EMP will involve an initial investment cost as well as recurrent costs. The EMP should include costs estimates for each measure and also identify sources of funding.

3.2 Key Principles/Guidelines for Engineering Design

In order to avoid and minimize adverse environmental and social impacts at sub-project level, the following principles are being adopted for alignment finalization:

1. The proposed right of way for bypasses will be 30 meters if the projected traffic is less than 15,000 PCUs in 2030 and 45m if the traffic is more than 15,000 PCUs in 2030.
2. The alignment would as far as possible stay within the existing right of way in forest areas. In case of exception, both options (within the existing right of way and the alignment proposal with forest land diversion) would be analyzed before a final decision is made.
3. The corridor of impact (CoI) for the project will broadly range between 15m to 18 m to fit the typical cross sections, space for drains, roadside furniture and utilities. However, in specific locations, CoI of less than 15m will also be considered to minimize the impact on properties. Whereas, in urban areas, if the available land width is found more than the required to fit the cross section, entire available space may be paved from building line to building line to facilitate parking etc.
4. Decision on bypasses and realignments is being taken based on a comparison of options with or without the proposed change in design on a case to case basis.

More so, findings from the environmental and social screening report provide the basis for developing engineering designs. In certain cases where results from the field assessments are not duly factored into project drawings, ecological footprints that could result from such proposed engineering designs are found to be significant. To eliminate such complexities, Highway Engineers will work hand in hand with the respective Environmental and Social Experts ensuring that proposed designs are environmentally, socially and economically viable. Until the EIAs are publicly disclosed and approved, engineering drawings would undergo a series of changes to incorporate all recommendations from the environmental and social stand point.

3.3 Consultation and Disclosure Requirements

Consultation with key stakeholders in preparing the EIA/EMP is critical for Category A projects. For all Category A projects/sub-projects, the project proponent is expected to consult project-affected groups and local nongovernmental organizations (NGOs) about the project's environmental aspects and take their views into account. The project proponent should initiate such consultations at each stage of the project cycle. The disclosure of documents shall be as per requirements of GoI and World Bank procedures. All safeguard documents shall be disclosed at least 120 days prior to the award of works.

3.4 Integration of EMP into Bidding Documents

Sections of EMP relevant for the construction stage will be integrated into the Bid Documents. More guidance has been provided in Annexures. Contract documents will need to be incorporated with clauses directly linked to the implementation of environmental management measures. Mechanisms such as linking the payment schedules to implementation of the said EMP clauses need to be explored and implemented, as appropriate.

Chapter 4
POTENTIAL ENVIRONMENTAL IMPACTS

Overall, the project is classified as Environmental Category A as per World Bank's Guidelines. This is based on the review of findings from the preliminary and detailed screening exercises. The following sections of the framework summarize possible environmental impacts that could arise and presents possible ways of addressing them.

4.1 Potential Environmental Issues and Impacts – An Over-view

The proposed expansion of the project roads and associated improvement works is likely to create adverse environmental impacts, particularly in case of road corridors that will involve realignments and bypasses, requiring land beyond the existing right of way (RoW). The direct, indirect and induced adverse impacts resulting as a result of upgrading of the project roads (Component 1) may cause adverse environmental impacts in the project area. The proposed expansion of the project roads and associated rehabilitation works will have varying levels of impacts on the surrounding environment.

Project activities, if not properly managed and mitigated, could have adverse environmental impacts. These may include:

- Felling of roadside trees;
- Adverse impacts on water resources (water bodies/public water supply sources);
- Impairment to or worsening of the local/regional drainage;
- Issues related to cutting of slopes and management of debris (for hill/mountainous roads)
- Construction phase impacts, including those related to camp site operation, pollution from plants, machinery, and vehicles and disposal of debris/other construction wastes;
- Potential impacts on material sources and common property resources located along the road;
- Impact on environmentally sensitive receptors (such as schools and health facilities) located along the road corridors from increased noise and air pollution during the construction and operation stages; and
- Potential for poorly planned or managed development induced by the improved roads.

Uptake of fertile agricultural land, increased traffic from upgraded roads causing safety concerns for road-users and road-side residents, occupational health related risks faced by construction workers and construction stage nuisances such as dust and noise are a few other adverse impacts that are likely to arise on account of planned project interventions. Potential long-term impacts could include changes in land use patterns (from agriculture, natural habitats to real estate, or other non-farming purposes) and changes in occupational patterns.

More so, diversion of forest land is required for widening of the road for sub-projects such as NH-516E, NH-158, NH-70 and NH-707. For the other sub-projects (NH-92, NH-730C and NH-731K), plantation along the avenue declared as 'protected forest' will also be affected due to cutting of trees for proposed road expansion/upgrading.

By and large, no roads have been proposed for financing in ecologically sensitive habitats such as national parks, tiger/elephant reserves and sanctuaries, except one bridge in NH-92 (Uttar Pradesh)

that crosses over a protected area in River Chambal. However, the presence of wildlife habitats and/or crossings outside the protected environs has been identified in some cases. In case of NH-707 and NH-516E, the impact on wildlife in forest areas along/close to the road needs to be addressed through appropriate measures in the engineering design and through enabling provisions in the contract documents to avoid any unwarranted issues during the construction stage.

If not properly designed, improved roads could also have safety concerns during the operation phase, especially since design speed improvements are a key desired outcome of the project.

No significant change in the macro-climatic parameters (precipitation, temperature and wind) is envisaged due to the project but cutting of roadside trees, laying of paved surface and other construction activities are likely to temporarily affect the micro-climate.

India is the sixth most vulnerable nation to climate change impacts, according to a risk index released at COP23 by Berlin-based NGO German watch. In 2016, the country reported the highest number of deaths due to extreme weather (2,119 fatalities) and suffered losses of more than INR 1.4 trillion (USD 21 billion) in property damage. This is almost 1% of India's GDP of USD 2.5 trillion, and almost equivalent to the country's whole health budget. It is important to ensure that the transport infrastructure that is created is resilient to the impacts of disasters and climate change induced extreme events. Already, many of the roads and bridges across the country get washed away during floods and sudden cloud bursts causing loss of critical road access to communities and costly repairs of the road infrastructure. The service life of the roads subjected to such events is also low, necessitating frequent reconstruction and maintenance. Weaknesses in engineering designs, construction quality and inadequate maintenance of the existing road network exacerbate the impact of climate/natural disaster events. Unless these aspects are addressed through appropriate infrastructure planning and engineering design in the on-going/new highway programs of the GoI, roads and highway infrastructure stand an increasing risk of losses and damages from these future weather-related events and disasters. Current IRC codes and guidelines do not adequately incorporate these aspects in planning and design. It may be useful to pilot construction of such climate resilient roads along with the use of new materials or technology and monitor the performance so that these aspects can then be mainstreamed into road construction.

Pavements are still designed traditionally, without the use of alternate materials. Consequently, natural resources required for road construction such as soil, aggregates and sand are becoming scarce – and increasingly being brought in over large distances from the construction site, leading to spiraling construction costs. The externalities associated with these could be minimized by use of local and marginal materials and industrial byproducts and green technologies by appropriately integrating them into the design of pavements and embankments. This can also generate economic benefits (up to about 25 percent reduction in construction cost specifically in areas where good quality stone is not locally available).

The details on the specific nature, magnitude and scale of such impacts will be covered in the analysis/assessment (EIA) for five sub-projects, for which design/DPRs have been prepared. For the remaining four road corridors, the same will be presented in the sub-project EIAs and EMPs once the engineering designs/DPRs are prepared and associated field assessments as part of environment impact studies are completed.

4.2 Potential Adverse Environmental Impacts

The proposed upgradation of the project roads and associated rehabilitation works will have

varying levels of impacts on the surrounding environment – on natural and planted forests, on lands with agricultural, cultural and other socioeconomic and religious values, and to an extent on factors wildlife and wildlife habitats, particularly those located outside the designated protected areas such as National Parks and Sanctuaries.

Observations during preliminary field visits, desk study and results from the screening exercise identified that potential impacts could range from immediate to long term, could be direct or indirect including induced development, reversible or irreversible, and or cumulative as a result of interaction with other development activities ongoing in the sub-region.

The screening exercises also identified the environmental policies and regulations that are potentially triggered. Also, since most of the sub-projects serve as lifelines in the backward areas, the findings also indicate an over-all positive project outcome that is expected to be beneficial. However, the proposed expansion of the project roads and associated rehabilitation works will also create some adverse environmental and social impacts, particularly in project corridors involving realignments and bypasses beyond existing right of way (ROW). The exact quantum and significance of the likely environmental and social impacts will be determined after the completion of EIAs and SIAs, which are currently under preparation.

Diversion of Forest Lands

Some forest land diversion would be required to construct the road to a standard configuration. In most of the other cases, the road side/avenue plantation notified as 'protected', is likely to be affected in the process of road widening. However, the project is not likely to have a significant impact the health and quality of natural forests. The project would also seek to not impact the rights and welfare of people and their level of dependence upon the forests; or aim to bring about changes in the management, protection or utilization of natural forests.

It is envisaged that engineering designs largely maintain road widening within the existing ROW limiting extent to which new land will be diverted except in built up stretches where realignments and bypasses are proposed as the most cost effective and environmentally benign alternative. Findings from field assessments show that in majority of the roads, lands abutting the carriage way within the ROW and the Direct Impact Zone are mostly forest lands except in built up areas. Forests are categorized as protected forests or reserve forests. Construction works will involve removing trees in the ROW and in specified locations for workers camps, temporal connecting roads, temporary storage sheds for construction materials, temporal diversion of routes, etc. Depending on expanse of contiguous area cleared, forest loss could affect soil characteristics and soil stability increasing dust pollution and potential erosion. Where roadside forests provide assist with connecting larger forests, tree removal could affect its value as wildlife corridors.

Where road works involve bypasses or realigning existing carriageways, critical natural habitats such as protected areas, wildlife sanctuaries and reserves, under private or tribal

ownership could be impacted. Such roads will need more robust planning and design to avoid, minimize and manage adverse environmental impacts.

From the screening reports, it is observed that forest land diversion will be required in many project roads. These sub-projects will be subjected to applicable forest clearance as required by MOEF&CC, Regional Office of MOEF&CC and the concerned state governments. For stretches that are in close proximity (within 10km) of wildlife sanctuaries or passing through pristine forest areas, biodiversity assessment will be carried in addition to results from environmental screening to ascertain potential direct and indirect impact on wildlife particularly where charismatic fauna and endangered species are involved.

Uptake of Agricultural Lands

In addition to diversion of forest lands for road construction, fertile agricultural lands could also be acquired. This may put pressure on less arable lands and could lead to environmental degradation of the area.

Impact on Wildlife

When project roads traverse close to natural forest reserves and wildlife sanctuaries (the road itself would be outside designated protected areas), construction process could increase noise levels, cause affect migration paths, impact availability and access to food especially for obligate herbivores and carnivorous faunal species. In corridors where surface water bodies usually used as watering holes by wildlife are affected, dependent wildlife will be affected.

Transportation and hauling of material and increased vehicular activity within the road corridor may introduce invasive species, increase noise and air pollution associated destroy plants with conservation value. Extraction of raw material for construction such as gravel, sand, etc outside designated locations could create further disturbance to the ecosystem by degrading habitat conditions. Also, one of the risks would be the possibility of increased wildlife poaching during construction.

Extraction and Management of Construction Materials

Road construction will involve use of construction materials such as aggregates, sand, earth and water and other chemical inputs including bitumen, grease, oil, petrol, kerosene and other substance considered to hazardous to human health or the environment according to the Management Storage and Import of Hazardous Chemicals (MSIHC) Rules of India. Uncontrolled extraction practices such as river sand quarrying, water extraction from both underground and ground sources, earth excavation could result in irreversible effects including depressions that may demand huge restorative actions. Improper disposal of construction material waste could affect local water sources and agricultural lands with related health issues.

Road Topography

Topography of most of the road corridors are flat plains, undulating with mild slopes and to a small degree, rolling terrains and mountainous with steep slopes. The flat terrains affect

drainage conditions with increased potential for flooding, overtopping and soil erosion. Road works may thus involve raising the road to offset frequent overtopping. For road works that will involve slope cutting, concerns will evolve around increased potential for soil erosion, landslides especially during monsoonal seasons, debris storage, management and disposal.

Demolition Exercise

Bridge reconstruction works can generate debris which can obstruct waterways if not properly disposed.

Other Impacts

Increased traffic from upgraded roads may cause safety concerns for both road-users and road-side residents, occupational health related risks faced by construction workers and construction stage nuisances such as dust and noise. In towns with touristic sites and potential medium to large scale industrial plants/hubs, new commercial and public activities may lead to an increase in pressure on local and regional natural resources. Potential long-term impacts could include changes in land use patterns (from agriculture, natural habitats to real estate, or other non-farming purposes) and changes in occupational patterns.

4.3 Potential Positive Impacts

The proposed project will contribute to positive economic growth both locally in the project area and at the regional level by removing barriers to connectivity. Since most of the sub-projects serve as lifelines in the backward/less developed areas, the over-all positive project outcome of the project is expected to be beneficial.

The project is expected to have positive impacts in terms of providing better connectivity and improved access to population in less developed or remote areas to more advanced socio-economic centers. Local businesses and inhabitants in the area of influence of the project roads as well as users of the project roads will be direct beneficiaries of the project. These people will have improved access to higher service level highways and transport services. Benefit will also accrue from the savings in travel time and transportation costs. Other expected positive outcomes of the project include improved access to a larger number of economic opportunities, better health services, facilities and higher levels of education, and improved road safety.

The strengthened human capital from enhanced habitation connectivity and increased access to employment centers is an important benefit that is expected from the project. Since a substantial part of the project road development is expected to be within the existing Right of Way (RoW), improvements are likely to outweigh the temporary disruptions to the surrounding environment.

On the positive side, the project also seeks to mainstream wherever feasible in the project highway designs, 'green roads' approach that would consider promoting resource efficiency and sustainability measures from a menu of options such as pavement recycling, use of local materials, recycled aggregates, use of innovative materials, plantations along the corridor, soil and water conservation and new/alternative technologies. Strengthened human capital from enhanced habitation connectivity and increased access to employment centers is important benefits of the project.

Over-all, the project is expected to have positive impacts in terms of providing better

connectivity and improved access to populations in less developed or remote areas to more advanced socio-economic centers. Local businesses and inhabitants in the area of influence of the project roads as well as users of the project roads will be direct beneficiaries of the project. These people will have improved access to higher service level highways and transport services. Benefit will also accrue from the savings in travel time and transportation costs. Other expected positive outcomes of the project include improved access to a larger number of economic opportunities, better health services, facilities and higher levels of education, and improved road safety.

Chapter 5
CONSULTATIONS WITH KEY STAKEHOLDERS

The stakeholder consultations form a very crucial part of development projects, including infrastructure and are usually carried out as a continuous process through the project cycle. Stakeholder consultations and workshops during the design and project planning stages provide the medium for sharing information about the project objectives and scope, alternative design options, and stakeholder perceptions regarding proposed investment plans. Ensuring an open and transparent information exchange about the project at this stage, lays a good foundation for an inclusive and participatory implementation process.

In view of the scope of interventions giving reference to the GoI regulatory policies on EIAs along with provisions under the Bank's safeguard requirements, the project is generally categorized as A. It has triggered the World Bank O.P/B.P 4.01- Environmental Assessment. For a Category A operation, the World Bank's safeguards policies require comprehensive consultations with all key stakeholders including communities residing in the project corridor particularly women, disabled, youth; NGOs; civil society groups; road users; private sector; local traditional leaders, district and state government officers involved in the project; and other categories of stakeholders that may be peculiar to the area under consideration such as scheduled castes, scheduled tribes, forest dwellers, etc.

Conforming to the GoI Right to Information Act, 2005 and the World Bank Consultation and Disclosure Policy, and to meet the project's needs for an inclusive participatory process during project planning, design, implementation, supervision and monitoring, MORTH with guidance and assistance from the World Bank will facilitate (public and focused group) consultations/workshop plan for each project road that covers the following key stages:

- Preliminary consultative session at the very early stages of the project design when the first set of engineering designs are developed
- Second round of consultations on the engineering design once recommendations from the first consultations have been considered in revised designs taking into considerations concerns about bypasses, realignments, land acquisitions, forest diversions, tribal forest land concerns
- When the draft EIA TORs are complete
- Public consultations on the draft EIAs with the respective SPCB (where an Environmental Clearance is required)
- Once the final EIA are cleared for official release into the public domain

During the first sets of public discussions, the DPR/Feasibility Consultants will carry out a series of stakeholder consultations in the project areas to present and to seek inputs and feedback on the project objectives, design options, activities plan, and to determine stakeholder interest to participate in project activities.

Before finalizing the EIA reports, another round of consultations would be carried out to ensure that all key stakeholders are well aware of the project, the potential impacts (positive and negative) and mitigation measures, and to lay out a plan for participation in monitoring, implementation and supervision/auditing. The active participatory process would ensure that the local communities, ultra poor groups in the communities and ethnic groups and women, in the project areas will not be worse off and that benefits or positive effects are well distributed.

To ensure that consultations are useful to the affected groups, the client and the agency conducting it, this case the DPR consultants, the consultants will ensure an environment where participants, irrespective of social status, would be able to express their opinions and preferences freely. The consultants will provide relevant material in a timely manner prior to the consultations in a form and language that are comprehensible and accessible to the groups that are participating in the consultations.

Over-all, the consultations would:

- Learn about the community needs and preferences with respect to the project objective to improve connectivity through widening and rehabilitating project roads
- Identify and agree on alignment options that have relatively lesser impact on affected people
- Discuss the environmental and social safeguard implications/impacts that might be associated with the suggested alignment or bypass options, along with the impact mitigation guidelines and measures adopted in the EMF
- Where voluntary lands are involved, identify the donors
- Discuss compensatory afforestation plans
- Have the community identify grievance and redress mechanisms for resolving project design and implementation concerns
- Determine the main pillars of a communication/consultation strategy that will be adopted throughout the project phases
- Determine options for engaging local community and NGOs in the operation

Chapter 6
IMPLEMENTATION ARRANGMENTS FOR ENVIRONMENTAL MANAGEMENT

6.1 Institutional Capacity

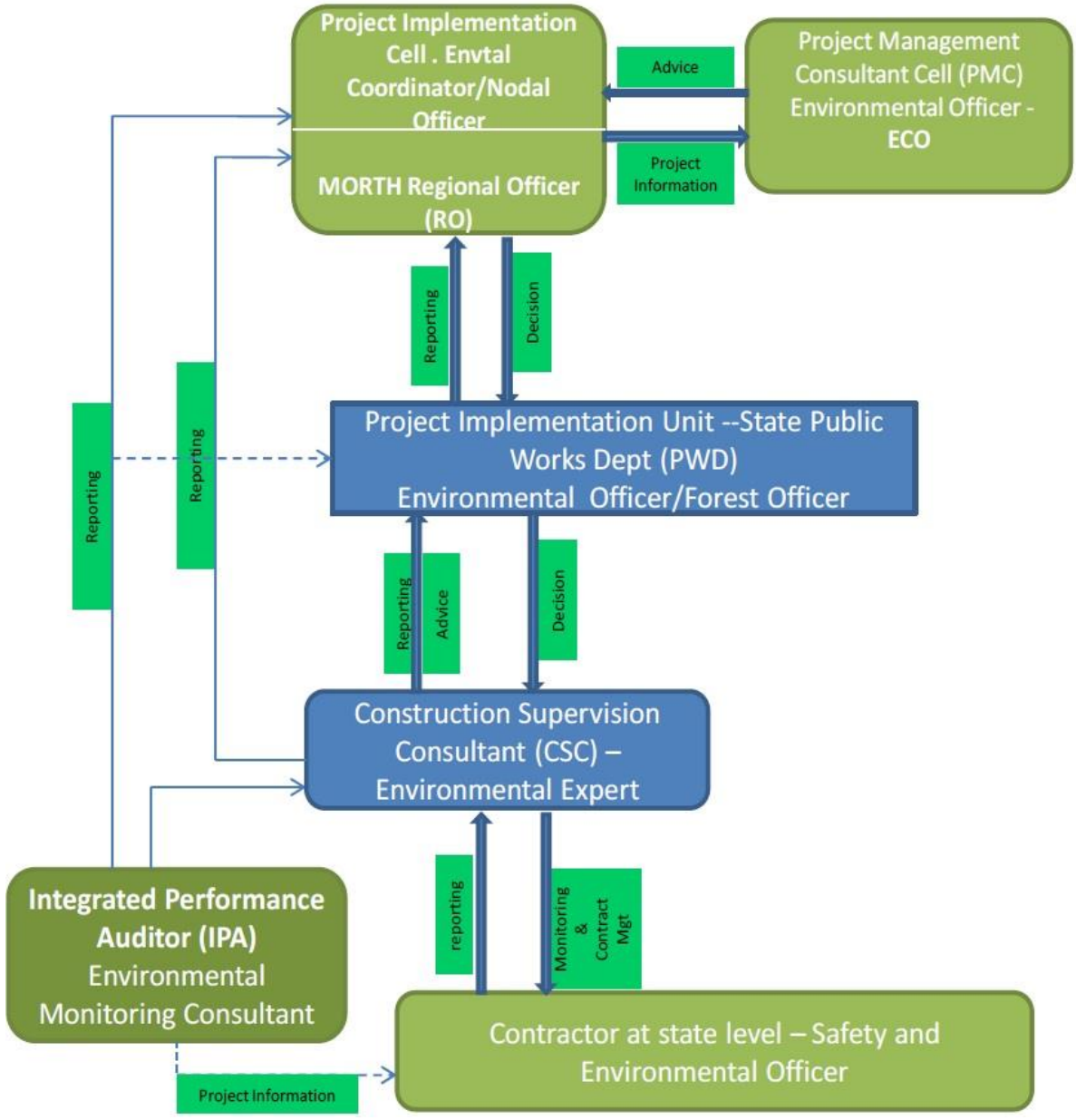
Towards delivering of environment and social policy and procedural requirements three levels of institutions - central, state, and sub-project/site level would be involved in the project. MoRTH will be the overall implementation agency and shall be responsible for preparing and implementing the project through Public Work Departments (national highway division) at the state level. While MoRTH has the prior experience of implementing World Bank funded projects and its safeguards policies, it has to depend on state departments/divisions and consultants. The capacity of states and the performance of consultants varies substantially. In some cases, finding relevant expertise in an efficient and timely manner both for project preparation and for construction supervision during execution, was noted as an issue under the on-going project (NHIIP). Also, there were some slackness in the inter-departmental coordination with Forest, Wildlife, Pollution Control Board, Power, Water Supply, Revenue, Urban and Rural Local Bodies in the initial years of project execution.

Given the sensitization and capacity building carried out under the on-going project (NHIIP), it is encouraging to see the positive transition in MoRTH's policy and focus on issues pertaining to environmental sustainability and safety in the last few years. This includes the initiatives taken through the National Green Highways Policy/Mission and support to several new technical codes (through IRC) promoting recycling, use of waste/by-products, resilience and other forms of environmental management, making these mainstream elements in road design and implementation.

6.2 Project Implementation Structure

The Environment Management Framework needs to be applied and implemented at all stages of the project. This requires an institutional mechanism to deal with various processes and issues. The over-all proposed project implementation structure is depicted in the following diagram:

GNHCP - EMP Implementation Arrangements and Responsibilities



GNHCP - EMP Implementation Arrangements and Responsibilities

Within the institutional framework proposed for the project, preparation, implementation, supervision and monitoring of environment functions, particularly the Environment Management Plans (EMP), will be carried out at the three levels – national center, state level and the project/community level with an inbuilt mechanism for coordinating activities at all levels.

Specific functions will be delegated to the Environmental Experts assigned to the MORTH at the national center (Project Implementation Cell), the National Highways wings of the respective state Public Works Departments (Project Implementation Unit), Construction Supervision Consultants, and the civil works engineering contractors, some Non-

Governmental Organizations (NGOs) and other local civil society bodies.

National Level

At the central level, the Project Implementation Cell within the MORTH will serve as a facilitator, overseeing overall responsibilities spanning policy development, fund disbursement, learning coordination and information sharing as well as monitoring and evaluation. Specifically, towards managing environmental issues, the PIC will contract a Project Management Consultant (PMC) with a designated Environment Expert who will provide advisory services to the MoRTH's (PIC) National Level Nodal Environmental Officer.

The PMC Environment Officer will support PIC on critical issues and provide up to date guidance and recommendations for effectively managing environment related project activities at the state and project levels. The PMC EO will facilitate cross learning between state PIUs and civil contractors and enhance coordinated reporting on progress with implementation of the EMP. The PMC EO will liaise with the Social and engineering Experts on the PMC to ensure a comprehensive and coordinated approach to the EMPs.

State Level

For each state, a Project Implementation Unit (PIU) will be created in the State (PWD) with a multidisciplinary staff expertise in environment and social safeguards, project management, monitoring and supervision, procurement and fiduciary issues. Institutional structures for the Project Implementation Unit (PIU) may differ relatively to reflect the unique requirements of the state.

The Environment Officer (EO) designated to the PIU will over-see and co- ordinate various aspects related to the environment management as envisaged under each sub-project. The EO will provide specific guidance on policy and regulatory requirements specific to the state and local setting to the DPR consultants. The EO will also provide guidance on the process and steps for obtaining any requisite clearances. The Environment /Forest Officers will support in terms of building PIU team capacity for incorporating environmental concerns in design, implementation and operation of the sub-project. The EO will collaborate strongly with counterpart social and engineering specialist on the PIU as well as the Construction Supervision consultant and will report to the Project Management Consultant through the PIC. Where there are multiple sub- project roads within one state, separate sub- PIUs will be established within the State PWD to reduce overburdening with implementing multiple sub-projects.

Together with the Social Expert on the PIU, the Environment/Forest Officer will:

- ensure integration of the EIA and resulting EMP into the sub-project design and implementation plans (contract documents)
- monitor implementation of the mitigation measures by the Contractors
- assist the engineers at site by providing appropriate environmental advice, and developing/revising environmental mitigation measures for the sub-projects
- assist the PIU to carry out participatory consultation during planning, design and

implementation of sub-project

- document experiences associated with and lessons learned from environmental mitigation and prepare useful training materials for both internal and external capacity building
- prepare regular periodic progress reports on the implementation of the EMP throughout project implementation

Project Level

Actual civil works and reconstruction of the project roads will be carried out by the Construction Consultants/Contractors under the direct supervision of Construction Supervision Consultants. The Environmental Expert on the Contractor team will ensure strict compliance with the environmental contractual clauses and will report on progress or challenges to the Construction Supervisory team.

6.2 Monitoring Arrangements for Effective Environmental Management

In order to ensure that the proposed mitigatory measures have the intended results and complies with GoI and World Bank requirements, an environmental performance monitoring program would be carried out. This could be achieved through daily and more sequenced monitoring by the Environment Experts on the contractor, CSC and PMC respectively.

Construction Phase Monitoring

In selecting the monitoring parameters, care will be taken to choose parameters according to the characteristic features of the existing environmental baseline conditions ensuring that parameters are both cost effective and viable for identifying changes that deviate from predetermined impacts. The plan will be designed on the premise that civil works and related activities will have relatively less significant effects on existing conditions and residual impacts will be controlled using the EMP. Results from the monitoring the environmental parameters will be compared to MOEF&CC and CPCB/SPCB prescribed limits.

Operational Phase Monitoring

It is envisaged that operation of the reconstructed highways will present fewer environmental impacts compared to the construction phase. Monitoring indicators for the operation phase will be based on feedback from local surveys and from planned social responsibility/peripheral development activities. Monitoring during the operational phase will be carried out more frequently especially during the first year of operation to ensure that any complaints about the road operation is readily captured and resolved.

Auditing

A Third Party Audit will review the effectiveness of the implementation of environmental management plan. Primarily the auditing exercise will determine whether the sub- projects comply with all environmental regulatory performance standards in addition to any GoI stipulated highway construction and operation standards. Auditing process will test the accuracy of reports from field assessments and cost effectiveness of management measures.

It entails a systematic, documented and periodic review of project implementation and could be a very useful tool to improve project management performance.

Instituted environmental audits at the project road level and at the overall operation level is critical for an operation of this dimension. In this regard, the operation will incorporate a series of independent verification and audit mechanisms both at design and implementation phases. At the preparation phase, the project will launch a one- time independent technical audit of the EMF and the EIAs. During the construction phase, GNHCP will contract chartered accounting firms to conduct bi-annual or annual performance audit that will include financial management, procurement and safeguard compliance. As Integrated Environmental and Social Performance Auditor, the firm(s) will review all sub-project documents and visit a representative sample of project roads for validation of safeguards compliance. These will complement system enhancements that are aimed at monitoring efficiency and quality of expenditure within the GNHCP project.

With respect to environmental issues, the performance audits will:

- collect, analyze and interpret monitoring results to detect changes related to implementation and operation of specific activities
- verify if monitoring parameters are in compliance with national set standards
- compare the predicted impacts with actual impacts and evaluate the accuracy of predictions in view of proposed mitigation measures
- evaluate the effectiveness of implementation of the EMP
- loop back into the EMP, any short comings identified from the auditing
- identify and report if there is non-compliance with the EMP and where applicable identify replicable lessons from the monitoring

To facilitate auditing process, auditors may first develop a structured questionnaire based on the EMP and this can be administered to state officers involved in the project, construction engineers, PAP, etc. Depending on specific characteristics of the sub-project road, audits can be carried out at regular intervals or on ad hoc basis or when mitigation is not carried out as defined by the EMP leading to public concern.

6.3 Measures to Introduce/Strengthen Institutional Capacity

To meet the multiple and varied nature of environment challenges that the project poses, capacity needs will be built at the central, state and project levels responsible for planning and designing and implementing the sub-projects and the EMPs. In this respect, GNHCP will also initiate some key activities with MORTH and the participating states as enumerated below:

a) Capacity Building and Mainstreaming Environmental Dimensions in the Technical Standards: The existing limited implementation capacity can affect environmental outcomes despite safeguard provisions. This dearth in capacity will be addressed through enhanced technical assistance and training, and sharing of environmental and

social lessons from similar national highway projects. Technical assistance component (TA) and training on the management of key environmental issues of highway roads development program, such as planning, design and/or construction of roads in ecologically sensitive areas; drainage design and management; slopes and debris management in hilly terrain and materials management, will be provided to the engineers and contractors. The GNHCP may provide assistance in revising IRC codes on highway construction. This can also include a manual towards creation of „green highways".

b) Integration of Environmental Aspects in the Operations Manual: The Operations Manual of GNHCP (a key document that lays out the detailed procedures) will be prepared to reflect the environmental management procedure that will govern the operation

c) Integration of EHS requirements in the Standard Bidding Document: Inappropriate construction practices can cause adverse environmental, health and safety (EHS) impacts, especially from the improper scheduling of works, unsafe handling of hazardous materials and haphazard dumping of construction wastes (including earth cuts in hills). To ensure improved environmental management during the construction stage, a section clearly specifying preventive and mitigation measures to be taken by the contractor will be introduced in the Standard Bidding Document (SBD). Compliance with these specifications will be supervised as part of project technical supervision.

6.4 EMP Implementation Budget

In view of the environmental management measures suggested above and factoring in the limited implementation capacity of the state PIUs, necessary budgetary provisions should be made for different sub-projects. Tentative budget for each of the sub-projects should include environmental management cost, monitoring cost.

ANNEXURES

Annexure 1
Guidance Note for Incorporation of Environment Management Plan into Bidding/Contract Documents

The purpose of the annex is to provide some guidance on the integration of the EMP/ GEMP into the contract documents of a sub-project.

Environment requirements in the pre-bid documents

The project implementing agency, i.e. PIU / the Line Departments issue the pre-bid documents to shortlist a few contractors, based on their expression of interest and capability. While details on environmental requirements are really not required in the pre-bid stage, it is useful to mention that the contractor is expected to have good environmental management capability or experience.

1. Incorporating EMP in the Bid Document

The project implementing agency (line department) issues the bid documents to the pre-qualified contractors. There are two kinds of bid documents, for International Competitive Bids (ICB) and National Competitive Bids (NCB). In Bank projects, these documents are prepared based on templates (separate for ICB and NCB) provided by the Bank. The ICB documents are based on the FIDIC (i.e., an acronym for the International Institute of Consulting Engineers) guidelines, while the NCB is closer to the national contracting procedures, i.e. the Central PWD contract documents in India. The bid documents contain separate volumes. For instance, a typical ICB document contains:

(i) General Conditions of Contract, which is based on the FIDIC;

(ii) Technical Specifications, which is based on the applicable specifications in India for similar infrastructure related works;

(iii) Bill of Quantities and

(iv) Drawings.

The EMP parts/sections should be included in the relevant locations of the bid documents in the following way:

- ***Mitigation/Enhancement measures & monitoring requirements tables***

The cross-reference to these tables should be included in the "conditions of particular application (COPA)", which is a part of the General Conditions of Contract (e.g. Section IV, Item 19.1 of the ICB). As a standard practice, there is an over-all reference to the laws that have to be followed in this section/item. The relevant laws need to be mentioned here. In addition, the adherence to the mitigation/enhancement measures and table on monitoring requirements should be included. The two tables will have to be added as Annexes or the entire EMP (without cost and drawings) as a whole should be attached. Either the Annexes or the appropriate section in the EMP should be cross-referred in the description of this item.

- ***Modifications/additions to the technical specifications***

  Due to the mitigation/enhancement measures included in the EMP, there may be (a) additions/alterations required to the applicable specifications and/or (b) there may be a need to add new specification/s. These are to be referred in the section on "Supplementary Specifications" in the Technical Specifications Volume of the bid document. Generally, the GoI applicable specifications are already referred/listed and are not repeated in the bid documents. However, changes and additions to these specifications are made through the inclusion of a section "Supplementary Specifications." This section should also include additional technical specifications related to the EMP or should provide a cross- reference to the specific section of the EMP.

- ***Cost table***

  All the items in the EMP cost table relevant to the contractor have to be referred in the Bill of Quantities (BoQ) table, which is a separate volume of the bid documents. It is to be noted that the BoQ table in the bid document includes the various tasks to be done by the contractor under different categories. Against each task, the contractor will have to indicate a unit rate while completing the bid documents.

- ***Drawings***

  All EMP drawings are to be reflected in the „Drawings" volume of the Bid document. If the drawings are included in the EMP, then a cross-reference should be provided in the Drawings Volume.

2. **Developing the EMP to Suit the Bid/Contract Document**

   As one of the intentions is to integrate the EMP requirements into the bid documents/contract Agreement, the EMP should be developed keeping the following in mind:

   a. Mitigation/enhancement measures: In the Mitigation/Enhancement Measures table, the text describing each measure should not include/repeat what is already covered under the technical specification/s, and this should only be cross- referred. The text should be short, clear and succinct. The description should focus on "what" and "where" of the mitigation / enhancement measure as the "how" of the measure is covered under the specification.

   b. Monitoring requirements table: There are certain monitoring requirements for the contractor. While developing the Monitoring Requirement table, those that pertain to the contractor should be clearly mentioned.

   c. Technical specifications: The modifications to the specifications and the additional specifications should be separately listed. These should be included as Annexure in the EMP. The (added or modified) technical specifications should be adequately detailed to avoid problems (including that of interpretations) at site.

d. Drawings: The modifications to the drawings and the additional drawings should be included as Annexure in the EMP. It is important to note that all drawings

included/ added should be "execution drawings" detailed as per requirement of the particular item so as to execute at site with adequate quality control and workmanship. Also, it is important to note that the quality of BoQ [or cost estimate] and technical specifications part of the contract document depends on the degree of detailing in the drawings.

e. Cost table: The items pertaining to the contractor should be clearly separated from the expenditures that are to be incurred by the project implementing agency, supervision consultant and/or any other agency/organization.

f. Timing for finalizing EMP: It is best to finalize the EMP before the finalizing the bid documents. This is required to fully reflect the sections of the EMP relevant to the contractor in the bid document and to ensure its proper integration.

3. **Other Notes**

Once the completed bids have been received from prospective contractors, the project implementing agency takes a decision based on the costs and the technical merit of the bids. Following the decision, the implementing agency and the chosen contractor sign and counter-sign the completed bid documents. It becomes the contract agreement thereafter. If issues have been missed in the bid documents, it cannot be amended at the time of signing the contract agreement stage unless there is a really strong justification for the same. If there is an EMP cost item that is not reflected in the BoQ of the signed contract agreement, the supervision consultant/engineer may issue a variation order, if such case has merit. Contractor will quote a rate and the task gets done. This issue of variation orders is a standard practice and can be used, if found necessary. However, the intent of the good contracting practices should be to minimize variation orders and therefore EMP should be carefully prepared and integrated in the bid document.

Annexure 2
Potential Environmental Impacts

Activity	Potential Impacts
Construction Workforce	Environmental impacts during construction include: • Tensions between outside workers and local communities • Affected living standard and income of local residents due to occupation of farmland • Market distortion due to temporary inputs to local economy • Unemployment of local labor • Disruption to livelihoods, cultural activities, and wellbeing of locals Competition for employment with locals.
Worker's Camp and Site Installation	Environmental Impacts during construction include: • Generation of significant volumes of wastewater and solid waste. • Stockpiling of waste and illegal dumping • Contamination of land, surface water and groundwater caused by spillage and leakage from storage of hazardous materials including petroleum products, chemicals, hazardous substances or hazardous wastes. • Water courses, nearby rice paddies, and agricultural land can be easily contaminated with wastewater and solid wastes.
Erosion and Sedimentation	Roadbed and side slopes digging, roadbed filling, road surface paving, bridge foundation treatment, materials stack, concrete plants, construction machinery operation etc. can: • Destroy surface vegetation • Aggravate soil erosion • Weakened soil conservation capacity • Temporarily change water flow patterns

Activity	Potential Impacts
Emissions and Dust (Air Quality)	Sources or air pollution during construction that can be a nuisance and cause health problems are: • Fugitive dust emissions due to exposure of slope surface, uncovered stockpiling area, earth moving and excavation activities • Dust emission due to blasting of rock • Dust from vehicles and unpaved roads • Wind blow during transportation of material by vehicles and when transporting on unpaved access roads • Gases emissions from batching plants and concrete mixing stations • Gases emissions during payment of road surface by asphalt plant; and • Air pollutant emissions from exhaust of construction plant and vehicles such as CO, CO_2, NO_2, and SO_2. • Air pollution problems during the operation phase are: • Exhaust from vehicles (e.g. CO, NO_2) that may deteriorate air quality in tunnel and at nearby sensitive receptor locations; and • Gases emissions during road maintenance and re-surfacing of road surface (e.g. asphalt plant).
Noise and Vibration	Disturbances to livelihoods and damage to structures can be cause by: • Operation of the various equipment during construction (air compressor, concrete mixers, powered mechanical equipment, bulldozers, excavators, etc); • Vehicles transporting materials within construction site and beyond the construction boundary; • Piling activities during construction of foundations / piers; • Ventilation systems during tunnel construction; • Blasting and vibration during tunnel construction • During the operation phase, noise may be generated by: • Traffic noise from road and horning of vehicles; • Noise from service areas and car parking areas; and • Construction plant during road maintenance.

Activity	Potential Impacts
Earthworks, Fill Slopes, Cuts, Borrow Pits, Quarries, Disposal sites, Stockpiles	Environmental impacts include: • Loss of topsoil affecting productive land. • Land instability from incorrect earth removal or unstable deposition of spoil, leading to landslides or erosion events. • Discharge of sediments into watercourses, rice paddies, drainages, and irrigation canals. • Erosion of riverbanks, slopes, and productive land • Noise and vibration • Dust emissions affecting health. • Disturbances or damage to physical cultural resources. • Damage to agricultural land and native vegetation • Visual Impacts
Disposal of Debris, Demolition of Structures	Environmental Impacts include: • Damage of local forest areas, contamination of drainage watercourses and impacts on land by improper disposition of construction and Demolition waste • Injure of workers and the general population by falling debris and flying objects
Clearing of Construction Areas	Large-scale moving activities, disturbance of soil profile and removal of vegetation can result in: • Soil erosion and visual impact • Loss of productive plots / trees affecting livelihoods and habitat • Loss of habitat and vegetation for animals • Discharging sediment and vegetation material into water courses affecting in-stream habitat • Discharging sediment and vegetation material into rice paddies, and irrigation canals
Landscape, Visual Impacts and Site Restoration	Landscape and visual impacts during construction can result from: • Poor/inadequate aesthetic design and landscaping design of the proposed road structures

Activity	Potential Impacts
	• Poorly implemented temporary mitigation measures and slope protection measures during excavation and slope work. After the completion of construction and before operation of the project, landscape and visual impact may occur because of: • Lack of appropriate compensatory planting at the end of construction or non-native species • Planting of species visually incompatible to the background environment; • Lack of proper maintenance/watering of newly planted vegetation during the post-construction period. • Lack of proper restoration of cleared areas, such as borrow pits, stockpiles and disposal areas, construction camp areas, areas under bridges, and any areas occupied temporarily
Water Quality	• Pollution of watercourses, groundwater, natural habitats and productive land caused by: • Wastewater generated from construction equipment (e.g. uncontrolled release of bentonite from tunnel drilling machine); • Wastewater from bored piling locations. Re-suspension of bottom sediment and mud caused by cut-trench river crossings and construction of bridge foundation within rivers; • Soil erosion / flush away from uncovered stockpiling locations, uncovered excavation site and unprotected slope surface during adverse weather conditions; • Uncontrolled surface water run-off carrying sediment laden discharges directly into natural water bodies such as streams, ponds, rivers and local irrigation channels; • Domestic sewage generated by construction workers, such as kitchen, shower, campsite, etc. Main water quality issues during operation phase are: • Wastewater generated during routine road surface cleaning and surface runoff from road surface during heavy rain falls; • Pollution of nearby water body due to vehicle accidents leaking fuel, hydraulic oil, toxic materials or dangerous goods; and Wastewater discharge from service areas, car parking and toll station

Activity	Potential Impacts
Solid Waste, Hazardous and Chemical Waste	Damage to local forest areas, pollution of drainage watercourses and natural habitats, and impact on agricultural land caused by: • Surplus excavated materials requiring disposal due to earth moving activities and slope cutting; • Disposal of used wooden boards for trenching works, scaffolding steel material, site hoarding, packaging materials, containers of fuel, lubricant and paint; • Waste generated by demolition of existing houses / buildings affected by the project or breaking of existing concrete surface; • Domestic solid waste generated by construction workers, construction campsite, kitchen, toiletries, • Improper disposition of hazardous wastes such as waste oil, spent lubricant, solvents, and contaminated materials resulting from leakage of oil and fuel. • Improper handling and storage of hazardous and chemical substances and construction materials
Work on Bridges	• Discharges of sediment into water courses affecting in- stream habitat. • Erosion of river banks • Introduction of invasive species. • Changing water course paths blocking fish passage and affecting in-stream habitat from fallen debris from the construction process • Discharges of oil and fuel to water courses affecting water quality.
Ecological Considerations (Fauna and Flora)	Environmental impacts during construction include: • Destruction of native vegetation and land outside proposed working areas • Damage of forest areas • Loss of habitat and vegetation for animals due to site clearance • Temporary destruction or disturbance of aquatic life due to bridge works

Activity	Potential Impacts
	• Land occupation at ecological sensitive areas • Damage of forests and waterways adjacent to camps and work areas. • Illegal hunting of wild animals by construction workers • Lack of re-construction of lost habitats and re-creation of diverse ecosystems. Environmental impacts during operation phase include: • Traffic noise and lighting can force wildlife to leave their natural habitats • Lack of evaluation of the success of recreation of habitat and identification of further measures to improve ecological conditions • Traffic accidents with wildlife crossing the expressway
Construction Site Safety	Environmental impacts include: • Risk associated with working in enclosed environment such as inadequate ventilation and fire fighting within tunnel / tunnel shaft • Seepage of water into tunnel during the tunnel construction; • Collapse within tunnel when drilling through geologically unstable ground layers • Risk of falling objects and unstable working platform • Risk associated with blasting and fire • Risk associated with equipment and traffic movements, on and off the construction sites.
Traffic Management	Environmental impacts include: • Traffic congestion during construction due to the increase of heavy traffic (of the construction itself and from traffic detours) in high traffic avenues and exit ramps, community roads; • degradation of local roads due to heavy equipment machinery and traffic detours; • Pedestrian safety specially for school children during construction; • Increase in traffic accidents

Activity	Potential Impacts
Access and Linking Roads	Environmental impacts include: • Increase noise, dust t and air pollutants caused by construction vehicles that will use existing local and provincial roads; • Pedestrian safety specially for children and pupils • Additional vehicles used for transportation of materials may cause traffic jams and accidents in existing access roads which already exceed traffic capacity • Newly developed access roads may impact water quality, destroy existing vegetation cover, cause changes in the landform in certain areas, impact and create bare surface more prone to erosion
Community Relations	Lack of communication and consultation with local communities can lead to an opposition to a road project, delays in the construction process increased costs and unsatisfactory solutions.
Health Issues	Environmental impacts include: • Spread of disease due to poor housekeeping and accumulation of domestic waste within the construction site • Stagnant water may result in mosquitoes breeding. • HIV/AID risk to the local communities. • Illnesses brought by outside construction workers.

Annexure 3
Environmental Guidelines for Developing Environment Management Plans

General Issues

Issue	Key Principle / Mitigation Standard	Mitigation Measures
Water supply affecting ecology or neighboring community water supply.	Camp to provide its own water supply that does not affect village water supply.	▪ Any water supply sources should be located so that it does not adversely affect the villages supply. ▪ The intake of water from streams for water supplies should leave residual flows in the watercourses. ▪ Storage tanks should be used to buffer water supplies.
Wastewater Discharges affecting water quality	Wastewater to be treated prior to discharge.	Sewerage disposal methods should be designed to the standards outlined by the Vietnamese government
Solid waste polluting the environment and causing health hazards	No waste to be burnt or buried on site.	All solid wastes shall be removed from site and disposed of at a municipal landfill.
Camps using local services and resources, at the expense of villagers.		Refer to section on Village impacts
Workers intruding on village life and disrespecting traditional cultural values.		Refer to section on Village impacts

General Construction Issues

Issue	Key Principle / Mitigation Standard	Mitigation Measures
Noise of machinery associated with construction activities	Noise must not unreasonably intrude on traditional village life.	▪ Keep a current list of all noise producing machinery and noisy activities ▪ Operate machinery only during designated hours in agreement with local communities ▪ Adopt a complaint mechanism
Dust generation from construction activities	Dust must not cause a hazard or nuisance to village life.	▪ Dusty operations to occur only during designated hours. ▪ Adopt complaint mechanism ▪ Concrete batching plants and other dusty equipment to be located as far as practical from settlements.
Vibration disturbance from construction activities	Vibration must not unreasonably intrude on traditional village life.	▪ Keeps a list of all vibration producing machinery and activities causing vibration. ▪ This machinery operation to occur only during designated hours (to be confirmed by contractor in agreement with villages). ▪ Use of complaints register and procedures to address issues as they arise.
Increased utilization of roads by traffic associated with construction activities	There should be no significant increased risk to local populations from traffic associated with the development.	▪ Road upgrades, including signage, speed humps, re-grading. ▪ Training of locals regarding the hazards of traffic. ▪ Training of vehicle drivers regarding the driving risks through villages and along remote roads. ▪ Use of complaints register and procedures to address issues as they arise.
Pollution risk activities occurring on site	Develop appropriate storage, transport and use practices for storage and handling	▪ Keeps a current list of all potentially contaminating materials used on site. ▪ Develop and implement appropriate storage, transport and use practices

Issue	Key Principle / Mitigation Standard	Mitigation Measures
	of mixed classes of dangerous goods in packages and intermediate bulk containers. There shall be no solid or liquid waste disposal directly or indirectly to any water course (whether flowing or not).	to recognized standards. ▪ Solid waste disposal shall be taken off site.

Excavation and Blasting

Issue	Key Principle / Mitigation Standard	Mitigation Measures
Noise disturbance of local populations	Noise must not unreasonably intrude on traditional village life.	▪ Keep lists of all noise producing equipment. ▪ This machinery operation to occur only during designated hours (to be confirmed by contractor in agreement with villages). ▪ Blasting to occur at the same time each day, and / or a warning siren should sound prior to blasting.
Vibration disturbance of local populations	Vibration must not unreasonably intrude on traditional village life.	▪ Keep current lists of all vibration producing machinery ▪ This machinery operation to occur only during designated hours (to be confirmed by contractor in agreement with villages). ▪ Blasting to occur at the same time each day, and / or a warning siren should sound prior to blasting.

Construction Material Stockpiling

Issue	Key Principle / Mitigation Standard	Mitigation Measures
Runoff of suspended sediments from stockpiles	Stockpiling activities should not give rise to storm water containing elevated suspended solids. Provide treatment to achieve 75% reduction in suspended solids.	▪ No direct discharge of sediment laden water without treatment. ▪ Stockpiles should be compacted as much as practical and not be exposed for extended periods. that will enable capturing and addressing issues upfront ▪ Work to be carried out in daylight, in typical working hours. ▪ Concrete batching plants and other noisy equipment to be located as far as practical from settlements ▪ Storm water should be diverted around stockpiles.
Dust generation from stockpiles	Dust must not cause a hazard or nuisance to village life.	▪ Stockpiles should be compacted and not exposed for extended periods. ▪ Stockpiles should be reused as soon as practicable.

Soil / Overburden Removal and Placement

Issue	Key Principle / Mitigation Standard	Minimum Mitigation Measures
Generation of suspended solids from bare ground and	Development activities should not give rise to storm water containing elevated	▪ No direct discharge of sediment laden water without treatment.

runoff into watercourses	suspended solids. Provide treatment to achieve 75% reduction in suspended solids.	▪ Earthworks and land clearance should be minimized and phased. ▪ Any discharges to watercourses should occur during high flow and / or discharged as close to the outfall as possible to maximize mixing. ▪ Stockpiling should occur at least 10m from a water course. ▪ Re-vegetation of exposed areas as soon as practicable. ▪ Timing of works around the drier seasons where possible. ▪ Provision of storm water cut off drains wherever possible.
Disturbance of natural habitats for spoil / alluvial material.	Soils should be reused where possible in the development – to reduce the need for spoil sites and the need to import fill.	▪ Stockpile and reuse soils before ▪ excavating new soils / alluvium.
Efficiency of control measures over time	Control measures should continue to work appropriately throughout the construction period.	▪ Earthworks control measures should be inspected and maintained in efficient operating condition over the construction period.

Concrete Mixing Plant

Issue	**Key Principle / Mitigation Standard**	**Minimum Mitigation Measures**
Contaminants in water discharged from concrete manufacturing, including rise in pH.	▪ No direct discharges of concrete batching water to any water course. ▪ Provide treatment prior to discharge to achieve 75% reduction in suspended	▪ Settlement ponds and / or sediment infiltration gallery. ▪ Monitoring immediately upstream and 50m downstream of the discharge with a clarity tube to estimate

	solids.	any effects on clarity; for pH to detect alkali discharges. ▪ Any storm water discharges to watercourses should occur during high flow and / or discharged as close to the outfall as possible to maximize mixing. ▪ Water to be reused where possible in the process. ▪ Procedures for handling of un-hydrated cement material and wet cement to avoid spills.
Community nuisances.	Noise and dust must not unreasonably intrude on traditional village life.	▪ Concrete batching plants and other noisy / dusty equipment to be located as far as practical from villages.

Fuel Storage and Use

Issue	**Key Principle / Mitigation Standard**	**Minimum Mitigation Measures**
Pollution risk associated with the storage and use of fuels for all plant, generators and vehicles	No oil, lubricants, fuels or containers should be drained or dumped to ground or waterways. Accidental spills shall be minimized, and procedures put in place to clean up the environmental damage.	▪ Keep a current list of all fuels stored on site. ▪ Keep the Safety Data Sheet of all hazardous materials used on site. ▪ Develop appropriate storage, transport and use practices to recognized standards. ▪ Diesel to be stored in truck tankers or in overhead tanks to a maximum of 5000 liters. ▪ Diesel to be stored on flat ground, and 100m away from a waterway. ▪ Dikes to capture 100% of fuel

Issue	Key Principle / Mitigation Standard	Minimum Mitigation Measures
		must be placed around fuel storage areas. ▪ All refueling of vehicles and plant to be done on flat ground. ▪ All significant vehicle and plant maintenance shall be undertaken offsite where possible. ▪ Spill kits and emergency procedures should be used and staff trained. ▪ There shall be no deliberate discharge of oil, diesel, petrol or other hazardous materials to the surrounding soils and waterways.

Works in and near Rivers

Issue	Key Principle / Mitigation Standard	Minimum Mitigation Measures
Sediment discharges arising from working in and near the river. For blasting in or near the river, refer to the blasting issues, above.	Work in the wetted area of the riverbed should be minimized, and only in relation to the construction of bridges and culverts at stream crossings.	▪ Stabilize works at the end of each working day and prior to storm events. ▪ Do the work during low flow periods. ▪ Works shall be minimized. ▪ Diversion of the river around the work area where possible. ▪ Construction of Coffer Dam

Village impacts

Issue	Key Principle / Mitigation Standard	Minimum Mitigation Measures
Key Considerations for a Communication Strategy to avoid deterioration of current quality of life and traditional livelihoods	Communication channels are established between Villagers, Construction Supervisors, and state PCUs to facilitate information flow and easier process for lodging complaints	▪ Set up a communication network for discussing issues between Construction supervisors Contractors and the villagers and the state PCUs built on recognized negotiation structures ▪ Construction Supervision Consultant and the Contractors will have an Environmental Specialist on site to ensure daily conformance with environmental health and safety guidelines and to respond to complaints ▪ A Health Program to be included in the Contractor's Construction and Workers Camp Management Plan. This will be made available to the communities ▪ Education and orientation of outside workers to local culture and social norms before the start of work. ▪ Camps to be self sufficient in resources and services. (refer to the workers camp table below) ▪ Villagers shall be adequately informed of all potential hazards to health and safety with regards to increased traffic, blasting, machinery operation.

Issue	Key Principle / Mitigation Standard	Minimum Mitigation Measures
Traffic causing safety risks to road users	Construction traffic will be managed to minimize the impact on existing road users.	▪ Signage to be used to identify current risks to road users. ▪ Construction Supervision consultancy and Contractors to discuss major traffic issues with village representatives prior to the event to discuss course of action. ▪ Heavy traffic to avoid the hours when school children walk to and from school.
Sediment affecting river water uses.	Sediment discharges to the river shall be minimized.	▪ Refer to the sections above discussing erosion and sediment control.

Annexure 4
Environmental Aspects and Management Measures Considered for GNHCP

A. Addressing Environmental Concerns during DPR Preparation

S.No.	Activity	Aspects to Consider	Measures to Address Concern/Issue
A.	**Road Construction**		
1.0	Environmental Inventory	Trees	• Inventory preparation of all key environmental features • Avoidance, design modifications to minimize adverse environmental impacts • Incorporating community concerns into finalizing alignment
		Forests	
		Wildlife Sanctuary/ National Park/ Notified Protected Areas	
		Rivers / water crossings	
		Water bodies	
		Wetland	
		Grazing lands	
		Cultural properties	
		Utilities	
		Community facilities	
		Major junctions	
2.0	Detailed Surveys	Geological, geo-technical studies	• Stability analysis and measures to address slope instability, bridge works, etc. • Detailing of features
		Topographical surveys	
		Hydrological surveys in flood prone areas	• Identification of flood prone areas and measures to avoid afflux • Identification of use of land
3.0	Identification of material sources	Borrow material	• Utilizing alternative materials
			• Minimize requirements through design modifications
			• Location criteria
		Quarry material	• Utilizing alternative materials
			• Material extraction from existing quarries
		Water availability	• Identification of community/private sources
			• Scheduling construction to suit water availability
			• Utilizing community water sources without conflict of uses
		Water bodies	• Provision of silt fencing
			• Rehabilitation of water bodies
		Stability of slopes	• Measures for slope stabilization
		Soil erosion	• Erosion control measures
		Land use changes	• Land use control measures adjacent to road

S.No.	Activity	Aspects to Consider	Measures to Address Concern/Issue
		Agriculture lands	• Avoid setting-up construction camps, borrow areas
			• Conservation of top soil (if unavoidable)
			• Site restoration after construction
		Cultural properties	• Avoidance through design modifications
			• Planning for Relocation & rehabilitation
		Common Property Resources	• Avoidance through design modification
			• Planning for Relocation of consultation with community
		Drainage	• Provision of adequate number of Cross Drainage Structures
		Trees	• Compensatory plantation and arrangements for roadside plantation
		Forest areas	• Avoidance through design modifications
			• Environment Management Measures during construction
		Natural Habitats	• Avoidance through design modification or formulating additional measures for avoiding impacts
5.0	Precautionary measures during construction to avoid environmental impacts	Top soil	• Stockpiling of topsoil and its preservation
		Construction sites	• Provision of pollution control measures
			• Measures to ensure public and worker's health/safety
			• Water Management
		Construction camps	• Criteria for identification of sites and Infrastructure arrangements
			• Safe disposal of all wastes
			• Enforcement of pollution control measures
		Borrow areas	• Arrangements with land owners to include redevelopment
		Quarry areas	• Rehabilitation of quarry areas if new quarries are opened
		Public/workers health & safety	• Personal Protective Equipment to be provided
			• Public safety at construction sites to be undertaken
			• Measures for worker's health & hygiene at construction camps
6.0	Consultations with community	Land for borrowing	• Agreement to include borrow area rehabilitation
		Water for construction	• Agreements with owners/community for utilizing water
		Site for construction camps	• Rehabilitation of the land after construction

S.No.	Activity	Aspects to Consider	Measures to Address Concern/Issue
		Removal of trees	• Compensation for the trees cut
			• Relocation costs to be covered in the project
			• Relocation costs to be covered in the project
		Traffic during construction	• Provision of alternate routes or prior notice to the users
7.0	Finalization of alignment	Concerns of community	• Community concerns to be incorporated
		Environmental impacts identified	• Impacts identified are to be mitigated by incorporation of provisions as per guidelines
		Design aspects	• Impacts that can be mitigated through design modifications should be incorporated
8.0	Preparation of detailed drawings	All concerns/impacts identified	• Designs for enhancements and mitigation measures including cost provisions
9.0	Monitoring	All environmental aspects identified	• Monitoring implementation of environmental measures

B. Environmental Concerns to be Addressed during Execution of Works

S.No.	Activity	Impact/s	Measure/s
A	**Pre-Construction Stage**		
A1.0	Alignment marking	None	• Co-ordination with Revenue Department
A2.0	Relocation of utilities	Disruption of services of current use	• Identification of relocation site in advance
			• Scheduling the activity in consonance with the community usage pattern
A3.0	Tree Felling	Compliance with Forest Act in case trees are on forest land (Roadside trees are notified Protected Forests in states like Uttar Pradesh and Rajasthan)	• Avoid felling of trees with nests and those used for perching by birds • Avoid felling during nesting season • Prior clearance from Forest Department
		Loss of canopy and warming effect	• Compensatory plantation
A4.0	Clearance of land	Impact on standing crops	• Scheduling of activity and coordination
		Impact on cultural properties	• Relocation of the cultural properties
		Impact on natural habitats	• No clearance of vegetation beyond proposed RoW.
A5.0	Diversion of forest land	Compliance with Forest Act	• Activity scheduling to avoid delays, conformance to legal requirements
		Impact on vegetation	• Precautionary measures during construction in forest areas
		Pollution from construction activities	• Precautions while operating equipment/machinery
A6.0	Transfer of land ownership	Grievances from community	• Addressal through Grievance Redressal Mechanisms & Consultations

S.No.	Activity	Impact/s	Measure/s
A7.0	Location of Storage Yards, labour camps, and construction sites	Pollution from construction camps, storage yards & labour camps	• Location criteria to be adopted • Obtain NOC from State PCB
		Pressure on local infrastructure	• Infrastructure arrangements to be as per EMF/EMP guidelines
A8.0	Procurement of equipment and machinery	Machinery likely to cause pollution at settlements and natural habitats	• Machinery to be procured shall be in conformance with emission standards of CPCB
		Safety concerns in machinery operation	• Safety equipment for workers • Tool box talks • Training on safe operations
A9.0	Identification and Selection of Material Sources	Conflict of uses in case of water	• Consultations and arrangements at individual/community level • Documentation of agreement
		Borrowing causes depressed lands	• Consultations and arrangements at individual/community level • Documentation of agreement
		Pollution due to material extraction from borrow and quarry areas to surrounding environment	• Precautionary measures during siting of borrow areas and quarry areas
		Disturbance to Natural Habitats	• Avoidance of location of material sources in Natural Habitats
A10.0	Identification of designated locations for waste disposal	Pollution due to location close to settlements, water bodies & other sensitive areas	• Site selection in conformance to criteria provided
B	**Construction Stage**		
B1.0	Site Clearance		
B1.1	Clearing and Grubbing	Effect on roadside vegetation	• Restricting movement of machinery/ equipment
		Debris generation creating unsightly conditions	• Disposal / storage of grubbing waste and possible reuse
B1.2	Dismantling of existing culverts and structures	Generation of Debris creating unsightly conditions	• Disposal of waste and likely reuse
		Flooding due to interception to drainage paths	• Provision of diversion channels and/or scheduling construction of culverts in dry months
B2.0	Planning Traffic diversions and Detours	Trampling of vegetation along traffic diversions	• Activity scheduling, identification of alternative track

S.No.	Activity	Impact/s	Measure/s
B3.0	Material Procurement	Loss of topsoil	• Stripping and proper storage of topsoil
		Formation of stagnant water pools due to borrowing/quarrying	• Rehabilitation plan for borrow areas & quarry areas
		Illegal quarrying / sand mining	• Conformance of quarries selected to the SPCB requirements, including quarry rehabilitation plans
		Uncontrolled blasting at quarries	• Controlled blasting to the extent required. Conformance to blasting rules as per the Indian Explosives Act
B4.0	Transport of materials to site	Fugitive emissions from transport trucks	• Covering of material with tarpaulin or use of covered box trucks during transport
		Dust emissions from haul roads	• Haul road management
B5.0	Materials handling at site		
B5.1	Storage of materials	Contamination to water sources, leaching into ground water	• Provision of impervious base to storage areas
B5.2	Handling of earth	Dust rising and increase in particulate concentration in ambient air	• Use of dust suppressants
B5.3	Handling of fly ash	Increase of particulate concentration and contamination of nearby areas	• Use of dust suppressants
B5.4	Handling of granular material	Risk of injury to workers	• Use of Personal Protective Equipment
B5.5	Handling of bituminous materials	Leaching of materials, contamination of water sources	• Provision of impervious base at bitumen storage areas
		Air pollution	• Control of emissions from mixing
B5.6	Handling of oil/diesel	Contamination from accidental spills	• Prevention of accidental spills, affecting cleaning immediately after spill
		Pollution due to incomplete burning	• Use of pollution control equipment
B5.7	Waste management	Littering of debris at construction site	• Waste to be disposed at disposal locations only
		Contamination of surroundings due to runoff from construction site	• Prevention of runoff from entering water bodies
B5.8	Operation of construction	Air and Noise pollution	• Conformance to Emission standards and norms

S.No.	Activity	Impact/s	Measure/s
	equipment and machinery	Operational safety of workers	• Conformance to Safety concerns of the road users and workers in operation • First aid provision • Mandatory provision of Personal Protective Equipment (PPE)
B5.9	Movement of Machinery	Trampling of vegetation	• Restriction of movement within ROW
		Damage to flora	• Minimizing impact on vegetation
		Damage to road side properties	• Minimizing impacts on private and common properties, including religious structures
B6.0	Earthworks		
B6.1	Cutting	Uncontrolled blasting in case of rock cutting	• Controlled blasting to be made mandatory
		Loss of topsoil	• Preservation of topsoil for reuse
		Waste generation	• Safe disposal of waste & possible reuse
B6.2	Embankment construction	Interruption to drainage	• Drainage channels to be provided with culverts in advance to embankment construction
		Dust Rising	• Dust suppression with water
		Excess water/material usage	• Minimising height of embankment
		Erosion causing impact on embankment/slope stability	• Slope stabilization measures as seeding, mulching & bio-engineering techniques
		Formation of rills / gullies	• Construction of temporary erosion control structures as per requirements
		Contamination of water bodies/ water courses	• Control measures as silt fencing, vegetative barriers etc
			• Avoiding disposal of liquid wastes into natural water courses
B6.3	Maintenance at construction camp	Collection of rainwater in construction camp	• Temporary drains during construction
		Waste water from labour camp	• Disposal of waste water into soak pits
		Contamination of soil	• Removal of oil / other chemical spills & wastes
B6.4	Cutting embankments of water bodies	Impact on the drainage flows in and out of the water body	• Restoration of drainage channels
		Embankment stability	• Design of slopes of the water bodies, slope protection etc
B7.0	Sub-Base and Base courses		
B7.1	Granular sub-base	Extensive extraction of quarry materials	• Use of locally available materials

S.No.	Activity	Impact/s	Measure/s
B7.2	Wet mix macadam	Extensive water requirement	• Scheduling the activity in wet months • Avoiding conflict of uses due to water extraction from construction
B7.3	Shoulders treatment	Movement of Machinery for compaction	• Restricting movement on adjacent lands
B8.0	Culverts and Minor Bridge Works	Interruption to water flow	• Provision of diversion channels
		Pollution of water channels during construction	• Control of sediment runoff
		Safety of Workers	• Mandatory use of Personal Protective Equipment
B9.0	Surfacing		
B9.1	Bituminous surface	Worker's safety during handling of hot mix	• Mandatory use of Personal Protective Equipment
		Damage to vegetation (burning/ cutting)	• No use of wood as fuel for heating bitumen
			• Hot mix plant location on waste lands
		Contamination due to bituminous wastes	• Safe disposal of bituminous wastes
		Impacts on Air quality	• Ensuring compliance of hot-mix plants with the CPCB emission standards
B9.2	Concrete surfacing for roads crossing built up areas	Contamination of surroundings due to concrete mixing	• Mixing concrete at designated locations away from habitation and agriculture lands
B10.0	Road furniture/ Signage	None	• To be provided as per design • Follow safety precautions during installation
B11.0	Shoulder protection	Requires material extraction from quarries	• Use locally available material
			• Ensure that all shoulders are clear of debris or construction materials
B12.0	Enhancements	None	• To be included in DPR • Follow standard precautions during works
B13.0	Monitoring	None	• To be as per EMF/EMP
C	**Post Construction Stage**		
C1.0	Clearing of construction camps		
C1.1	Dismantling of campsite	Waste generation at the construction site	• Disposal of waste at designated locations • Restoration of site to original or better condition
C1.2	Campsite rehabilitation	Change of land use due to setting up of construction camp	• Campsite to be restored to its original condition as per the rehabilitation plan
			• Restoration of top soil

S.No.	Activity	Impact/s	Measure/s
C2.0	Clearing of Water Channels, side drains and culverts	Generation of debris and silt	• Reuse in civil works as provided in the design/contract document • Removal of debris and disposal at designated/pre-approved locations
C3.0	Rehabilitation of borrow areas	None	• Top soil restoration, revegetation