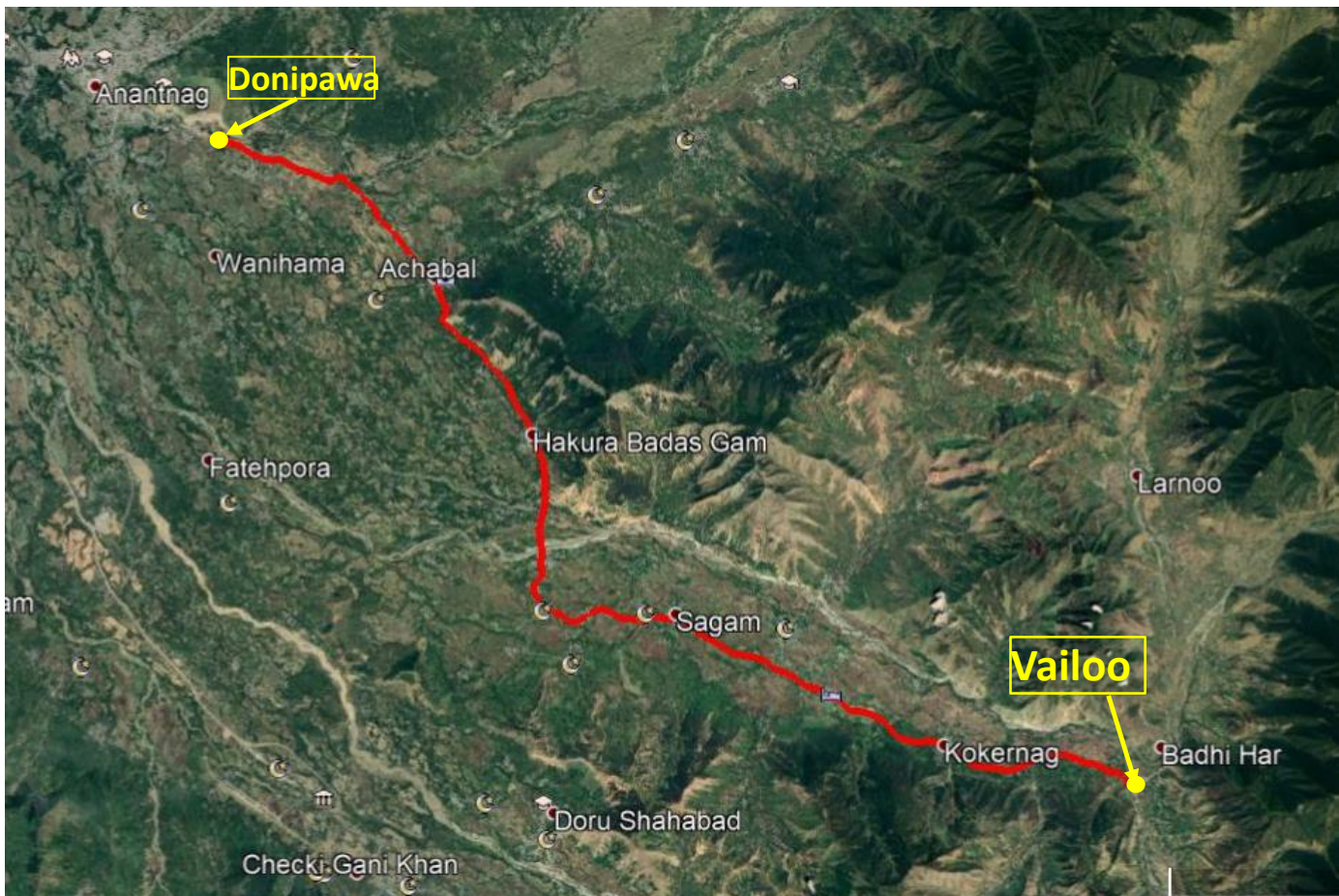


NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.

(MINISTRY OF ROAD TRANSPORT & HIGHWAYS, GOVT. OF INDIA)

3RD FLOOR, PTI BUILDING, 4-PARLIAMENT STREET, NEW DELHI – 110001

Consultancy Services for Feasibility Study, Preparation of Detailed Project Report and providing pre-construction services for upgradation to 2 lane with paved shoulder from (i) Km 44.500 to Km 142.000 of Chattroo Village & (ii) Km 235.00 (Vailoo Village) to Km 269.00 (Khanabal) of Khellani- Kishtwar- Chattroo- Khanabal Section of NH 244 in the state of Jammu & Kashmir



FINAL DETAILED PROJECT REPORT VAILOO TO DONIPAWA SECTION

VOLUME-IV : ENVIRONMENT IMPACT ASSESMENT REPORT



NOVEMBER 2020

RODIC CONSULTANTS PVT. LTD.

IN JV WITH

MONARCH SURVEYORS AND ENGINEERING CONSULTANTS PVT. LTD.



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1. PROJECT BACKGROUND

The Ministry of Road Transport and Highways (MORT&H) is poised to develop all remote and strategically important roads in hilly terrains to perennial routes. In continuation to these developments National Highways and Infrastructure Development Corporation Limited (NHIDCL) has been appointed by MORT&H, to implement these projects.

National Highways & Infrastructure Development Corporation Limited (NHIDCL), has been assigned the work of preparation of feasibility study / DPR and providing pre-construction services of road stretches/ corridors for up-gradation to two laning with paved shoulder according to NH Configuration. National Highways & Infrastructure Development Corporation Limited (NHIDCL), Ministry of Road, Transport & Highways, Govt. of India has been assigned the work of preparation of feasibility study / DPR and providing pre-construction services of road stretches/ corridors for up-gradation to two/four laning with paved shoulder according to NH Configuration.

In pursuance of the above, M/S Rodic Consultants Pvt. Ltd., New Delhi in joint venture with M/S Monarch Surveyors and Engineering consultant Pvt. Ltd. have been appointed as Consultants to carry out the “Consultancy Services for Feasibility Study, Preparation of Detailed Project Report and providing Pre-Construction Services for upgradation to 2 lane with paved shoulder from

1. Km 44.500 to Km 142.000 of Chhatroo Village
2. Km 235.000 Vailoo Village to Km 269.000 Khanabal of Khellani – Kishtwar – Chhatroo - Khanabal Section of NH 244 in the state of Jammu and Kashmir.

The agreement was signed on 4th June 2019.

This project section deals with Vailoo- Khanabal section from existing Km. 235.000 to Km. 269.000. Proposed Chainage km 148+589 Vailoo to km 176+532 Donipawa.

1.1 Overview of National Highways and Infrastructure Development Corporation (NHIDCL)

National Highways and Infrastructure Development Corporation is a fully owned company of the Ministry of Road Transport & Highways, Government of India. The company promotes, surveys, establishes, designs, builds, operates, maintains, and

upgrades National Highways and Strategic Roads including interconnecting roads in parts of the country which share international boundaries with neighboring countries. The regional connectivity so enhanced would promote cross border trade and commerce and help safeguard India's international borders. This would lead to the formation of a more integrated and economically consolidated South and South East Asia. In addition, there would be overall economic benefits for the local population and help integrate the peripheral areas with the mainstream in a more robust manner.

The company has set a vision to become an instrument for creation and management of infrastructure of the highest standard in the country while contributing significantly towards nation building. The company has a Mission to be a professional company which works in most efficient manner and designs, develops & delivers infrastructure projects in a time bound manner.

The endeavor of the Company is to develop, construct and maintain Highways and Infrastructure in a clean manner. The Company has also become part of the 'Swachh Bharat Abhiyan'.

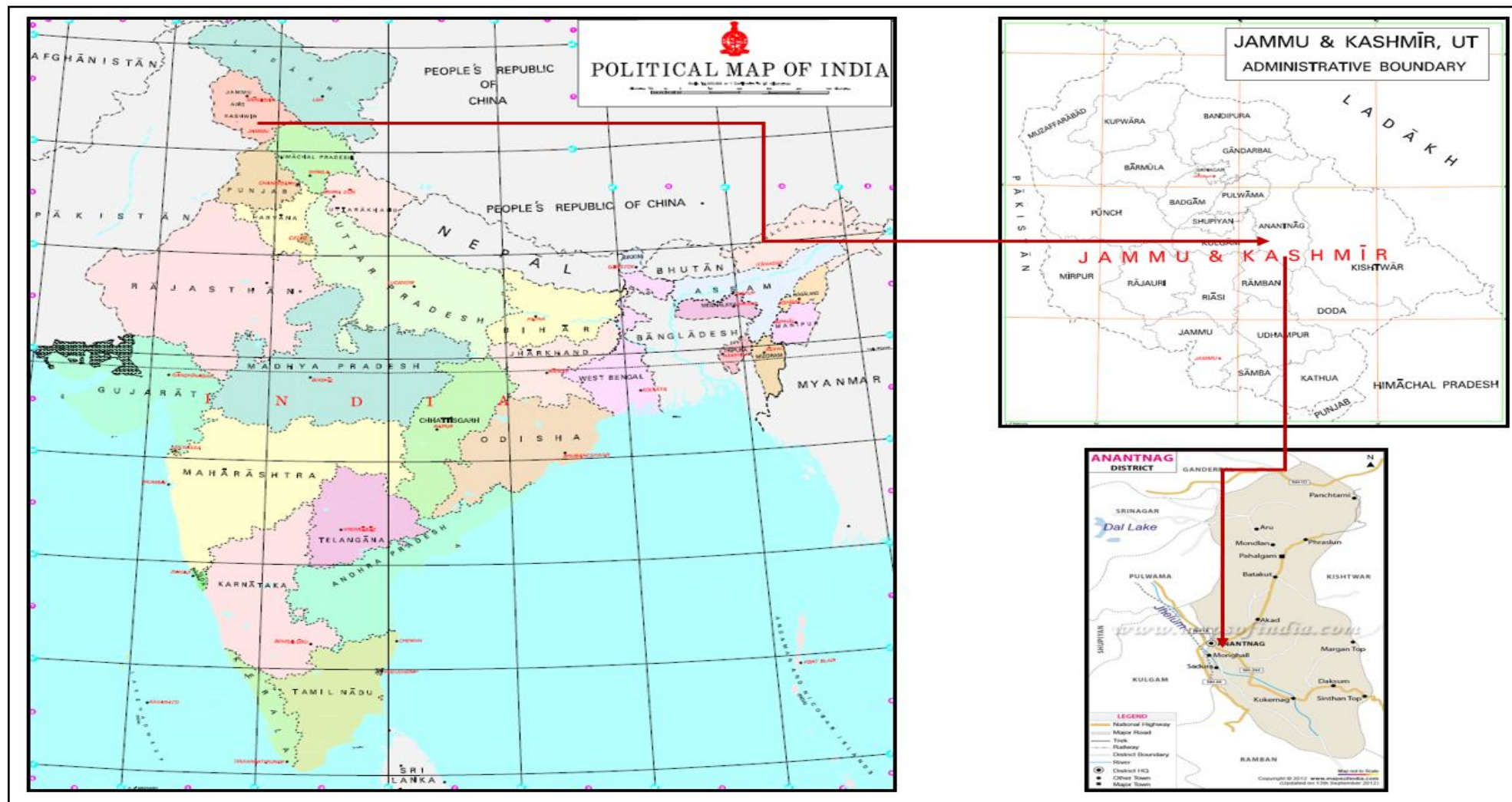
1.2 Project Description

The project road lies on NH-244 (previously NH-1B) and connects Batote with Khanbal, passing through the Union territory of Jammu & Kashmir. The proposed project alignment passes through Vailoo town, Achabal, Kokernag, Donipawa for a total design length of 27.943 km. The Index Map showing the stretches of National Highways, described above as a part of project road, is presented in Fig.1.

DRAFT DETAILED PROJECT REPORT

Consultancy Services for Feasibility Study, Preparation of Detailed Project Report and providing Pre-Construction Services for upgradation to 2 lane with paved shoulder from Km 235.00 (Vailoo Village) to Km 269.00 (Khanabal) of Khellani – Kishtwar – Chattroo - Khanabal Section of NH 244.

Project Key Map: Vailoo - Khanabal



The project road of Vailoo - Khanabal lies entirely in Anantnag district in newly formed Union Territory of Jammu and Kashmir. The project road is part of NH-244 (old NH-1B) which runs from Batote to Khanabal via Khellani, Thattri, Kishtwar, Vailoo, Achabal and Anantnag. The Project Road is in south-west part of Jammu and Kashmir.

The last point of project of Vailoo tunnel and its approach roads” coincides with Vailoo – Khanabal project near its starting point at Existing Chainage 235+070. Now, there is already a DPR proposed for a 2 -Lane bypass (Donipawa-Ashajipora Project) which bypasses the Anantnag city and ignores the heavy traffic of the city. This bypass is link road between NH-244(NH-1B) and NH-44 (NH-1A) which starts from Donipawa (NH-244) and terminates near Khudwani at NH-44 passing through Ashajipora. The starting point of this proposed bypass coincides with the Project road of Vailoo – Khanabal at Ex. Ch. 263+107.

Hence, all the traffic approaching from Doda, Khellani and Kishtwar side with intention to reach at NH-44, will divert from proposed Vailoo Tunnel and will reach at Vailoo – Khanabal project road section and here mixed with the local traffic of project road with the same intention, will reach eventually at NH-44 opting the proposed 2-lane bypass from Donipawa.

Accordingly, the project road starts from Design Ch. 148+589 at Vailoo and terminates at Design chainage 176+532 at Donipawa. The location of the Project Road has been shown in the figures below.

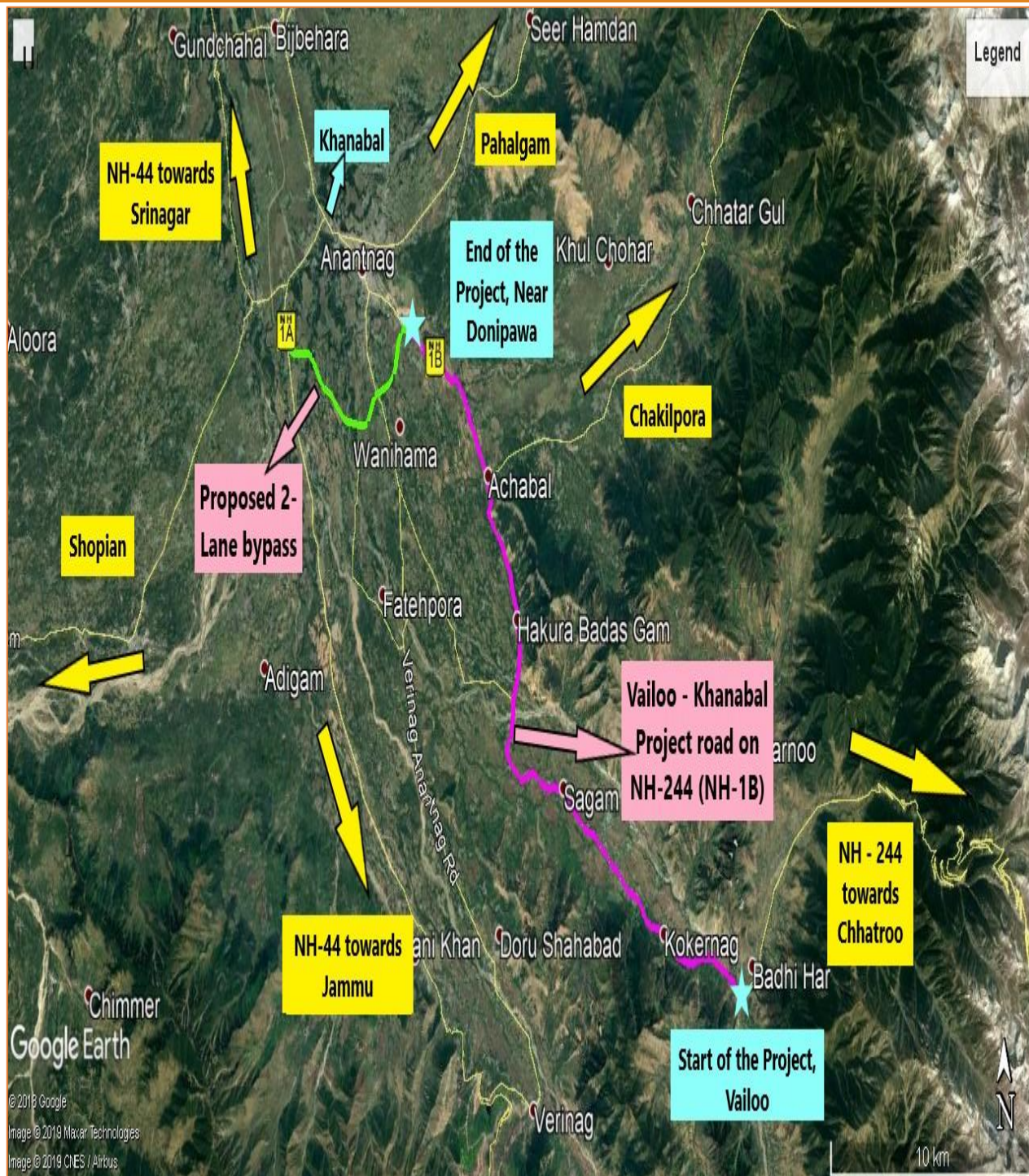


Figure: index map project Road

Proposed improvement under the project

The project road is widening and strengthening 2 Lane carriageways with paved shoulder configurations. The geometric designs would be as per recommendations of IRC: SP:73-2018 & IRC: 48 Hill road Manual.

1.3 Project Objectives

Project aims to improve transport efficiency of the NH/Boarder State road network, which will contribute to expansion of economic opportunities and poverty reduction. This will be realized by:

1. Improving the National Highway network in Jammu and Kashmir Boarder Area.
2. facilitating safe and appropriate road usage,
3. increasing efficiency of transport services and
4. Reduction of Travel time to alternative route Srinagar to Jammu.
5. Every Season access and Free from Traffic congestion
6. Reduce Road Accident

Project immediate outcome will be improved accessibility to social services and markets, increased fuel efficiency, reduced travel time, accidents, vehicle emissions and better employment opportunities outside agriculture, both through improved access to economic centers and increased industrial activities in the project area. To achieve the above objectives, candidate roads will be widening and strengthening to 2-lane with paved shoulders largely in consistent to Indian Road Congress (IRC) guidelines.

1.4 EIA/IEE Objectives

The project is categorized as category 'B' in accordance with Ministry of environment and forest EIA notification 2006, Government of India and ADB's Safeguard Policy Statement (SPS), 2009 warranting an Environmental Impact Assessment (EIA), initial environmental examination (IEE). EIA/IEE identifies the environmental issues to be considered at project planning and design stage. The EIA/IEE report covers the general environmental profile of the study area and includes an overview of the potential environmental impacts and their magnitude on physical, ecological, economic, and social and cultural resources within the project's influence area during design, construction, and operation stages. An Environmental Management Plan (EMP) forms part of this report which includes mitigation measures for significant environmental impacts during implementation of the project, environmental monitoring program, and the responsible entities for mitigation and monitoring. EIA/IEE has four basic objectives.

- I. Identify the environmental issues that should be considered due to project interventions,
- II. determine the magnitude of potential environmental concerns and to ensure that environmental considerations are given adequate weight at planning/design stage,
- III. identify need for further environmental studies or Environmental Impact Assessment (EIA), and

1.5 Extent of EIA/IEE

EIA/IEE extent has been decided considering all likely Impacts and risks analyzed in the context of the project's area of influence. It encompasses

- I. the primary project site(s) and related facilities
- II. associated facilities whose viability and existence depend exclusively on the project
- III. areas and communities potentially affected by cumulative impacts from further planned development of any existing project or condition, and other project-related developments that are realistically defined at the time of assessment; and
- IV. areas and communities potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location.

The core zone of impact is taken as proposed right of way and its immediate vicinity. The assessment also considers the areas and activities related to associated facilities viz. quarry operation, borrow areas, construction camp, transportation/hauling routes etc. The study area is considered up to 5-10 km on either side of road for larger analysis of land use and other features. Assessment is carried out for all facets of environment i.e. physical, biological, and socio-economic aspects.

1.6 Approach and Methodology

1.6.1 Preface

EIA/IEE report addresses all environmental impacts triggered by the entire project which EMPs have been prepared presenting the segregated technical details to define

clear scope of activities under EMPs for the convenience of civil contractors.

1.6.2 Information Sources

The EIA/IEE report has been prepared based on project interventions as described in Design Report, field investigations and stakeholder consultations to meet the requirements for environmental assessment process and documentation as per ADB's Safeguard Policy Statement (SPS), 2009. Key information sources include executing agency, primary field survey, consultations with Anantnag District Administration Department, J&K Forest Department, Disaster Department, Tourism Department IMD and other websites.

1.7 Steps Followed

EIA/IEE commenced with the review of legal requirements for the project. In next step, technical details were collected compiled by detailed design team. This was followed by a discussion with the implementing agency to reconfirm the technical details. Further steps followed for EIA/IEE has been concisely described in following paragraphs

1.7.1 Reconnaissance Survey and Initial Consultations

Reconnaissance survey and initial consultations facilitated in designing the nature of the environmental survey and extent of consultations to be carried out along the road alignment. It helped to identify data gaps, decide valued environment components, key stakeholders and key informants who can further substantiate the collected information.

1.7.2 Primary Data Collection

Environmental resource inventory was prepared for all environmental features viz. terrain, land use, waterways/water bodies, road side vegetation, sensitive receptors, common property resources, utilities, drainage, flooding/water logging, accident prone areas etc. within the area of interest/core zone.

1.7.3 Secondary Data Collection:

Secondary sources included environmental assessment, published government reports, government websites, recognized institutions, and relevant government departments, forests and pollution control board, statistics, Indian Meteorological Department (IMD) etc. Recent Google images were captured to view environmental features at regional

scale. References made to the secondary sources have been mentioned in the text and tables throughout the length of the report.

1.7.4 Public Consultations

Meaningful consultations were organized with the government agencies, local people/beneficiary population to know the level of project acceptability, understand their concerns, apprehensions, and overall opinion. These consultations enabled incorporation of all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, the sharing of development benefits and opportunities, and implementation issues. Efforts were made to make it gender inclusive and responsive. Information were gathered about existing baseline environmental condition viz. ambient levels and its effects on health, water resources, water logging/flooding, flora and fauna, wildlife movement, socio-economic standing of local people, impact due to loss of land other assets and common property resources, accident risk during construction and operation stage, perceived benefits and losses, etc. This will be continued throughout the project cycle.

1.7.5 Assessment of Potential Impacts

The assessment of the type, nature, direct, indirect, cumulative or induced impacts and their significance to the physical, biological, and socio- economic components of the environment has been done to ascertain whether the project is environmentally sustainable or not. Nature of impacts has been classified as significant, insignificant, short-term, long-term, reversible, irreversible etc. After identification of nature and extent of impacts, mitigation measures have been suggested.

1.7.6 Environment Management Plan

EMP has been formulated with an aim to avoid, reduce, mitigate, or compensate for adverse environmental impacts/risks and propose enhancement measures. This includes:

- 1) mitigation of potentially adverse impacts,
- 2) monitoring of impacts and mitigation measures during project implementation and operation
- 3) Institutional capacity building and training

- 4) compliance to statutory requirements
- 5) Integration of EMP with project planning, design, construction, and operation.

1.8 Structure of the report

EIA/IEE has been structured in accordance with MOEF EIA notification 2006, IRC and SPS, 2009. An executive summary describing critical facts, significant findings, and recommended actions has been presented in the beginning of the report. The report has been compiled and presented as follows.

- Chapter I- Introduction
- Chapter II- Policy, Legal and Administrative Framework
- Chapter III- Description of Project
- Chapter IV- Description of the Environment
- Chapter V- Anticipated Impacts and Mitigation Measures
- Chapter VI- Information Disclosure, Consultation, and Participation
- Chapter VII- EMP and Grievance Redress Mechanism
- Chapter VIII- Conclusion and Recommendation

3. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

This session presents a review of the international agreements and commitments, existing institutions, and legislations relevant to the project at the National and State level. The environmental assessment process needs to adopt environmental regulations and guidelines of Government of India and ADB's World Bank Safeguards.

➤ International Agreements and Commitments

India is party to various international agreements/conventions/treaties for conservation of environment at global level. Important among them have briefly described and analyzed vis- a- vis the project development.

➤ Ramsar Convention on Wetlands, 1971

The Convention on Wetlands, signed in Ramsar, Iran, in 1971, is an inter-governmental treaty, which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. Out of 19 designated wetlands of International Importance in India, none of them is in project influence area.

➤ Convention on Protection of the World Cultural and Natural Heritage, 1972

The United Nations Educational, Scientific and Cultural Organization (UNESCO), which seeks to encourage the identification, protection and preservation of cultural and natural heritage around the world considered to be of outstanding value to humanity has embodied these objectives in an international treaty called the Convention concerning the Protection of the World Cultural and Natural Heritage in 1972. There are Twenty-six world cultural heritage and natural sites in India. None of them is in project influence area.

➤ Vienna Convention for Protection of the Ozone layer, 1985 and Montreal Protocol on Substances Depleting the Ozone layer, 1987

The Vienna Convention outlines states responsibilities for protecting human health and the environment against the adverse effects of ozone depletion, and established the framework under which the Montreal Protocol was negotiated. The Montreal Protocol stipulates that the production and consumption of compounds that deplete ozone in the stratosphere chlorofluorocarbons (CFCs), halons, carbon tetrachloride,

and methyl chloroform) are to be phased out by 2010. The project does not envisage production and consumption of ODS.

➤ **United Nations Framework Convention on Climate Change (UNFCCC), 1994**

As per the convention the reduction/limitation requirements of Green House Gases (GHG) apply only to developed countries. The only reporting obligation for developing countries relates to the construction of a GHG inventory (GHG sources and sinks, potential vulnerability to climate change, adaptation measures and other steps being taken to address climate change). India acceded to the Kyoto Protocol but has not ratified it and hence the carbon emission limits are not binding upon India.

➤ **Convention on Biological Diversity (CBD) 1992**

The Convention on Biological Diversity (CBD) is dedicated to promoting sustainable development and came into force in 1992 Rio Earth Summit. India signed the CBD in 1994. Member Parties have committed themselves to achieve by 2010, a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on earth.

2.1 **Country's Legal Framework and Regulatory Requirements**

The implementation of the Vailoo 33.5640° N, 75.3602° E Donipawa 33.7184° N, 75.1677°E road connecting NH-244 & NH-44 comply with the environmental acts, policies, rules, and regulations of the Government of India which has a comprehensive coverage of environmental issues and requirements. This environmental legal framework imposes command and controls on certain activities deemed detrimental to the environmental integrity and encompass the conservation of various components of the biological and physical environment and environmental assessment procedures and requirements for public consultation. The policies and requirements which are most relevant in the context of this project are provided in Table below.

Table- 1: Summary of Environmental Legislations Applicable to the Project

| Sr. No | Act / Rules | Purpose | Applicable | Reason for Applicability | Authority |
|--------|-----------------------------|--------------------------------|------------|--------------------------------|-----------------------------------|
| 1. | Environment Protection Act- | To protect and improve overall | Yes | It is umbrella legislation and | MOEFCC. Gol; J&K State Gov. Jammu |

FINAL DETAILED PROJECT REPORT

Consultancy Services for Feasibility Study, Preparation of Detailed Project Report and providing Pre-Construction Services for upgradation to 2 lane with paved shoulder from Km 235.00 (Vailoo Village) to Km 269.00 (Khanabal) of Khellani – Kishtwar – Chattroo - Khanabal Section of NH 244.

| Sr. No | Act / Rules | Purpose | Applicable | Reason for Applicability | Authority |
|--------|---|---|------------|--|---------------------------|
| | 1986 | environment | | notifications; rules and schedules are promulgated under this act. | and Kashmir SPCB/SPCC. |
| 2 | Environmental Impact Assessment Notification, 14 th Sep-2006 | To accord environmental clearance to new development activities listed in schedule of EIA notification. | No | None of the Projects are located either in eco- sensitive areas | MoEF, SEIAA |
| 4 | Office memorandum dated 18.05.12, by MoEF in view of Apex Court order dated 27.2.2012 | Conserve topsoil, aquatic biodiversity, hydrological regime etc. by haphazard and unscientific mining of minor minerals | Yes | In case of renewal of quarries and opening of new borrow areas | SEIAA |
| 5 | National Environment Appellate Authority Act (NEAA) 1997 | Address grievances regarding the process of environmental clearance. | Yes | Grievances if any will be dealt with, within this act. | NEAA |
| 6 | Forest Conservation Act 1980 | To check deforestation by restricting conversion of forested areas into non- forested areas | No | No forest Area fall under this project. | Parivesh, MoEF-CC |
| 7 | Forest Conservation Act 1980 | To restore tree, cover equal to or more for trees likely to be cut | Yes | Significant Tree cutting is involved in Projects. some Revenue tree in alignment | DFOs, Revenue Department. |
| 8 | Air (Prevention and Control of Pollution) Act, 1981 | To control air pollution by controlling emission of air Pollutants as per the prescribed standards. | Yes | For construction; for obtaining NOC for establishment of hot mix plant, workers' camp, construction camp, etc. | SPCB |
| 9 | Water (Prevention and | To control water pollution by | Yes | This act will be applicable during | SPCB |

| Sr. No | Act / Rules | Purpose | Applicable | Reason for Applicability | Authority |
|--------|--|---|------------|---|--|
| | Control of Pollution) Act 1974 | controlling discharge of pollutants as per the prescribed standards | | construction for (establishments of hot mix plant, construction camp, workers' camp, etc. | |
| 10 | Permission of Abstraction of Ground water | To conserve and augment the groundwater resources | Yes | Projects work used Chasma/Nallah Local Concerned Official permission required if Applicable. | CGWA/Concerned State/District Authority |
| 11 | Noise Pollution (Regulation and Control Act) 1990 | The standards for noise for day and night have been promulgated by the MoEF for various land uses. | Yes | Vehicular noise on project routes required to assess for future years and necessary protection measure need to be considered in design. | SPCB |
| 12 | Explosive Act 1984 | Safe transportation, storage and use of explosive material | Yes | In case of opening new Quarries, Blasting | Chief Controller of Explosives |
| 13 | Mines & Minerals Development Act, 1957 | To regulate excavation, production, storage, collection, distribution, transportation, manufacturing, possession, purchase and sell of any minor mineral including soil | Yes | Project requires sand, aggregates, soil, and other minor minerals in large quantity. | District Collector and State Mines Dept. |
| 14 | Central Motor Vehicle Act 1988 and Central Motor Vehicle Rules 1989 and its amendments | To check vehicular air and noise pollution. | Yes | These rules will be applicable to road users and construction Machinery. | Motor Vehicle Department |
| 15 | Construction and Demolition Waste Management Rules, 2016 | To ensure all such waste are disposed in environmentally acceptable manner | Yes | Road Extraction during construction | Municipal Corporation and SPCB |

| Sr. No | Act / Rules | Purpose | Applicable | Reason for Applicability | Authority |
|--------|--|---|------------|--|-----------|
| | | and prevent from land and water pollution | | | |
| 16 | Solid Waste Management Rules, 2016 and Plastic Waste Management Rules 2016 | Mandated the source segregation of waste to channelize the waste to wealth by recovery, reuse and recycle. | Yes | Domestic wastes food leftovers, vegetable peels, plastic, house sweepings, clothes, ash, paper, cardboard, plastic, wastes like batteries, bulbs, tube lights etc. | SPCB |
| 17 | Hazardous and other Wastes (Management and Trans Boundary Movement) Rules, 2016. | To ensure that transport storage, use, and disposal of such waster do not pollute land and water environment and do not causes danger to health | Yes | Hazardous wastes from construction and demolition like tar and tar products (bitumen, felt, waterproofing compounds, etc.), wood dust from treated wood, lead having products, chemical admixtures, sealants, adhesive solvents, paints etc. | SPCB |
| 18 | Batteries (Management and Handling) Rules, 2001 as amended 2010 and its amendments 2020. | Notified with an aim of channelizing the used lead acid batteries for environmentally sound recycling. | No | Applicable to all the projects when disposal of used lead-acid battery is involved. | |
| 19 | E-waste (Management and Handling) Rules, 2011 | to channelize the E-waste for environmentally sound recycling which is largely controlled by the un-organized sector who are adopting crude | No | Due to use and disposal of electrical and electronic wastes generated in the building, like PC, printers, cartridges, CDs, Xerox machine etc. collectors | SPCB |

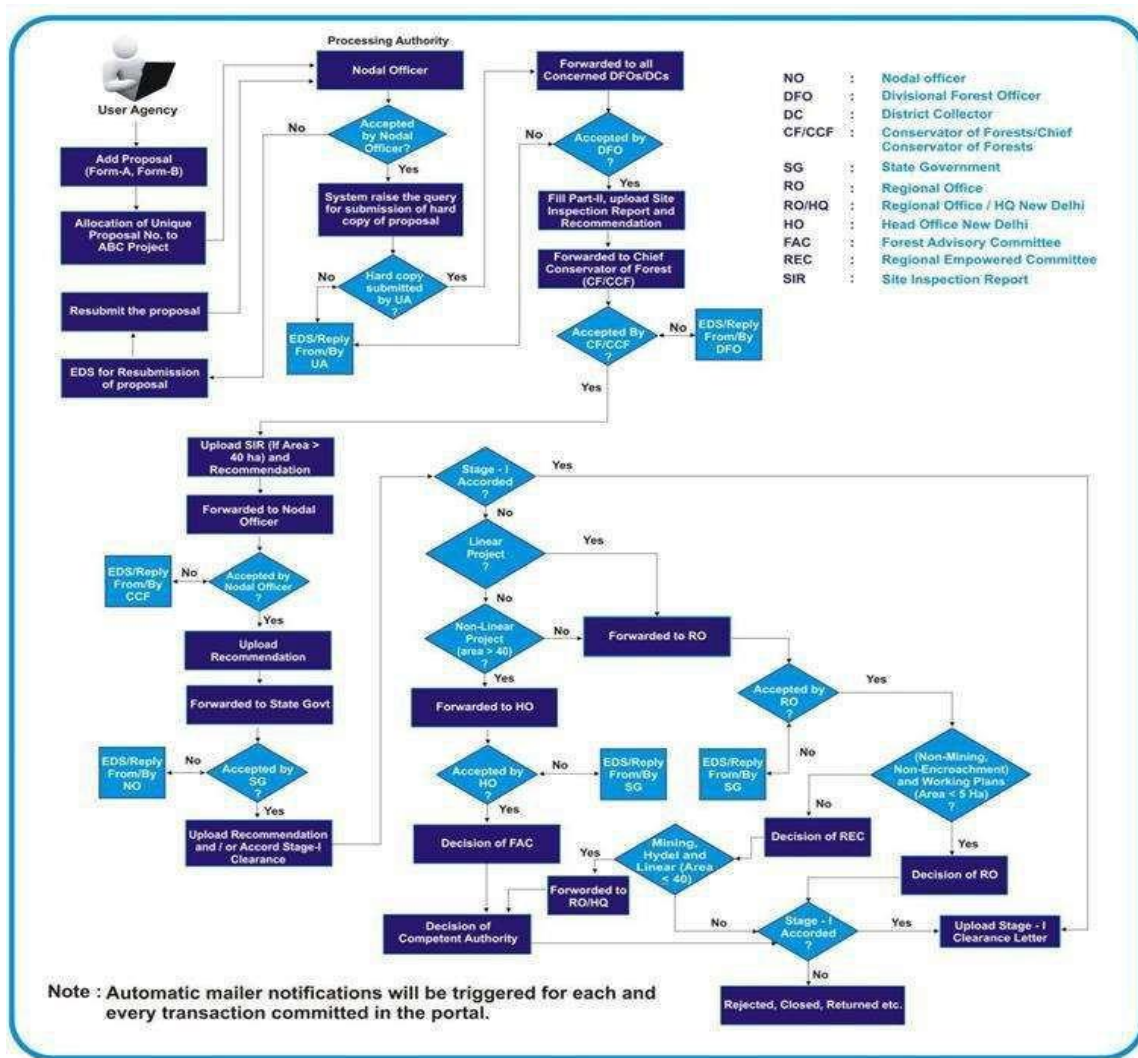
| Sr. No | Act / Rules | Purpose | Applicable | Reason for Applicability | Authority |
|--------|--|--|------------|--|--|
| | | practices that results into higher pollution and less recovery, | | | |
| 20 | The Building and Other Construction Workers (regulation of employment and conditions of service) Act, 1996 | To regulate the employment and conditions of construction workers and to provide for their safety, health, and welfare measure and for other matter incidental thereto | Yes | Many construction workers skilled, semiskilled, or unskilled will be employed temporarily during Construction Phase of the project | Ministry of Labor and Employment Government of India |
| 21 | Bonded Labor (Abolition) Act, 1976 and Rules, 1976 | Abolition of bonded labor. | Yes | - Do- | - Do- |
| 22 | Contract Labour (Regulation and Abolition) Act 1970 and rules, 1971 | Prevent exploitation of contract labor and to introduce better conditions of work. | Yes | - Do- | - Do- |
| 23 | Employees Provident Funds and Miscellaneous Provisions Act 1952 | Promote and secure the well-being of the employees where contractors employ more than 20 persons during Construction | Yes | - Do- | - Do- |
| 24 | Minimum Wages Act 1948 along with Central Rules 1950 | Ensure that workers get at least minimum wages as fixed by the state/central Govt. whichever is higher | Yes | - Do- | - Do- |
| 25 | Public Liability and Insurance Act 1991 | Protection form hazardous materials and accidents. | Yes | Contractors need to stock hazardous material like diesel, Bitumen, Emulsions | - Do- |

2.2 Procedure for Obtaining Forest Clearance

MOEFCC has initiated online submission and disposal of forest clearance cases. The

detail procedure is available on ministry website <http://forestsclearance.nic.in/>. However, the workflow is unchanged which has been illustrated in the succeeding Figure.

Figure: Procedure and Workflow for Forest Clearance



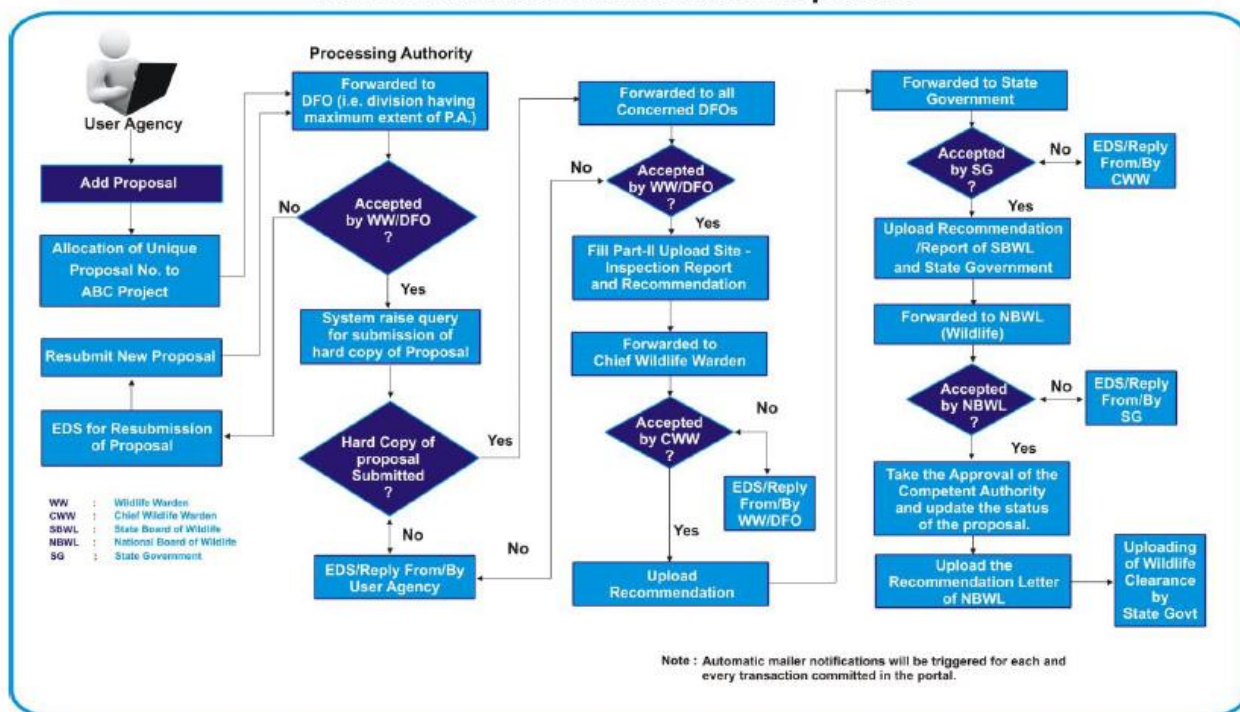
Note: MOEFCC has decided to dispose of all proposals of linear projects by its Regional Office irrespective of diversion area. Specific time limit for processing and disposal of fresh/new proposal at state level and central level is 90 days and 60 days (total 150 days) respectively. Time limit is reckoned from date of acceptance by Nodal Officer subject to completeness of application. However, this project not required forest clearance.

2.3 Procedure for Obtaining wildlife Clearance

MOEFCC has initiated online submission and disposal of wildlife clearance cases. The

detail procedure is available on ministry website <http://forestsclearance.nic.in/> . However, the workflow is unchanged which has been illustrated in the succeeding. However, this project not required Wildlife clearance.

Workflow for the of Wildlife Clearance process



2.4 Procedure for Obtaining Borrow Area Permit

In pursuance to the order of Hon'ble Supreme Court dated the 27th February 2012 in I.A. No.12- 13 of 2011 in Special Leave Petition (C) No.19628-19629 of 2009, in the matter of Deepak Kumar etc. Vs. State of Haryana and Others etc., prior environmental clearance has now become mandatory for mining of minor minerals irrespective of the area of mining lease. Steps to obtain environmental clearance for borrow areas is given in Table.

Table- 2: Steps to be followed for obtaining Environmental Clearance for Borrow Areas

| Steps | Activities |
|-------|---|
| 1 | Contractor identifies the Borrow Area (BA) quantity based on prospective BA identified in F/S/DPR |
| 2 | Contractor identifies the Borrow pits with quantity and raise Request for Inspection (RFI) to IE/A.E. |
| 3 | IE/A.E. inspects borrow pit in the presence of Environmental Engineer of contractor and land owner with his lease document. |

| Steps | Activities |
|-------|---|
| 4 | Contractor takes the sampling of soil in identified pit and test in lab. IE/A.E approves the pit based on the test report (Moisture contents, particle size etc.) |
| 5 | Contractor makes the agreement with land owner and get NOC from Gram Panchayat if necessary |
| 6 | If BA is more than 5Ha (B1 category), contractor submit application for clearance to State Environment Impact Assessment Authority (SEIAA) the project is treated as B1 EIA and Public Hearing needs to be carried out. |
| 7 | If BA is < 5Ha (B2 category), contractor submit application in Form 1M, Prefeasibility report and approved mine plan to District Environment Impact Assessment Authority (DEIAA). DEIAA accords clearance on the recommendation of District Environment Appraisal Committee (DEAC). |
| 8 | Contractor pays Royalty amount to state government at the prescribed rate. |
| 9 | Contractor submit Borrow Area Redevelopment plan to IE/A.E. |
| 10 | Contractors raise RFI to IE/A.E. for Borrow pit excavation |
| 11 | Contractor fulfils the compliance of EC agency observations if any. |
| 12 | Contractor will maintain haul road and ensure for fugitive dust suppression |
| 13 | Contractor does sample of each pit at the time of excavation test and gets approval of IE/A.E. |
| 14 | Contractor raises RFI to IE/A.E. before closing the pit. |
| 15 | Contractor reclaims borrow pit as per owner agreement and gets clearance from him. |

Key Considerations prior to selection of Borrow Areas:

- Cluster shall be formed if the distance between peripheries of one lease to the other and is less than 500m in homogenous mineral area.
- Minimum distance between two clusters is 500 meters.
- Maximum depth of excavation 2000mm from existing ground level.
- In case of fertile land, 15 cm top soil is stock piled, further up to max.30 cm depth.
- Maintain 5m distance from the toe of the final section of the road/Embankment.
- BA should not be dug within 1500 m of town/village. If unavoidable should not exceed 30 cm in depth.
- Ridges not less than 8m width shall be left an interval of not exceeding 300m.

2.5 Relevant Indian Road Congress (IRC) Codes

Key IRC guidelines have been summarized in below Table that have a direct/indirect bearing on the environmental management during design and construction stages.

Table- 3: Relevant Indian Road Congress (IRC) Codes

FINAL DETAILED PROJECT REPORT

Consultancy Services for Feasibility Study, Preparation of Detailed Project Report and providing Pre-Construction Services for upgradation to 2 lane with paved shoulder from Km 235.00 (Vailoo Village) to Km 269.00 (Khanabal) of Khellani – Kishtwar – Chattroo - Khanabal Section of NH 244.

| Sr. No. | IRC code Theme | IRC code |
|---------|--|------------------|
| 1. | Recommended practice for borrow pits for Rural road embankments constructed by manual operations | IRC: 10 1961 |
| 2. | Guidelines for Pedestrian Facilities | IRC: 103 -1988 |
| 3. | Guidelines for EIA of Highway projects | IRC:104-1988 |
| 4. | Ribbon developments on highways and its prevention | IRC: SP: 1996 |
| 5. | Manual on Landscaping of road | IRC: SP: 21-2009 |
| 6. | Report on recommendations of Regional workshops on highway safety | IRC: SP: 27-1984 |
| 7. | Road safety for Children (5-12 years old) | IRC: SP: 32-1988 |
| 8. | Guidelines on road drainage | IRC: SP: 42-1994 |
| 9. | Highway safety code | IRC: SP: 44-1994 |
| 10. | Guidelines for safety in construction zones | IRC: SP: 55-2001 |

4. DESCRIPTION OF PROJECT

3.1 Location of the Project

Project road section falls in the Anantnag Districts of Jammu and Kashmir. The union territory of Jammu and Kashmir in two divisions structurally as Jammu and Kashmir. The project road starts at Vailoo 33.5640° N, 75.3602° E Donipawa 33.7184° N, 75.1677° E road connecting NH-244 & NH-44. It passes through Anantnag districts of Union territory of Jammu and Kashmir. The soil in the district is generally loose and sandy with very low moisture. The rate of soil erosion is very high and roads blockage is frequent during the rainy season. The land-use pattern for a major part of the project road is open area.

Figure: Index Map



FINAL DETAILED PROJECT REPORT

Consultancy Services for Feasibility Study, Preparation of Detailed Project Report and providing Pre-Construction Services for upgradation to 2 lane with paved shoulder from Km 235.00 (Vailoo Village) to Km 269.00 (Khanabal) of Khellani – Kishtwar – Chattroo - Khanabal Section of NH 244.



3.2 Importance of Projects and Need for the Project

- 1) Projects are strategically linked with national highways Road forming parts of state's core network. They directly or indirectly connect district/State

headquarters or serve as arterial road joining two or more district centers. Connectivity to Jammu and Kashmir 24*7 in every season and reduce the travelling time. Traffic load on these roads has already outstripped the present single/intermediate lane configuration and Land Slide Zone and snow causing increased Casualty, accident travel time, decreased fuel efficiency adversely affecting vehicle operating cost. There are many unbridged gaps along some of the Projects. High projected traffic load combined with deficient road geometry, inadequate cross and side drainage facilities, lack of safety provisions and road furniture, idling at level crossings and poor conditions of other road ailments necessitates the capacity augmentation and improvement of Project roads.

2) Enhancement of Projects roads will ensure

- I. better riding quality, congestion free and improved level of service resulting in reduced travel time and fuel consumption
- II. decrease in accidents
- III. reduced recurrent costs over the medium and long term due to more efficient road asset management and high-quality construction and maintenance
- IV. acceleration in social and economic development through increased employment opportunities and better accessibility to socio-economic services.

Table- 4: Key features of Project

| Attributes | Details |
|--------------------------------|--|
| NH No. | 244 |
| Origin – Destination | Vailoo (Km 235+070) -Donipawa (Km 263+107) 33.5640° N, 75.3602° E 33.7184° N, 75.1677° E |
| Via Town | Vailoo, Achabal, Kokernag, |
| Existing Carriageway | 2lane (7m) over 90% of the road stretch with 14 m in 10% of the stretch in some urban area. |
| Service lanes and slip road | Nil |
| Shoulder | 1 to 2m |
| Condition of Existing Pavement | Good to fair |
| Right of Way | Varying from 20 to 30 m as per visual |

| Attributes | Details |
|-----------------------------------|---|
| Land Use along project road | Built up & Agricultural |
| Traffic on the stretch | AADT-8055PCUs |
| Structures along the stretches | Major Bridge at Hillar -1 no., Minor Bridge -14nos., and Culverts- 109nos. (107 Re-constructed and 02 new construction); Side Drain-01. |
| Junctions | 2 Major and 30 Minor |
| Terrain | Mountainous to rolling |
| Key utilities in the proposed ROW | Electric poles & water pipeline etc. |
| Forest stretches along RoW | Nil |
| Rail Crossing along RoW | Nil |
| Other clearance related aspects | Nil |

3.3 Project Category

Project categorization has been done using Rapid Environment Assessment (REA) checklist of ADB & MOEF for roads and highways after screening survey and initial consultations. Project scope is widening and strengthening of 2 lane. Hence, it expected that stress on exiting natural resource viz, land, water, soil, and aggregates are not significant. Project roads do not pass through or located nearby any wildlife sanctuary, national park, reserved forest protected area network, archeological monument/heritage sites or any other similar eco- sensitive areas.

All other impacts are mainly temporary and localized in nature which can be mitigated by effective implementation of Environmental Management Plan (EMP) included in EIA/IEE. Hence, the project has been categorized as ‘B’ as per GOI’s EIA Notification 2006 & ADB SPS, 2009.

However, widening and strengthening of project Road is proposed within existing RoW. So, Environmental Clearance prior approval from MoEF is not required as per Clause 7(f) of Environmental Impact Assessment notification 2006 and its amendment S.O.2559 (E) dated 22nd August 2013, S.O. 382(E) dated 3rd February 2015, and S.O. 996(E) dated 10th April 2015.

“Expansion of National Highway greater than 100Km involving additional Right of way or land acquisition greater than 40m on existing alignments and 60m on realignments

or bypasses.

1.1 Projected Traffic

Traffic Homogeneous Section

The traffic homogeneous sections have been identified based on the major traffic generators and diversion locations along the project corridor. The passenger traffic has been observed to vary with respect to the influence of village/towns falling along the project corridor. The major traffic generators settlements and its connections (diversion) points are:

- Vailoo to Donipawa

Traffic surveys locations were selected to capture representative traffic volume on the homogeneous sections with a view to capture section wise traffic flow characteristics, the total stretch has been segmented in to one homogeneous sections, based upon the major intersections that act as main collectors or distributors (diversion) of traffic along the project road. The traffic homogeneous section in the road section is as follows:

Table- 5: Traffic Homogenous Section

| Sr. No. | Homogeneous Section | Existing Chainage | |
|---------|---------------------|-------------------|---------|
| | | From (Km) | To (km) |
| 1 | Vailoo – Donipawa | 235+000 | 269+000 |

Traffic Survey Planning and Selection of Survey Location

A comprehensive traffic survey plan has been prepared for the project road after considering traffic intensity on homogeneous sections and travel characteristics. Detailed site visit of project road and its influence/alternative transport network has been carried out between on 10th July 2019 to 24th July 2019. Traffic survey locations were finalized by consultation with client officials. Reasoning with detailed justification for selection of each traffic survey location is given in Table

Table- 6: Traffic Survey Locations Justification/Rational

| Sr. No. | Existing Chainage | Justification/Rational |
|--|--------------------------------------|---|
| Classified Volume Count Surveys (CVC) & Origin and Destination | | |
| 1 | Km 263.550, Brakpora (near Donipawa) | Km (263+550) has been selected to get the idea of traffic in homogeneous section from Achabal to Khanabal |

The survey data were recorded in the pre-designated approved formats for each type of survey. All the above traffic surveys were carried out as per the schedule finalized after considering requirements of TOR and project requirements as presented below.

Table- 7: Traffic Survey Schedule

| Type of Survey | Location | Survey Date | | Duration |
|--|---------------------|-------------|------------|-----------------|
| | | From | To | |
| Classified Traffic Volume Count Survey | Km 263+550 | 10-07-2019 | 17-07-2019 | 7 days (24 Hrs) |
| Turning Movement Survey | Km 268+000 | 24-07-2019 | | 12 Hrs |
| O-D Survey | Km 263+550 | 10-07-2019 | | 24 Hrs |
| Speed & Delay Surveys | Entire project road | | | |
| Axle load survey | Km 263+550 | 10-07-2019 | | 24 Hrs |

3.4 Terrain Classification

The following terrain classification recommended by IRC-38:1988 is proposed to be adopted:

Table- 8: Terrain Classification

| Terrain Classification | Percentage cross slope of the country |
|------------------------|---------------------------------------|
| Plain | 0 – 10 |
| Rolling | 10 – 25 |
| Mountainous | 25 – 60 |
| Steep | > 60 |

3.5 Design Speed

Design speed is the basic parameter, which determines geometric features of the road. The proposed design speeds for different terrain categories are as follows:

| Terrain Classification | Design Speed (km/h) | |
|------------------------|---------------------|---------|
| | Desirable | Minimum |
| Plain & Rolling | 100 | 80 |
| Mountainous & Steep | 60 | 40 |

For road stretches passing through built-up areas, the speeds corresponding to rolling terrain are proposed.

3.6 Cross-Sectional Elements

3.6.1 Side Slopes

The slope of embankment is linked with its height. In accordance with the Manual for Safety in Road Design (MoRT&H publication), 2H: 1 V has been proposed for the entire

stretch.

3.6.2 Typical Cross-section

Widening Scheme

To meet future traffic requirement, the existing carriageway is proposed to upgrade to achieve high speed of travel with comfort and safety. Concentric widening scheme is followed to minimise land acquisition issues and to ensure maximum utilisation of existing carriageway.

Table- 9: Summary of widening scheme as per TCS

| Sr. No. | Detail | TCS | Length | |
|----------------------------|---|-----|--------------|---------------|
| | | | (m) | (Km) |
| 1 | 2 LANE CARRIAGE WAY WITH PAVED SHOULDER IN ROLLING/MOUNTAINOUS TERRAIN WITH LEFT SIDE CUT (RURAL SECTION) | 1 | 201.00 | 0.201 |
| 2 | 2 LANE CARRIAGE WAY WITH PAVED SHOULDER IN ROLLING/MOUNTAINOUS TERRAIN (RECONSTRUCTION) | 2 | 8142.00 | 8.142 |
| 3 | 4 LANE CARRIAGE WAY IN ROLLING/ MOUNTAINOUS TERRAIN (URBAN SECTION RECONSTRUCTION) | 3 | 17510.00 | 17.510 |
| 4 | 4 - LANE DIVIDED CARRIAGEWAY IN ROLLING/ MOUNTAINOUS TERRAIN (AT ACHABAL URBAN SECTION - FORMATION WIDTH. 15100 RECONSTRUCTION) | 4 | 1750.00 | 1.750 |
| 5 | MAJOR BRIDGE (OUT OF SCOPE) | | 105.00 | 0.105 |
| 6 | MINOR BRIDGE | | 235.00 | 0.235 |
| TOTAL DESIGN LENGTH | | | 27943 | 27.943 |

3.7 Sight Distance

Safe stopping sight distance, both in the vertical and horizontal directions will apply in design. The sight distance values as per IRC recommendations are as follows:

Table- 10: Sight Distance

| Design Speed Km/h | IRC SP 23:1993 | |
|----------------------|-----------------------------|---------------------------------|
| | Stopping Sight Distance (m) | Intermediate Sight Distance (m) |
| 20 | 20 | 40 |
| 25 | 25 | 50 |
| 30 | 30 | 60 |
| 35 | 40 | 80 |
| 40 | 45 | 90 |
| 50 | 60 | 120 |
| 60 | 90 | 180 |

| Design Speed Km/h | IRC SP 23:1993 | |
|----------------------|-----------------------------|---------------------------------|
| | Stopping Sight Distance (m) | Intermediate Sight Distance (m) |
| 80 | 120 | 240 |
| 100 | 180 | 360 |

4. DESCRIPTION OF EXISTING ENVIRONMENT

To get familiar with existing phenomena before project implementation and the phenomena which could get impacted due to proposed project activity it is imperative to assess baseline conditions before projects take off. The entrant roads are Anantnag district of Union territory of Jammu and Kashmir .This chapter presents primary and secondary data covering all facets of environment viz Physical, Biological, social and land environment in the project influence area with respect to the State, corresponding project districts and project corridor.

4.1 District

Anantnag has for long enjoyed the status of the second largest city of the Valley. The name of Anantnag District according to a well known archaeologist, Sir A. Stein from the great spring Ananta Naga issuing at the southern end of the town. This is also corroborated by almost all local historians including Kalhana according to whom the town has taken the name of this great spring of Cesha or Ananta Naga land of countless springs. The spring is mentioned in the Neelmat Purana as a sacred place for the Hindus and Koshur Encyclopedia testifies it. The district as well as its headquarter town are also called Islamabad. Regarding this second name no mention is to be found in the old chronicles of Kashmir. It is however, said that the name of Islamabad was assigned to the town by one Islam Khan who was the Governor of Kashmir during the Mughal rule in 1663 A.D., but the change in its nomenclature proved temporary and during the reign of Gulab Singh the town as well as district again resumed their old name, Anantnag, but still the name Islamabad is Popular among common masses, though officially the name Anantnag is used. The majestic Martand temple is one of the important archaeological sites of the country. Its impressive architecture reveals the glorious past of the area. Martand temple is the clear expression of Kashmir's pristine glory. The Mughal Emperors especially Jehangir developed many beauty spots of the district, but of their noble and magnificent edifices only faint traces survive. All the same, even in their present ruinous conditions, these monuments do not fail to feast the eye or excite the imagination of admirers at large.

4.2 Climate and Rainfall

The climate of the district is Temperate cum Mediterranean type. In the higher reaches the temperature remains cold throughout the year. Average minimum and maximum temperature vary from -11°C to 33°C . The winter season starts from the middle of the November and severe winter conditions continues till the middle of February / March. The district receives an average annual precipitation of about 1103 mm in the form of rain and snow for about 70 day

4.4 Geomorphology and Soils

Anantnag district is hilly and mountainous towards the northeast and southwest with broad intermountain valley. The altitude of the hill ranges up to 3000 m AMSL. The valley area in the central part of the district has flat to mildly undulating topography with its elevation about 1700 m AMSL and has an area about 900 sq. km. The master slope in the area is towards north west. The district forms part of the Jhelum sub basin of Indus basin. River Jhelum is the major river, originating at the place Verinag, with its tributaries viz., Lidder, Vishav, Sandarn rivers drains the area. Soil is poor in hilly areas and fertile in plain areas. Productivity in higher ranges is poor while in central regions is fertile.

4.5 Hydrogeology

Hydro-geologically, the district is divided into two distinct and well-defined aquifer systems, viz., hard rock or fissured aquifer constituted mainly by semi-consolidated to consolidated rock units and soft sedimentary or porous aquifer constituted mainly by unconsolidated sediments. The fissured formation includes the semi-consolidated to consolidated rock formations exposed in the district are igneous, metamorphic, and sedimentary origin. These forms low and high hill ranges throughout the district. Fractured and jointed igneous, metamorphic rocks and the scree/talus deposits in the foothills form low to moderate potential aquifers with poor to moderate yields. Occurrence and movement of the ground water is mainly controlled by secondary porosity originated due to fracturing and faulting and related tectonic disturbances and weathering. Ground water oozes in the form of springs, seepages in the hilly areas and is utilizing for domestic purposes. There are numerous springs in the district generally concentrated along the contact zones and in the hilly area. At some places shallow hand

pumps and tube wells are constructed for ground water development. The yield of the shallow tube wells and hand pumps constructed along these secondary porous zones varies from 0.5 to 3.0 lps. The unconsolidated sediments comprising of fluvio-glacial and lacustrine deposits of Karewas and recent alluvium, terrace deposits and alluvial fan deposits constitute the porous aquifer system of the district. The sediments consist of sand, gravel, cobbles, pebbles, boulders interlayered with thick clay beds forms the prolific aquifer system. Occurrence and movement of ground water is mainly controlled by the primary intergranular porosity in the soft sedimentary Quaternary alluvium and the Karewa formations. This unconsolidated sedimentary deposit forms multi-layer major aquifer system in the area. The sedimentary formation is +300m thick in the district as revealed by the study and ground water exploration carried out by CGWB. Ground water in the district occurs in phreatic and confined conditions in these formations. The depth of the tube wells ranges from 19.50 m at Khannabal to 300.29 m at Vessu. The water table occurs under artesian conditions at some areas. The yield of the tube wells ranges from 150 lpm at Marhamma to 1928 lpm at Ladarmal. The depth to water level ranges from 2.50 m agl (artesian free flowing) at Charsoo to 6.48 m Khannabal.

4.6 Springs

The name of the district “Anantnag” itself indicates countless springs & streams. (Anant means countless & Nag means spring) The most famous spring is located at Verinag at the foothills of Pir-Panjal Range & is the origin of the Jhelum river.

4.7 Location & Geographical Area

Anantnag is located at about 54 Kms. from Srinagar and about 254 Km from Jammu. The district is well connected with other districts and National Highway NA-1A passes through the district. The district is having a good road network. District Anantnag is called the Gateway of Kashmir Valley. The nearest airport is located at Srinagar, which is about 65 Kms. from the District Headquarter and the nearest Railhead is located at Jammu. The general approach to the whole of the District is through road and one can avail the transport facilities like Taxi, Deluxe Buses etc. both from Jammu and Srinagar. The ambitious project of bringing the Kashmir Valley on the railway network map has been started and hopefully a day will come when the people of the district will see the train passing through their district. Geographically the district lies between 33-20' to 34

-15' north latitude and 74-30 to 75 -35 East Longitude bounded by north west by Srinagar and Pulwama districts and in the north east by Kargil district, in the southeast by district Doda, Kishtwar and in the south and south west by Ramban and Kulgam districts respectively.

4.8 Topography

Anantnag is one of the districts of the state situated in its south and south western direction. Its entire southern sector and major part of the eastern region is strewn with thick forests and mountains. The height of these mountains in the east, south and west of the district ranges between 2438 meters to 3048 meters and in some areas, the peaks even to a height of 4572 meters. On the west the district is bounded by mighty Pir Panchal range mountains, through which passes the world famous Jawahar Tunnel. The district Anantnag is situated at 55 Kms. of the south east of Srinagar, the district is spread over an area of 1869 Sq. Kms. There are 394 revenue villages in the District. These villages are further grouped in 8 (2 partly) Community Blocks. The Anantnag district is not only the rice bowl of the Valley, it is equally rich in landscape of lush green meadows. The nature has been generous in gifting the district with places of unparalleled beauty. The district has a feature of possessing the largest number of health resorts in the whole State, of them particular mention may be made of Verinag, Kokernag, Achabal, Daksum and world famous health resort of Pahalgam. Anantnag District is famous for the Amarnathji cave situated at Mount Amarnath whose altitude is about 5,486m above sea level. The world-famous shrine of Amarnathji is situated about 48 Kms. from Pahalgam and attracts devotees from all over India. It is in the upper reaches of District Anantnag at an altitude of about 13,000 ft. from the sea level. Because of this height, the cave is covered with snow for most of the year. Only for a short period in summer, the entrance is accessible. The cave is an ice cave, it contains a certain amount of ice stalagmites. The cave is a holy place for Hindu pilgrims, because of its ice content. The ice pillar present inside the cave is also called ice lingham, the phallic symbol of Lord Shiva. Two smaller ice stalagmites represent Parvati, his wife, and Ganesha, his son. The Hindu pilgrims also believe that the height of the lingham increases and decreases with the phases of the moon. In the month of Shravan, on the full moon in August, thousands of Hindus go on a pilgrimage up to the cave. Currently the lingam reaches its biggest size. The majority community in the district always welcomes the devotees with wide

open arms, while the yatries are on their way to and from the cave. Enroute one come across scenic beauty of Chandanwari, Sheshnag and Panjtarni. The temples of Mattan, Martand, Anantnag and Bijbehara which fall enroute are also worth seeing.

4.9 Forest

Anantnag district is a hilly area encircled by dense forests .The district has at present 2068 Sq. Km area under forest.

4.10 Soil

The Kashmir valley lies in temperate zone with an alluvial soil rich in nitrogen and organic matter. There are different types of soils in the valley which include slit (Gurti), loam (Bahil), sandy (Sekil), vegetable soil (Surzamin), kerewa soil (Wuder) and peaty (Nambal soil). No wonder, in Kashmir, soil is virtually worshipped as a miracle of divinity as it is a source of wealth of the land

4.11 Archaeological and Historical Monument, Sensitive Receptors and other Community Structures

There are no archeological or historical monuments along the project roads. However, there are several religious structures and other community property resources. Most of the religious structures are notional/symbolic as small shrines and hence not considered for solid noise barrier.

5.0 IMPACT ASSESSMENT AND MITIGATION MEASURES

Road projects are likely to bring several changes in the local environment both beneficial and adverse. This section of IEE identifies nature, extent, and magnitude of all such likely changes vis-a-vis project activities for all stage of project cycle i.e. pre-construction, construction and operation. Beneficial impacts are mostly long-term and permanent whereas adverse impacts are localized and temporary in nature and are likely to occur mostly during construction stage.

5.1 Potential Beneficial Impacts

The immediate benefits of road construction and improvement will come in the form of direct employment opportunities during construction for the roadside communities engaged as wage laborer's, petty contractors, and suppliers of raw materials. During operation stage, road- side economic activities supporting transport like gasoline stations, automotive repair shops, lodging, and restaurants will increase due to increased number of vehicles. Increase in agro- industrial activities are also expected to take advantage of improved access to urban centers where there are higher demands and better prices for agricultural products. Project will accelerate the economic opportunities resulting in reduced migration. Other benefits of project improvement are:

- a. reduction in travel time
- b. better mode and frequency of transport
- c. access to quality health care, educational and other infrastructural facilities
- d. improved quality of life of rural population
- e. reduced accident events and
- f. better investment climate for industries creating more employment opportunities to local people.

5.2 Potential Adverse Impacts

Major anticipated impacts arising from the Project roads are:

- i. cutting of green and mature trees
- ii. adverse impacts due to borrowing and quarrying,

- iii. increased risk of accident due to faster vehicular movement
- iv. increase in air pollution and noise pollution due to increased traffic. Most of the impacts are reversible, temporary, localized in nature, and can be easily mitigated/minimized/avoided by effective implementation of EMP.

5.3 Pre-construction phase Impact

5.3.2 Tree Cutting

Tree Cutting (categories of tree i.e. fruit bearing and non-fruit bearing tree) under scrutiny with revenue, Horticulture and Forest Department. Approx. 46 Nos. of tree fall under this alignment. However, the tree cutting will be restricted to toe line of the formation width. The mandatory compensatory plantation will be done on 1:10 basis will be done as a strategy to minimize GHG emissions from increase in traffic due to road. NHIDCL will implement the additional plantation through contractors of forest department with an access to monitor to ensure at least 80% survival of trees after 3 years.

Forest Land: Alignment does not fall any Reserved/protected forest.

5.4 Construction phase

5.4.1 Topography and Geology

Since project scope is limited to widening and strengthening of roads. The surplus soil from cut operations, which is unsuitable for selected sub grade, will be used to reinstate the borrow areas. Topography along the road will change a little on account of cutting, filling, and construction of project related structures. The overall impact on the physiography of the area will be limited along the RoW and therefore the impacts are categorized as low. Likely impact on the geological resources will occur from the extraction of materials (borrow of earth, granular subbase and aggregates for base courses and bridges). Boulders will be procured from the authorized suppliers and prevalent rules will be followed for borrowing of soil, sand, and aggregates.

➤ Mitigation Measures

- Sources/sites of construction material sites have been identified within the immediate vicinity of the road. No new quarry has been proposed for the project. Only licensed quarries will be used as sources of coarse and fine

aggregates.

- The Authority Engineer(A.E) will ensure that the quarries have environmental clearance from SEIAA, all appropriate licenses and being operated as per conditions of mine lease and pollution control board norms.
- Cut slopes should be re-vegetated immediately after widening activities
- Borrow areas should be rehabilitated and brought back as far as possible to their previous appearance. Some borrow areas will be converted into ponds to compensate loss of water bodies. This will also enhance the local aesthetics
- Cut off material should be used to widen the road or disposed of at proper sites

5.4.4 Air Quality

The specific locations affected by the air pollutant during construction are working areas, construction plant sites, quarries, and construction machinery and construction vehicles. Activities which generate air pollutants are:

- I. Dust generation from the construction zone during different stages of the construction such as clearing and grubbing, materials dumping, drying of materials, brushing of the surface.
- II. Dust generation from the access roads to the soil borrow areas, aggregate quarries construction plants and construction camp sites.
- III. Operation of the construction plants such as hot mix plants, Crushers, WMM plants and concrete batching plants; and
- IV. Material storage, transportation, and handling (loading/unloading) of different construction materials such as sand, earth from borrow pits and aggregates. Some of the pollution control measures have been incorporated in the design stage by relieving congestion in built-up stretches at critical sections, improving road geometry of road to smooth the traffic flow. The specific measures to control air pollution during construction are:

➤ Mitigation Measures

- Vehicles delivering loose and fine materials are covered.

- Loading and unloading of construction materials in covered area or provisions of water fogging around these locations.
- Storage areas are located downwind of the habitation area.
- Water will be sprayed on earthworks periodically
- Regular maintenance of machinery and equipment. Vehicular pollution check will be made mandatory.
- Hot mix plants to be located at least 1.5 km from the nearest habitation, school, hospital, forest, rivers, 500 m from ponds, and national highway, 250 m from state highway, unless otherwise required by statutory requirements after securing a No- Objection Certificate (NOC) from the SPCB/SPCC. Hot mix plant will be fitted with stack of adequate height as prescribed by SPCB/SPCC to ensure dispersion of exit gases.
- Bitumen emulsion and bitumen heaters should be used to extent feasible.
- Only crushers licensed by PCB will be used.
- LPG should be used as fuel source in construction camps instead of wood.
- Regular water sprinkling of unpaved haulage roads.
- Mask and other PPE will be provided to the construction workers
- DG sets will be fitted with adequate height as per CPCB/MoEF guidelines.
- Contractor should submit a dust suppression and control programmed to the NHIDCL/A.E prior to construction.
- Additional plantation proposed on 1: 10 bases will improve the micro-climate

5.4.5 Noise

Increases in noise due to construction activities (land clearing, site preparation, material/equipment's/machinery movement, establishment of camps/site offices) are expected. The impacts of noise exposure on the community residing near the work zones will be significant and intensity of the exposure to different receptors will also vary widely. These impacts are temporary in nature as the construction site moves along different road stretches. For these operations, the noise levels will increase during the construction period. The machinery involved in the construction operation are;

dozer, roller, grader, paver, tractors, brooms/ rotary brushing, tippers, generators, excavators, etc. produce noise levels in the range of 80 – 95 dB(A) (at a distance of about 5 m from the source). Although this level of noise is higher than permissible limit, it will occur intermittently and temporary. This noise level will attenuate fast with increase in distance from noise source. Adequate mitigations have been proposed for the remaining structures near the road.

➤ **Mitigation Measures**

- All equipment will be timely serviced and properly maintained to minimize its operational noise. Noise level will be one of the considerations in equipment selection which will favor lower sound power levels. Construction equipment and machinery will be fitted with silencers and maintained properly.
- Stationary noise making equipment will be placed along un-inhabited stretches.
- Timing of noisy construction activities will be regulated near residential areas and sensitive receptors. Maximum construction activities will be undertaken during nighttime and weekends when sensitive receptors such as schools are not functioning. Alternatively, construction work will be executed during daytime near residential areas. The health centers along the project roads are of primary level with first aid outdoor treatment facility and hence is anticipated not to require any permanent noise barrier.
- Noisy operations will be separated to reduce the total noise generated, and where feasible traffic will be re-routed during construction to avoid the accumulation of noise beyond standards.
- If the above-mentioned schemes prove to be inadequate, the provision of temporary noise barrier will be made near identified sensitive locations or near the noise source during construction.
- Protection devices (ear plugs or earmuffs) will be provided to the workers operating in the vicinity of high noise generating machines.
- Noise monitoring will be carried out to ensure the effectiveness of mitigation

5.4.6 Impact on Land and Soil

Loss of Productive Soil and Change in Land use

Acquisition of agricultural land is bare minimum. Topsoil from borrow areas are not used for embankment formation as it is specific Condition by SEIAA while granting environmental clearance for borrow areas. Loss of topsoil is envisaged during construction stage, if construction plant, offices, workers camps, stockyards, and borrow areas are located on fertile areas and if haul roads and traffic detours during construction are routed through agricultural land. Change in land use is insignificant since widening and improvement is mostly within available right of way. Hence no specific mitigation proposed.

➤ **Mitigation Measures**

- The topsoil will be stripped to a maximum of 1.5m depth and stored in stockpiles. At least 10% of the temporarily acquired area will be earmarked for storing topsoil.
- The stockpile will be designed such that the slope does not exceed 1:2 (vertical to horizontal), and the height of the pile will be restricted to 2m.
- Stockpiles will not be surcharged, or otherwise loaded and multiple handling will be kept to a minimum and stockpile will be covered with gunny bags or tarpaulin.
- It will be ensured that the topsoil will not be trafficked either before stripping or when in stockpiles.
- To prevent any compaction of soil in the adjoining productive lands, the movement of construction vehicles, machinery and equipment will be restricted to project corridor as far as possible.
- The stored topsoil will be utilized for; covering all disturbed areas including for the redevelopment of borrow areas after filling and dressing of the slopes of road embankment.

5.4.7 Soil Erosion/Silt Runoff:

Slopes of the project roads are relatively stable as the embankments of the roads are not high compared to the adjacent lands. Soil erosion may take place near cutting areas, at steep and un-compacted embankment slope, bridge locations and wherever vegetation is cleared. Soil erosion may have cumulative effect like siltation, embankment damage, drainage problem etc. Loss of soil due to run off from earth stockpiles may also lead to

siltation.

➤ **Mitigation Measures**

- Bank protection measures will be taken at erosion prone areas.
- Provision of side drain to guide the water to natural outfalls.
- Retaining walls and breast walls have been included in the design to check erosion.
- Covering the slope surface with grass and bushes, by simple planting of grass roots and saplings.
- In conditions where simple planting and seeding is not effective, the slopes are covered with open mesh of natural fibers such as coir or jute, or of geo-synthetics, followed by planting of grass and bushes. This is often termed slope reinforcement method of vegetation; and,
- Where slopes are of highly erodible materials or other adverse conditions prevail, the vulnerable slope surface is covered with protective surfacing. Stone or brick pitching are most used in India for this purpose.
- Side slopes of the embankment will not be steeper than 2H: 1V. Turfing of embankment slopes will be done along the stretch.
- IRC: 56 -1974 recommended practice for treatment of embankment slopes for erosion control will be taken into consideration.

5.4.8 Borrow Areas and Quarries:

Extraction of the soil from borrow area and boulders/ aggregates/ granular subbase from the river beds can result in some direct and indirect impacts on the local and regional environment. Impacts may be positive or negative and vary from case to case. Borrow areas may cause some adverse impacts if left un-rehabilitated. It may pose risk to people, particularly children and animals of accidentally falling into it as well as become potential breeding ground for mosquitoes and vector born disease. Illegal quarrying may lead to unstable soil condition; destroy the landscape of the terrain, air and noise pollution.

➤ **Mitigation Measures**

- Borrow areas will not be located near habitation and forest areas. The edges of borrow sites will be no closer than 3 meters from any fence line or boundary.
- Adequate clearance will be provided for the construction of catch drains. Borrow sites will have adequate drainage outlets unless the relevant landowner has agreed that the borrow area is to create a permanent tank or dam. Written clearance from the landowner/village head will be obtained before leaving a site
- Obtain environmental clearance from SEIAA for opening of any new borrow area and renewal of quarries.
- Borrow pits will be selected from barren land/wasteland to the extent possible. The topsoil will be preserved, and depth will be restricted to 1.5 m to comply IRC guidelines.
- Borrow areas should be excavated as per the intended end use by the owner. The Indian Road Congress (IRC):10-1961 guideline should be used for selection of borrow pits and amount that can be borrowed.
- The depths in borrow pits to be regulated as per IRC guidelines. Borrow areas will be levelled with salvaged material or other filling materials which do not pose contamination of soil.
- Transportation of fine aggregates and earth material by covered trucks.
- Sprinkling of water near loading/downloading and stockpile locations.
- The contractor will evolve site-specific redevelopment plans for each borrow area, which will be implemented after the approval of the A.E.
- Opening of new quarries only after environmental clearness from SEIAA, NOC from SPCB and permission from state mines department.

5.4.9 Compaction and Contamination of Soil:

Soil of the haulage roads and construction camp area may be compacted due to movement of construction vehicles, machineries, and equipment, and due to siting of construction camps and workshops. Soil may get contaminated due to inappropriate disposal of liquid waste, (lubricating oil and fuel spills, waste oil and lubricant and vehicle/equipment washing effluent) and solid waste (fuel filters, oily rags) likely to be generated from repair and maintenance of transport vehicles, construction equipment

and machinery. Soil may also get contaminated due to inappropriate disposal of domestic solid waste and sewage from construction camps. Sub-soil contamination may also be attributed to scarified bitumen wastes, operation of the emulsion sprayer and laying of hot mix, storage and stock yards of bitumen and emulsion, excess production of hot mix and rejected materials.

➤ **Mitigation Measures**

- Fuel and lubricants will be stored at the predefined storage location. The storage area will be paved with gentle slope to a corner and connected with a chamber to collect any spills of the oils.
- Unavoidable waste will be stored at the designated place prior to disposal. To avoid soil contamination at the wash-down and re-fueling areas, “oil interceptors” will be provided. Oil and grease spill and oil-soaked materials are to be collected and stored in labelled containers and sold off to SPCB/SPCC MoEF authorized re- refiners.
- Movement of construction vehicles, machinery and equipment will be restricted to the designated haulage route.
- Approach roads will be designed along the barren and hard soil area to reduce the compaction induced impact on soil.
- The productive land will be reclaimed after construction activity.
- Septic tank/mobile toilets fitted with anaerobic treatment will be provided at camp.
- Domestic waste at construction camp will be segregated into biodegradable and non-biodegradable waste. Non-biodegradable waste will be given or sold to relevant agents for recycling or buried in nearby waste land following environmentally friendly practices.

5.4.10 Impact on Groundwater and Loss of Water Sources:

There are numerous water bodies along the Project roads. Most of them are seasonal and few holds water year long. Encroachment or filling of any Stream/ Nallah is not envisaged, few Number of stream/nallah are likely to be affected due to the proposed project This may not hamper water need of community along road. Suitable

arrangement for drinking in the camp site will be managed by contractor without affecting availability to local community. Due to favorable geologic formations, J&K is endowed with abundant Stream water resources. Impact due to groundwater abstraction for construction purpose is insignificant since none of the project area is notified for regulation of groundwater and falls under safe category as per Central Ground Water Authority.

➤ **Mitigation Measures**

- All efforts have been taken in while finalizing the alignment to minimize the impact on Stream/Nallah water sources.
- In view of the recent order by Green Tribunal, it is pre-condition to recharge groundwater while granting permission for abstraction of groundwater by CGWA for any infrastructure project. This can be through roof top rainwater harvesting and/or collecting surface runoff and allowing it to aquifers through pipes.
- Additionally, creating a Nallah/pond/water body within site is also a good option subject to availability of space.
- The contractor will decide for water required for construction in such a way that the water availability and supply to nearby communities remain unaffected.
- No change in groundwater regime is envisaged hence no mitigation is proposed.

5.4.11 Ecological Impacts

1. **Flora:** Provision of extensities avenue plantation (1:10 compensatory plantations) has been made as strategy to minimize adverse impact due to GHG emission and improving micro-climate of the area. This will significantly help in habitat enhancement.
2. **Fauna:** In absence of any mitigation, vehicle-animal collision may increase with projected growth in traffic and high speed due to improved road surfaces. Adequate mitigative measures viz. informatory and cautionary sign boards, speed limitations by installing rumble strips, creation of water bodies on both sides to restrict wild animals to cross in search of water in mostly dense animal area, clearance of roadside shrubs/bushes providing adequate sight distance to drivers have been

incorporated in design to avoid any vehicle-animal collision. NHIDCL will support jurisdictional forest departments to monitor the effectivity and adequacy of these mitigation measures. However this project not fall under forest area.

5.4.12 Air Environment

1. Construction Phase: The source of air pollution during construction phase will be vehicular pollution, Stockpiles, transportation of goods and material and various construction activities. If not mitigated properly this may result in the built up of pollutants at site and nearby area

➤ **Mitigation Measures**

- Covering of the construction site on all four sides to a considerable height to prevent dust emissions and other pollutants to the surrounding environment.
- Proper lubrication of vehicles and machinery shall be ensured to reduce emissions.
- Engines & exhaust systems shall be properly maintained.
- Low Sulphur diesel (HSD) shall be used.
- Idling time shall be eliminated/ reduced to the minimum.
- Material drop shall be minimized at the transfer point and enclosure

2. Operational Phase: The source of air pollution during operational phase will be vehicular pollution and operation of DG set for power back up.

➤ **Mitigation Measures**

- EPA/CPCB certified DG set shall be used.
- D.G. set shall be provided with effective stack height as per the norms of CPCB above the roof of the D.G. house.
- Low Sulphur content fuel (HSD - Sulphur content 0.05%) shall be used.
- Enough of driveways shall be provided to ensure smooth traffic movements.
- Speed humps shall be installed for speed restrictions inside the project area.

- Minimum 10-15% of total plot area shall be under landscape, which will help to contain the emission within permissible norms.

5.4.13 Water Environment

1. **Construction Phase:** The source of water pollution during construction phase will be waste water generated from construction labor residence, leaching of contaminated water, surface run off from construction site etc. This may result in the contamination of ground water, nearby water bodies and nuisance in surrounding area.

➤ **Mitigation Measures:**

- Septic tanks followed by soak pits shall be provided to treat wastewater generated from labor residence.
- Awareness program shall be conducted to educate the team for judicious use of water.
- Soil and water management structures shall be in place prior to the commencement of construction works, and any advance activities likely to generate erosion and sedimentation impacts.
- Silt fencing with silt trap, Temporary silt fencing shall be installed at selected locations across the site.
- Stockpiles shall not be in proximity to existing or proposed drainage lines and storm water inlets.

2. **Operational Phase:** The source of water pollution during operational phase will be waste water generation from project activities, rainwater, sludge generated from waste water treatment etc. Excessive use of ground water (if any) is also a point of concern. Discharge of untreated wastewater and sludge will result in the contamination of ground water, nuisance at site, chances of disease vector etc.

➤ **Mitigation Measures**

- Closed system for wastewater transportation at the site shall be followed to avoid odor and other possibilities of environment contamination.
- Regular cleaning of drains / associated structure shall be followed.

- Sludge pretreatment and utilization as manure.
- Sludge shall be pretreated before disposal.
- Water meters shall be installed at freshwater inlet, wastewater inlet and waste water outlet to monitor the usage.
- Use of water efficient fixtures shall be considered, in place of conventional system, which will help in achieve approximately 31.36 % reduction in freshwater demand.

5.4.14 Noise Environment

1. **Construction Phase:** The source of noise pollution during construction phase will vehicular movement, construction machineries, DG set (if any) etc. This may result in the disturbance and discomfort to nearby residential areas.

➤ **Mitigation Measures:**

- The construction area shall be shielded with help of tarpaulin sheets.
- Construction work especially heavy earth work shall be done during daytime.
- Traffic planning and management shall be done.
- Proper maintenance of vehicles and machineries shall be ensured.
- The D.G. sets used shall be ecofriendly with minimum noise.
- Ear plugs shall be provided to the workers.

2. **Operational Phase:** The source of noise pollution during operational phase will be vehicular noise and operation of DG set. This may result in the discomfort to residents and nearby facilities.

➤ **Mitigation Measures**

- CPCB certified DG set conforming to the standards for noise shall be used.
- D.G. sets shall be housed in an inbuilt acoustic enclosure, which will help to contain the noise within the permissible standards.
- Adequate driveway and parking including provisions of visitors parking shall be provided.
- There shall be less starting and stopping and the vehicles will be speed

restricted to ensure the noise within the permissible limits.

- The area shall cover 10-15% area under landscape, which will help to absorb noise.

1. Management of municipal solid wastes

Any municipal solid waste generated in the project complex/ project colony/ labor colony, shall be managed and handled in accordance with the compliance criteria and the procedure laid down in Schedule II under rules 6 (1) and (3), 7 (1) of the Notification dated 25 September 2000. The management plan has, therefore, been framed taking into consideration compliance criteria against each parameter as set out under Schedule-II.

2. Collection of municipal solid wastes

The project authorities shall prohibit littering of solid wastes in the area under their control by resorting to following: -

- Organizing house-to-house collection of solid waste on regular pre-informed timing and scheduling through any of the methods, like community bin collection (Central bin).
- Devising collection of wastes from office complexes, hotels, and commercial areas.
- Avoiding mixing of Bio-medical wastes with municipal solid wastes.
- Collected waste from residential areas shall be transferred to community bin by hand-driven containerized carts or another small vehicle. Plant/leaf and construction/demolition wastes or debris shall be separately collected and disposed off.
- Waste like dry leaves shall not be burnt.
- Collection of wastes from vegetable and fruit shops and meat shops and dry leaves collected from avenues/ parks, which are biodegradable in nature to be finally handed over to Municipal Corporation for disposing off through aerobic composting.

3. Segregation of municipal solid wastes

The project authority shall organize awareness programmed to encourage the generators of wastes and to ensure community participation in waste segregation. For this purpose, regular meeting at quarterly intervals shall be arranged with representatives of resident of colonies.

4. Storage of municipal solid wastes

The project authority shall establish and maintain storage facilities in such a manner as they do not create unhygienic and unsanitary conditions around it. Following criteria shall be considered while establishing and maintaining storage facilities.

- Storage Facilities of handling transfer and transportation of waste. Bins for storage of bio-degradable wastes shall be painted green, those for storage of recyclable wastes shall be painted white and those for storage of other wastes shall be painted black.
- Manual handling of waste shall be prohibited. If unavoidable due to constraints, manual handling shall be carried out under proper precaution with due care for safety of workers.

5. Transportation of municipal solid wastes

Vehicles used for transportation of wastes shall be covered. Wastes should not be visible to public, nor exposed to open environment preventing their scattering. Transportation vehicles shall be so designed that multiple handling of waste, prior to final disposal, is avoided. The collected segregated waste will be handed over to the concerned municipal authority for final processing & its end use.

6. Sanitation and Sewage Management

Proper sanitary facilities would also be provided at the project / labour colonies. The standard municipal designs for community sanitation facilities in hill areas have been taken into consideration while formulating the sanitation scheme. Apart from this, there will be provision for cleaning the streets of the colony to keep the surrounding area clean. Considering water requirement of about 70 liter / head / day in hilly areas and on an average a person generates about 50 lit. of sewage per day and therefore, about 20,000 lit. /day of domestic sewage along with other waste are expected to be generated

from the colony. Adequate provision shall have to be earmarked under the sub--storm water drainage and O & M charges, respectively. Three community latrines of three-seater unit each with three bathrooms constructed at appropriate locations at a cost of Rs. 2.0 lac per unit having a total cost of Rs. 6 lacs. Proper provision for water storage in sufficient quantities will be needed to maintain hygienic environment. Septic tanks of appropriate size be constructed, and care be taken to avoid mixing of wastewater and sewage with local water body especially during rainy season. The collected sewage shall be given to local authorities for final disposal

5.4.15 Solid Waste Management

1. **Construction Phase:** During construction phase waste will be generated from construction practices. The waste will contain excavated soil, construction debris, wood, concrete, metal scraps, plastic etc. in varying composition.

➤ **Mitigation Measures**

- Efforts shall be made to reuse the waste within the site itself.
- Surplus waste shall be sold to authorized recyclers and vendors.
- Municipal solid waste will be generated from workers and staff shall be collected and segregated in bins and sent to municipal vendor.
- The provisions of the Solid Waste (Management) Rules 2016 and the e-waste (Management) Rules 2016, and the Plastics Waste (Management) Rules 2016 shall be followed.

2. **Operational Phase:** The Generation of municipal waste from hostel as well as other activities is anticipated at the time of operation of the project.

➤ **Mitigation Measures**

- The solid waste generated shall be first segregated and collected in different bins as plastic, glass, paper, and other waste separately and disposed of as per Municipal Solid Waste Rules.
- The waste shall be sent to Municipal Corporation sites through authorized vendors.
- Provisions of Solid Waste (Management) Rules 2016 and the e-waste

(Management) Rules 2016, and the Plastics Waste (Management) Rules 2016 shall be followed.

5.4.16 Biological Environment

1. Construction Phase: During construction phase tree, shrub and herb will be cleared if required. Impact will be negligible & short term. The extent of impact will be limited to the project site only.

➤ **Mitigation Measures**

- Vegetation/herb/shrub clearance shall be done only at the places where it is unavoidable.
- Topsoil shall be stored and reused at site only for landscaping.
- Appropriate erosion control and water diversion structures should be constructed at the same time as the vegetation is cleared so that the loosened soil is not left vulnerable to erosion.

2. Operational Phase: No adverse impact. Landscaping and plantation will result in positive impact of reduction of heat island effect, aesthetic beauty pollution absorbance etc.

5.4.17 Social Environment

1. Construction Phase: Due to construction activities surrounding area may get disturbed due to influx of labor, construction waste generation, noise generation from construction activities etc. Various basic facilities as listed below will be provided to construction labors at site to maintain hygiene and health environment at site. These negative impacts will be short term and will last for construction period only. However, the project will result in much positive impact like direct employment generation to the construction labors and other persons.

2. Operational Phase: During operation phase the project will result in many long-term positive impacts viz., generation of indirect employment in the form of increased grocery shops, basic services, medical & departmental stores etc., development of basic infrastructure facility like road development, electricity lines, water supply lines etc., improvement in the quality of life as project is specifically targeting economically weaker section.

6. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

6.1 Meaningful Consultation

Meaningful consultations in line with MOEF EIA notification 2006 and SPS 2009 were carried out during detailed design and IEE preparation. All the five principles of information dissemination, information solicitation, integration, co-ordination, and engagement into dialogue were incorporated in the consultation process. A framework of mitigating different environmental impacts likely from the project was New Construction/strengthened and modified based on opinions of all those consulted, especially at the micro level by setting up a dialogue with the village people from whom information on site facts and prevailing conditions were collected. This will be continued during the implementation of the project through grievance redress mechanism.

6.2 Objectives of the Public Consultations

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

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

6.3 Methodology

Consultation with the stakeholders, beneficiaries, and community leaders were carried out using standard structured questionnaires as well as unstructured questionnaires.

Questionnaire survey/ discussions were designed to obtain background information and details of general environmental issues that concern people in the project area. In addition, environmental issues were discussed with relevant organizations, government officials, beneficiaries, community leaders and experts. In addition, personal discussions with officials, on site discussion with affected stakeholders, and reconnaissance visits have also been made to the project area.

6.4 Project Stakeholders

All types of stakeholders were identified to ensure as wide coverage as possible like residents, shopkeepers and business-people who live and work along the road specially the project affected persons, road users/commuters, executing agency, government institutions whose remit includes areas or issues affected by the project (state environment and forest department, Pollution Control Board (PCB), Irrigation Department, fisheries and most importantly the beneficiary community in general.

6.5 Consultations with Local People/Beneficiaries

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

- Awareness and extent of the project and development components.
- Benefits of the project for the economic and social upliftment of community.
- Labor availability in the project area or requirement of outside labor.
- Local disturbances due to project construction work.
- Necessity of tree felling etc. at project sites.
- Impact on water bodies, water logging and drainage problem if any.
- Environment and health
- Flora and fauna of the project area
- Socio-economic standing of the local people

Local community welcomed the decision of road proposal they perceived several benefits like faster and cheaper connectivity, improved accessibility to better infrastructure facilities, reduction in migration, increased economic activities and

appreciation in value of land and many others. But at the same time, they apprehended that the risk of accident, air and noise pollution will increase due to high traffic density after widening. Main demand and suggestions made by the participants are.

- Employment and petty contracts during construction
- Provision of side drains
- Provision of drinking water facility near bus-shelters, road-side villages
- Road safety measures
- Extensive plantation
- Restriction on honking near built-up areas
- Measures to minimize air and noise pollution
- Bus Shelters
- Parking areas in markets and truck lay-byes.



Public Consultation

7. ENVIRONMENTAL MANAGEMENT PLAN, INSTITUTIONAL REQUIREMENTS AND GRIEVANCE REDRESS MECHANISM

7.1 Environment Management Plan

Environmental Management Plan (EMP) is intended to set out clearly and unambiguously the likely negative impacts of construction and/or operation of the project, the action that is required to avoid or mitigate each impact and the responsibility for taking each action. Responsibility is made legally binding when actions are subsequently specified in contracts. The EMP also ensures that the positive impacts are conserved and enhanced. Its addition, it provides measures for institutional strengthening and effectiveness assessment through defined monitoring plan, reporting and corrective & preventive action planning. More specifically the objectives of the EMP are:

1. To ensure compliance with Multi-lateral funding Agency i.e. World Bank/ Asian Development Bank's applicable safeguard policies, and regulatory requirements of Union territory of Jammu and Kashmir and the Government of India.
2. To formulate avoidance, mitigation, and compensation measures for anticipated adverse environmental impacts during construction and maintenance and ensure that environmentally sound, sustainable and good practices are adopted.
3. To stipulate monitoring and institutional requirements for ensuring safeguard compliance

7.2 Environment Monitoring Program

The monitoring and evaluation are critical activities in implementation of the project. Monitoring involves periodic checking to ascertain whether activities are going according to plan or not. It provides the necessary feedback for project management to ensure project objectives are met and on schedule. The reporting system is based on accountability to ensure that the environmental mitigation measures are implemented. Environmental monitoring program has the underlying objective to ensure that the intended environmental mitigations are realized and these results in desired benefits to the target population causing minimal deterioration to the environmental parameters. Such program targets proper implementation of the EMP. The broad objectives are:

1. To evaluate the performance of mitigation measures proposed in the EMP.
2. To evaluate the adequacy of environmental assessment.
3. To suggest ongoing improvements in management plan based on the monitoring and to devise fresh monitoring based on the improved EMP.
4. To enhance environmental quality through proper implementation of suggested mitigation measures.
5. To meet the requirements of the existing environmental regulatory framework and community obligations.

7.3 Performance Indicator

The significant physical, biological, and social components affecting the environment at critical locations serve as wider/overall performance Indicators. However, the following specific environmental parameters can be quantitatively measured and compared over a period and are, therefore, selected as specific Performance Indicators for monitoring because of their regulatory importance and the availability of standardized procedures and relevant expertise. A comprehensive monitoring plan for all performance indicators has been prepared for all stages appended. This includes parameters to be measured, methods to be used, sampling locations, frequency of measurements, detection limits, cost and responsibility for implementation and supervision. Performance indicators requiring quantitative measurements are:

- Air quality with respect to PM_{2.5}, PM₁₀, CO, NO_x and SO₂ at selected location.
- Water quality with reference to DO, BOD, Oil and grease, COD, Suspended Solids and Turbidity, Alkalinity streams/Nallah and water bodies at selected points.
- Survival rates of trees planted as compensatory plantation to be taken up as a strategy to curb GHG emission.

Ambient Air Quality (AAQ) Monitoring: Ambient air quality parameters recommended for monitoring road development projects are PM_{2.5}, PM₁₀, Carbon Monoxide (CO), Oxides of Nitrogen (NO_x) and Sulphur Dioxide (SO₂). These are to be monitored, right from the commencement of construction activity at selected locations of plants and machinery, crushers on sites, excavation works etc. Data should be generated once in a season excluding monsoon in accordance with the National Ambient

Air Quality Standards as per CPCB recent notification of 2009 (Appendix 2).

Water Quality Monitoring: The physical and chemical parameters recommended for analysis of water quality relevant to road Development projects are pH, total solids, total dissolved solids, total suspended solids, oil and grease, COD, Chloride, Lead, Zinc and Cadmium. The location, duration, and the pollution parameters to be monitored and the responsible institutional arrangements are given in the Environmental Monitoring Plan. The monitoring of the water quality is to be carried out at locations identified along the project road during construction and operation phase. The Indian Standard Specifications – IS10500: 1991 is given in Appendix 2. Surface water quality will be monitored as per freshwater classification of CPCB (Appendix 2).

Noise Level Monitoring: The measurements for monitoring noise levels would be carried out at sensitive receptors and construction sites along the project roads. The Ambient Noise Standards formulated by Central Pollution Control Board (CPCB) in 1989 or the standards by State Pollution Control Board if such standards are stringent than those of the CPCB are to be complied. The CPCB standards are given in Appendix 2. Sound pressure levels would be monitored on twenty-four-hour basis. Noise should be recorded at “A” weighted frequency using a “slow time response mode” of the measuring instrument.

Success of Re-vegetation: NHIDCL will implement the additional plantation guided, through Contractors of forest departments with strong community participation and ensure at least 80% survival of trees after 3 years. Annual reports pertaining to the accomplishment and survival will form part of the annual environmental monitoring report to be submitted to the Multi-lateral Funding Agency if Applicable.

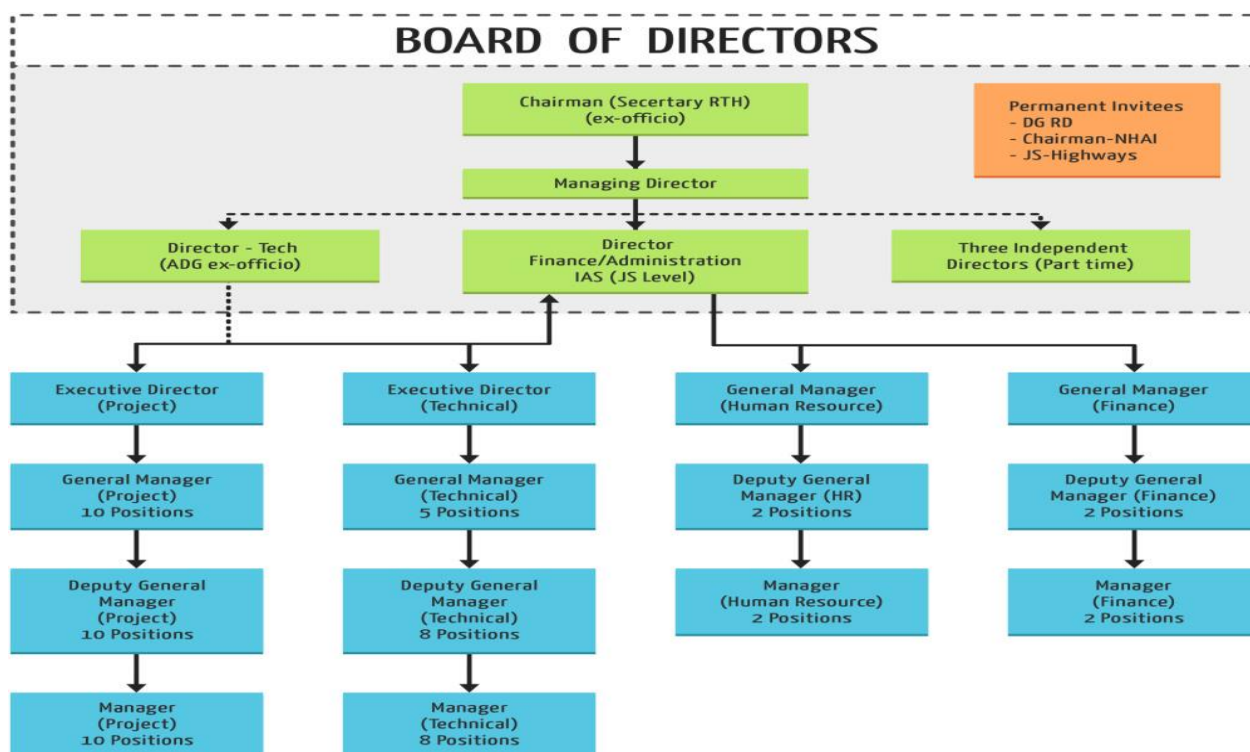
Records of Accidents: Contractors to keep records of all types (construction sites/road accident) of accidents during construction period. During the operation stage monitoring, NHIDCL will maintain records of traffic accidents including those caused due to Land Sliding, vehicle animals’ collisions through their field offices with support from forest department and local people.

7.4 Organizational Set-up of Implementing Agency

NHIDCL is the implementing agency for the project. It is an independent agency under the ambit of MoRTH, NHA and mandated with construction and maintenance of

National Highway and other roads and bridges with its own resources, Public Private Partnership, or external funding.

Organizational Set-up of Implementing Agency



7.5 Proposed Institutional Arrangement

NHIDCL, as the Project Executing Agency, shall be responsible for overall implementation of the project, and shall perform, its obligations as set forth herein and the project agreement through Government of India. NHIDCL will largely follow the same proven arrangement for EMP while implementing other road projects aided by Multi-lateral Funding agency World bank/ADB.

A Project management consultant (PMC)/Authority Engineer (A.E) firm will be recruited to supervise and administer civil works contracts and to ensure the works are executed in accordance with the drawings, technical specifications and contract conditions including implementation of EMP. The A.E team will include one environmental specialist and Roles and responsibilities of implementation of EMP have been outlined in Table Proposed institutional arrangement has been illustrated through a flow diagram.

Table- 11: Responsibilities for Environmental Safeguards Implementation

| S. No. | Agency | Responsibility |
|--------|---|---|
| 1 | NHIDCL (HQ & R.O) | Ensure that project complies with Multi-lateral Funding Agency World bank/ADB's SPS,2009 and GOI & J&K laws and regulations |
| | | Ensure that contract documents include all relevant parts of the environmental assessment and project agreements. |
| | | Ensure that sufficient funds are available to properly implement all agreed environmental safeguards measures |
| | | Obtain all statutory clearances and permissions |
| | | Review and approve the Contractor's Implementation Plan with Supervision Consultant for the environmental measures, as per the EMP |
| | | Review the environmental performance of the project through an assessment of the periodic environmental monitoring reports submitted by the Supervision Consultants |
| | | Overall project coordination and management through PIU supported by PMC and A.E. |
| | | Formation of Grievance Redress Mechanism |
| | | Submit annual safeguards monitoring reports to Multi-lateral Funding agency World bank/ADB and its closure if Required/Applicable. |
| | | Ensure updating of the EMP if any new or unanticipated environmental impacts occur during project implementation due to design change or other reasons |
| | | If there are significant new or unforeseen impacts, immediately inform World Bank/ADB to decide on the need for also updating the IEE report. If required |
| 2 | Project Implementation Unit (PIU) – Field Level | Ensure that Project complies with World Bank/ADB and GoI, Union territory of Jammu and Kashmir laws and regulations |
| | | Ensure that the environment checklist is completed on time by contractor, reviewed by A.E and submitted to NHIDCL |
| | | Participating in State and District level meetings related to forestry clearance and other compliances. |
| | | Periodic appraisal of progress and reporting to the HQ and Regional Office. |
| | | Facilitating the contractor to obtain necessary permissions/ approvals and its submission to HQ and further to ADB if Required |
| | | Directly interact with project affected persons and record their views and grievances and transmit the same to HQ and Regional Office. |
| | | Settle grievances if any at field level. |
| | | Review and approve the EMP's and EMOP's and make necessary modifications if required. |

| S. No. | Agency | Responsibility |
|--------|---|--|
| | | Facilitate the establishment of a grievance redress mechanism, to receive and facilitate resolution of affected peoples' concerns, complaints, and grievances related to environment safeguards |
| | | Ensure that all mitigation measures as given in the EMP are implemented properly |
| | | Ensure proper conduction of environmental monitoring during pre-construction, construction, and operation phases |
| | | Verify the monitoring checklist/report prepared by the A.E |
| | | Ensure annual environmental monitoring reports are prepared and submitted to Multi-lateral funding agency world bank/ADB for disclosure on their website on an annual basis |
| | | Identify environmental corrective actions and prepare a corrective action plan, as necessary, for submission to Multi-lateral funding agency world bank /ADB during project implementation if Required |
| 3 | Environment Specialist, Authority Engineer(A.E) | Review IEE and EIA to acquaint him/herself about the project and environmental safeguard requirements. |
| | | Identify statutory/regulatory requirements (clearances) |
| | | Provide technical assistance and follow ups with concerned authority for securing these clearances. |
| | | Prepare and provide checklist/formats to contractor for periodic pollution monitoring and OHS reporting in line with EMP and EMOP. |
| | | Review method of construction technology to make it most environmentally acceptable and develop good construction practices and guidelines to assist contractor. |
| | | Review the adequacy of existing onsite facilities (waste management, storm water drainage, oil spillage prevention, firefighting, emergency preparedness and other OHS requirements. before start of construction) |
| | | Review and approve EMP submitted by contractor and check whether it is in line with EMP of IEE and present site conditions. |
| | | Conduct workshops/training for contractor and PIU staffs before and periodically during construction. |
| | | Conduct periodic on consultations programs with communities along highway to know if any activities of contractor causing inconvenience like excessive noise, dust, debris disposal etc. to them. |
| | | Conduct regular site inspections to examine environmental compliances and suggest corrective actions; |
| | | In times of emergencies, where necessary coordinate with the relevant government agencies. |
| | | Formulate environmental awareness plan |

| S. No. | Agency | Responsibility |
|--------|------------|---|
| 4 | Contractor | Assess practicality of proposed GRC and modify as per local conditions. |
| | | Maintain proper records of all grievances received and addressed under the project |
| | | Prepare Annual Monitoring Plan. |
| | | Update IEE in case there is any change in alignment or other scope of work. |
| | | Provide necessary support to the PIU to ensure proper disclosure of project related information to stakeholders |
| | | Responsible for the physical implementation of the mitigation measures proposed in the Environmental Management Plans (EMP) associated with the construction activities. |
| | | Responsible for implementation of the Environmental Monitoring Program (EMOP) on collection of environmental quality data. Prepare contract package specific (EMOP) for approval by the A.E and/or PIU before the start of physical works |
| | | Ensure that adequate budget provisions are made for implementing all mitigation measures specified in the EMP and EMOP |
| | | Participate in induction training on EMP provisions and requirements delivered by the PIU |
| | | Obtain necessary environmental license(s), permits etc. from relevant agencies for associated facilities for project road works, quarries, hot-mix plant etc. prior to commencement of civil works contracts |
| | | Implement all mitigation measures in the EMP |
| | | Ensure that all workers, site agents, including site supervisors and management participate in training sessions delivered by PMC/A.E. |
| | | Ensure compliance with contractual obligations |
| | | Collect the baseline data on environmental quality before the start of physical works and continue collection of environmental quality data as given in the Environmental Monitoring Plan during construction |
| | | Participate in resolving issues as a member of the GRC |
| | | Respond promptly to grievances raised by the local community or and implement corrective actions |
| | | |

7.6 Institutional / Capacity Building

Several trainings and capacity building programmed have been conducted in by NHIDCL to enhance the capacity of its officials related to implementation of environment safeguards in World Bank/ADB's assisted projects. However, since the officers are not permanently positioned and there are periodic transfers within or outside the

department and vice-versa so it is imperative to devise a training program to acquaint the freshly joined officers about safeguard requirements, including EMP implementation and monitoring the resultant effects, Training module is also aimed to create awareness among workers and local community. The institutions/agencies like regional office of MoEF, SPCB/CPCB, Indian Institute of Technologies and forestry institutions, can be consulted for such trainings. Independent subject's experts/consultants (e.g., for the environmental awareness program, impact assessment specialist will be the resource person) can also be the resource persons to impart trainings. These experts /agencies shall be appointed based on specific need for the training. A separate budget for training has been allocated under the A.E budget.

Table- 12: Training/Workshop Module for EMP Implementation

| Sl. No | Target group | Subject(s) | Method | Time Frame |
|--------|--|---|---------------------------|--|
| 1 | All staffs of NHIDCL including PIUs involved in implementation of the project | Environmental Overview: Environmental Regulations, project related provisions of various Acts/ Guidelines, Procedures of EC and FC, process, and methodology for IEE, EMPs | Lectures cum interaction | Before beginning of the implementation of the project. |
| 2 | Managers (Env) at PIU, Supervision Consultant's Environmental Specialists and Select NGOs | Implementation of EMPs: Basic features of an EMP, Planning, designing and execution of environmental mitigation and enhancement measures, monitoring and evaluation of environmental conditions – during construction and operation | Workshop s and Seminars | Before the construction begins |
| 3 | Environmental officer, design team, Supervision Consultant Construction Contractors' staff | Environmentally Sound Construction Practices: Clean construction technology, alternatives materials and techniques for construction, Waste Management and minimization in construction, pollution control devices and methods for construction sites and equipment, Environmental clauses in contract documents and their | Workshops and Site visits | Before the construction |

| Sl. No | Target group | Subject(s) | Method | Time Frame |
|--------|---|--|-------------------------------------|--|
| | | implications, protection of flora and fauna Environmental monitoring during construction | | |
| 4 | PIU and Supervision Consultant, NGOs, and community representatives | Monitoring Environmental Performance during Construction: Air, Water, Soil and Noise, tree survival Monitoring requirement and techniques, Evaluation and Review of results, Performance indicators and their applicability, possible corrective actions, reporting requirements and mechanisms | Lectures, Workshop, and site visits | During initial phases of construction |
| 5 | -do- | Long-term Environmental Issues in Project Management: Designing and implementing environmental surveys for ambient air, noise, biological and water quality surveys, data storage, retrieval and analysis, contract documents and environmental clauses, risk assessment and management, contingency planning and management and value addition | Workshop and seminars | During implementation on of the project |
| 6 | Public /contractors' workers | Awareness programmed on environmental protection and measures being implemented by NHIDCL and their role in sustaining the measures taken including for noise pollution, air pollution, safety, soil conservation, and agricultural productivity enhancement | Workshops | During construction and initial phase say 18 months of operation |
| 7 | NHIDCL, A.E and Contractor. | Restoration of sites viz borrow areas, construction Camps, Crushing units, HMP etc. And Reporting Formats/procedure | Lecture/ Presentations | before Contractor Demobilization |

7.7 Grievance Redress Mechanism

- All the three parties involved in this project implementation i.e. Contractor, A.E and executing agency will maintain complaint registers at their following respective offices:
- Contractor's main site offices i.e. office of the Project Manager.
- A.E's main site office i.e. office of the Engineer's Representative; and
- PIU GM/Manager/Site Engineer office i.e. Employer's field office

Level 1 – PIU level: All public complaints regarding environmental issues received by any of the above-mentioned offices will be entered into the register with specific details such as name and address of the person or representative of the community registering a complaint, the details of complaint, and time. Project Director/GM/DGM/Manager (PIU) and A.E representative will immediately communicate the details of the complaint to the Contractor. The environment and safety officer of the contractor will promptly investigate and review the environmental complaint and implement proper corrective actions to arrest or mitigate the cause of the complaints within 3 days' time of receiving the complaint. The contractor will report to A.E environment expert about the action taken on the complaint, also within 3 days' time of receiving the complaint, for his further intimation to Project Director/GM/DGM/Manager PIU. The person making the complaint will also be intimated by the complaint receiving person or his representative, about the action taken, within 3 days.

Level 2 – State level: Grievances not redressed by the PIU level will be brought to the State level Grievance Redress Committee (GRC). The State level GRC will be headed and chaired by General Manager (Projects) and will comprise of the following:

- General Manager (Projects), NHIDCL
- Environmental Specialist, A.E
- A representative from the respective local community
- Representative of concerned agency such as Forestry Department or State Pollution Control Board depending on the nature of the complaint/issue

The main responsibilities of the GRC will be to:

- record grievances, categorize, and prioritize grievances and resolve them as soon as possible.
- Immediately inform the EA of serious cases; and report to complainants on decisions made regarding their grievances within three weeks of receiving the grievance from the PIU level. The decision must include the agreed timeline for addressing the grievance. Grievances related to resettlement benefits, compensation, relocation, replacement cost and other assistance will be addressed by following the grievance redress system provided in the RP.

8. CONCLUSION AND RECOMMENDATION

8.1 Summary of Environmental Cost

Estimates Rs 754500.00 for Different Management Plans for Vailoo to Donipawa Connecting NH-244 & NH-44 in the Union territory of Jammu and Kashmir

8.2 Widening and strengthening Vailoo to Donipawa connecting NH-244 & NH-44 in the Union territory of Jammu and Kashmir

1. The scope of works under involves Detailed Project Report and providing Pre-Construction activities National Highway Infrastructure Development Corporation limited aggregating 27.943 km widening and strengthening of 2 lanes. Further, the project is outside any legally protected, eco-sensitive, or critical habitat areas. Most of the adverse impacts are co-terminus with the construction stage, site specific, limited within the RoW, and are easily mitigated through good engineering and environmentally acceptable practices. Hence, classified as environment Category B in accordance with the MOEF EIA notification 2006 and its amendment/ ADB's Safeguards Policy Statement 2009. As per EIA notification 2006 and its amendment S.O.2559 (E) Dt 22nd August 2013, S.O 996(E) Dt 10th April 2015, S.O 382(E) Dt 3rd February 2015 Environmental Clearance Exempted from the purview of the Environmental Impact Assessment.

Significant environmental impacts anticipated are:

- I. pre-construction phase: permanent loss of trees, increase in road crashes from inadequate road alignment and design,
 - II. construction phase: loss of productive soil for embankment, increased dust, generation of noise, accidents risk and health hazard to construction Worker and Habitants. Inadequate clean-up operation, restoration and rehabilitation prior to decommissioning may cause disturbances to local community. Potential impacts during pre-construction may be minimized through design changes like permanent loss of some trees can be avoided by minor adjustments/eccentric widening and residual impacts are compensated through mandatory compensatory plantation and additional plantation.
2. During construction phase, adequate guidance and resources are provided by

NHIDCL to the Contractor to comply with the borrow area management requirements, suppress dust, control noise, and implement proper closure. NHIDCL, through its Project Implementation Units (PIUs), will ensure the effective implementation of the environmental management plan. To provide regular monitoring information and technical advice to the PIUs a Authority Engineer(A.E), will be engaged who will be responsible to examine environmental compliances and suggest corrective actions and guide contractors to enhance the environmental performance of the project.

3. The initial environmental examination ascertains that the project is unlikely to cause any significant environmental impacts. Need of undertaking detailed EIA is not envisaged at this stage. NHIDCL shall ensure that EMP and EMoP are included in Bill of Quantity (BOQ) and forms part of bid document and civil works contract. The same shall be revised if necessary, during project implementation or if there is any change in the project design and with approval of NHIDCL.
4. Environmental adverse impact is negligible will be minimized after implementation of EMP.

Annexure

Annexure

APPENDIX 1: RAPID ENVIRONMENTAL ASSESSMENT CHECKLIST

Vailoo Donipawa Road in Anantnag District Jammu and Kashmir

| National Highway Infrastructure Development Corporation Limited | | | |
|--|-----|----|---|
| Roads and Highways | | | |
| Screening Questions | Yes | No | Remarks |
| A. Project siting is the project area adjacent to or within any of the following environmentally sensitive areas? | | | |
| • Cultural heritage site | | x | No cultural heritage site is located within the road ROW or vicinity. |
| • Protected area | | x | None of the project road is inside or next to any notified protected area. However, protected and reserved forest patches are present in few stretches along project roads. |
| • Wetland | | x | None. |
| • Mangrove | | x | None |
| • Estuarine | | x | None |
| • Buffer zone of protected area | | x | None |
| • Special area for protecting Biodiversity | | x | No special biodiversity area is located within the project area. |
| B. potential environmental impacts will the project cause... | | | |
| • Encroachment on historical / cultural areas; disfiguration of landscape by road embankments, cuts, fills, and quarries? | x | | No encroachment of historical places. Quarry material will be procured from existing licensed quarries. Opening and operation of new quarry, if needed will follow consent conditions of State Pollution Control Board and environmental clearance from SEIAA, Jammu and Kashmir. |
| • Encroachment on precious ecology (e.g. sensitive or protected areas)? | | x | No National Parks, wildlife sanctuaries or similar eco-sensitive areas along the project road. |
| • Alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by increased soil erosion at construction site? | x | | Project area is Hilly train drained by a No. of Stream and Nallah and also intersecting some of project roads. Most of them is non-perennial in nature. |
| • Deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction? | | x | A temporary earthen bund or silt fencing will be provided around the construction site to avoid any sedimentation in nearby streams/Nallah. Adequate sanitary facilities and drainage in the workers |

| Screening Questions | Yes | No | Remarks |
|--|-----|----|--|
| | | | camps will help to avoid this possibility. Construction activity in this project will not contain any harmful ingredients. |
| <ul style="list-style-type: none"> Increased local air pollution due to rock crushing, cutting and filling works, and chemicals from asphalt processing? | x | | Air pollution level is likely to be increased for short duration during construction period. Appropriate distance from settlement area and wind direction may be considered to locate air polluting facility like stone crushing unit etc. use of environment friendly equipment's / machineries will help to reduce air pollution. |
| <ul style="list-style-type: none"> Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation? | | x | Workers may get exposed to dust and noise during construction activities. However, the exposure levels are likely to be short and insignificant. Workers will be provided requisite PPEs to minimize such exposure and associated harmful occupational health effects. Extensive safety measures have been included for occupational health in specific conditions of the contract. Road designs also address the safety issues comprehensively for the operation stage. |
| <ul style="list-style-type: none"> Noise and vibration due to blasting and other civil works? | | x | Ambient noise level is expected to marginally exceed due to various construction activities, maintenance workshops, and earthmoving equipment, their occurrence will be intermittent and co-terminus with the project construction. All stationary noise making equipment will be installed with acoustic enclosures. Timings of noise construction activities will be regulated near sensitive receptors. Multi- layered plantation proposed. |
| <ul style="list-style-type: none"> dislocation or involuntary resettlement of people | | x | Road construction within RoW. |
| <ul style="list-style-type: none"> Dislocation and compulsory resettlement of people living in right-of-way? | | x | |
| <ul style="list-style-type: none"> Disproportionate impacts on the poor, women and children, | | x | |

| Screening Questions | Yes | No | Remarks |
|--|-----|----|--|
| indigenous peoples or other vulnerable groups? | | | |
| <ul style="list-style-type: none"> Other social concerns relating to inconveniences in living conditions in the project areas that may trigger cases of upper respiratory problems and stress? | | x | Deterioration in ambient air quality will be localized and temporarily during construction stage only. The project area is located in built up and open areas. Extensive plantation along the highway and improved road conditions will improve the air quality of the area. |
| <ul style="list-style-type: none"> Hazardous driving conditions where construction interferes with pre-existing roads? | | x | Suitable traffic management plan will be designed and implemented by the contractor to prevent any hazardous driving conditions. |
| <ul style="list-style-type: none"> Poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations? | | x | Proper provisions for sanitation, health care and solid waste disposal facilities will be available in the contract documents to avoid such possibility. workers will be made aware about communicable diseases |
| <ul style="list-style-type: none"> Creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents? | | x | No such condition is anticipated. |
| <ul style="list-style-type: none"> Accident risks associated with increased vehicular traffic, leading to accidental spills of toxic materials? | | x | Adequate safety measures will be adopted to avoid such conditions. |
| <ul style="list-style-type: none"> Increased noise and air pollution resulting from traffic volume? | x | | Increase in noise and air pollution is expected during construction phase. Adequate mitigation measures will be adopted to minimize them. During operation phase, the main source of noise and air will be traffic. Improved road conditions, extensive plantation will help reduce the noise and air impact. Moreover, the alignment mostly passes through open agricultural land which will provide adequate dispersion of gaseous emission. If measures suggested for noise sensitive receptors prove inadequate, solid noise barrier will be placed. |
| <ul style="list-style-type: none"> Increased risk of water pollution from oil, grease and fuel spills, and other materials from vehicles using the road? | x | | This is expected from accidental spillage. Adequate safety provisions have been proposed to avoid such situation. |

| Screening Questions | Yes | No | Remarks |
|--|-----|----|--|
| <ul style="list-style-type: none"> Social conflicts if workers from other regions or countries are hired? | | x | Most of the workers will be from local areas and hence such conflict is not anticipated. |
| <ul style="list-style-type: none"> Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)? | | x | Workers will be mostly from local villages. Worker from remote places will be provided with adequate facility. The ratio of local and outside workers will be such balanced that there is minimum burden on existing social infrastructures and services. |
| <ul style="list-style-type: none"> Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation? | | x | There are well defined legislations and regulations for transport, storage and its use. All these legislations and regulations will form part of contract obligations which has to be necessarily complied by contractor. Similarly, during operation phase the transporters/carriers need to adhere it. |
| <ul style="list-style-type: none"> Community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning. | | x | Adequate measures have been adopted to mitigate such risks. Adequate awareness will be created amongst people and workers through information disclosure, safety signage and public consultation about safety aspects. |

Appendix

APPENDIX 1: ENVIRONMENTAL MANAGEMENT PLAN

| Environmental Issue/Component | Remedial Measure | Reference to laws/guideline | Location/Nos./ sections | Monitoring indicators (MI)/ Performance Target (PT) | Monitoring Methods | Mitigation Costs | Institutional Responsibility | |
|--|---|--|---|---|--|--|------------------------------|-------------|
| | | | | | | | Implementation | Supervision |
| A. Design and Pre-construction Stage | | | | | | | | |
| 1. Alignment/Pavement/Road Safety | | | | | | | | |
| 1.1 Risk due to constricted sections, Pavement damage due to use of unsuitable sub-grade material, over loading and inadequate drainage provisions | <ul style="list-style-type: none">Heavily built-up and geometrically deficit sections have been avoidedProvision of concrete pavement in heavily built-up sections to reduce formation width avoiding damage to residential/commercial structures.CBR value of sub grade adopted in consistent to MORTH guidelinesOverloading to be checked at weigh stationIncrease in vent size/waterway of cross drainsProvision of additional balancing culvertsProvision of adequate side drains with suitable outfalls. | Design requirement IRC: SP: 19. IRC: 37-2018 IRC: SP:73-2018 IRC-SP:50-2013. | Realignment//geometric improvements of curves | <u>MI</u> : Design and number of cross and side drains, <u>PT</u> : Design and numbers of CDs are in accordance with site needs and no incidence of overloading | Review of detail design documents & drawings and comparison with site conditions | Covered under costs for DPR consultant | Design Consultant | NHIDCL |
| 1.2 Safety along the proposed alignment | <ul style="list-style-type: none">Geometric Improvements of curvesProvision of crash barriers at accident prone areas and bridgesSpeed limitations near educational institutes, hospitals, and other CPR.Provision of retro-reflective warning signboards near | Design requirement IRC: SP:84-2019 IRC:8, IRC:25, IRC:26, IRC:35, IRC:67, IRC:103 and Section 800 of MoRTH Specifications Horizontal geometry will be based on IRC: 38-1988 and vertical geometry will be based on IRC: SP 23-1993 | Entire road stretch | <u>MI</u> : number and location of crash barriers, informatory and cautionary sign boards and street lighting as per design <u>PT</u> : numbers and location are in accordance with site needs : | Review of design documents and drawings and comparison with site conditions | Covered under costs for DPR consultant | Design Consultant | NHIDCL |

| Environmental Issue/Component | Remedial Measure | Reference to laws/guideline | Location/Nos./ sections | Monitoring indicators (MI)/ Performance Target (PT) | Monitoring Methods | Mitigation Costs | Institutional Responsibility | |
|--|---|--|-------------------------|---|---|--|------------------------------|-------------|
| | | | | | | | Implementation | Supervision |
| | curves, school, hospital, religious places and other sensitive location <ul style="list-style-type: none"> Provision of sidewalks in the built-up sections, on both sides. Signs and marking viz., delineators, object markers, hazard markers, safety barriers at hazardous locations, Street Lighting in built-up sections and bridge locations proposed Major Junctions to be improved as per IRC/MORTH guidelines. | “. IRC: SP: 67-2012 | | | | | | |
| 2. Natural Hazard/Climate Change Risk | | | | | | | | |
| 2.1 Damage to pavement integrity like Rutting, embankment softening and migration of liquid asphalt. Thermal expansion in bridge expansion joints and paved surfaces | <ul style="list-style-type: none"> Asphalt binder specifications based on viscosity-grade specifications as per IS 73-2013 guidelines and IS 15462 2004 for rubber modified binder and polymer modified binders. | IRC 37 2018 for flexible pavement design, IRC 81 1997 for strengthening of flexible pavement | Entire stretch | MI: Pavement Surface and bridge expansion joints during extreme heat PI: No softening, rutting, asphalt migration/thermal expansion of joint | Review of design documents and drawings and comparison with site conditions | Covered under costs for DPR consultant | Contractor | NHIDCL |
| 2.2 Earthquake | <ul style="list-style-type: none"> Relevant IS codes have been adopted in designing the structures to sustain the magnitude of earthquake corresponding to Seismic zone of the project area | Dislodgement of superstructure shall be taken as per Clause 222 of IRC: 6. | Entire Stretch | <u>MI:</u> CD Structure <u>PT:</u> Design conforms BIS and IRC guidelines | Review of design documents and drawings and comparison with site conditions | Covered under costs for DPR consultant | Contractor | NHIDCL |
| 2.3 Flooding/Water-Logging | <ul style="list-style-type: none"> CD structures designed for 50year return period | IRC:34 Recommendations for road construction in waterlogged area and IRC: | Proposed Bridge | MI: Design and numbers of cross & side drains, design and number of bridges PT: Design | Review of design documents and drawings | Covered under costs for DPR | Contractor | NHIDCL |

| Environmental Issue/Component | Remedial Measure | Reference to laws/guideline | Location/Nos./ sections | Monitoring indicators (MI)/ Performance Target (PT) | Monitoring Methods | Mitigation Costs | Institutional Responsibility | |
|---|---|--|--|--|---|---|------------------------------|-------------|
| | | | | | | | Implementation | Supervision |
| | <ul style="list-style-type: none"> Waterways of bridges and culverts have been increased. Roadside drains to be provided | 75 and MORT&H guidelines for | | and numbers are in accordance with site needs | and comparison with site conditions | consultant | | |
| 3. Loss of Land and Assets | | | | | | | | |
| 3.1 livelihood loss to affected persons | <ul style="list-style-type: none"> Road improvement work to be accommodated within available ROW to the extent possible. Social Impact Assessment and Resettlement Plan to be undertaken as per national policy and ADB' World Bank guidelines. Complete all necessary land and property acquisition procedures prior to the commencement of civil work. Adhere to the Land Acquisition procedures in accordance to RP's Entitlement Framework. Compensation and assistance as per project Resettlement Plan Implementation of Income restoration plan as per approved RP Preference in employment and petty contracts during construction to APs Constitute GRC as per approved RP | <p>The Right to Fair Compensation and Transparency in Land Acquisition act 2013</p> <p>Contract Clause for preference to local people during employment.</p> | Road Construction within RoW. If found encroacher during construction Throughout the corridor | <p>MI: compensation and assistance to DPs as per entitlement matrix of RP</p> <p>No. of grievance related to RP implementation</p> <p>PT: Minimal number of Complaints/ grievances.</p> <p>Cases if any are resolved at GRC level No case of grievance referred to arbitrator/court.</p> | <p>Check LA records, design drawings vs. land plans.</p> <p>Interview with affected persons</p> <p>Check status of employment given to local people during construction</p> | Part of administrative and resettlement costs | NHIDCL and implementing NGO | NHIDCL |

| Environmental Issue/Component | Remedial Measure | Reference to laws/guideline | Location/Nos./ sections | Monitoring indicators (MI)/ Performance Target (PT) | Monitoring Methods | Mitigation Costs | Institutional Responsibility | |
|---|---|-------------------------------|--|---|---|---|--|----------------------------|
| | | | | | | | Implementation | Supervision |
| 4. Diversion of Forest Land and Cutting of Trees | | | | | | | | |
| 4.1 Deterioration in climatic condition. Increase in Green House effect/climate change impact | <ul style="list-style-type: none">Geometric adjustments made to minimize tree cutting.Obtain tree cutting permission from forest/Revenue department.Provision for additional plantation on 1: 7 bases to be implemented through contractors of forest department. | Forest Conservation Act, 1980 | Forest Area: no forest area falls under this stretch | <p><u>MI</u>: location of geometric adjustments to minimize tree cutting, budget allocated for compensatory and additional plantation</p> <p><u>PT</u>: — Unnecessary tree felling avoided. Budget allocation for compensatory plantation is adequate,</p> | Review final design. Check budget provision for compensatory afforestation and additional plantation. | Covered under costs for DPR consultants | NHIDCL, Design consultants Forest department | NHIDCL /Forest department. |
| 5. Shifting of Utilities | | | | | | | | |
| 3.1 Disruption of utility services to local community | <ul style="list-style-type: none">Geometric adjustment has been made to minimize shifting need and/or the loss to any such facilities.All telephone and electrical poles/wires and underground cables should be shifted before start of constructionNecessary permission and payments should be made to relevant utility service agencies to allow quick shifting and restoration of utility servicesLocal people must be informed through appropriate means about the time of shifting of utility structures and potential disruption of services if anyRelocation of wells, hand pumps at | Project requirement | Throughout the corridor | <p><u>MI</u>: Number of complaints from local people, number, timing, and type of notifications issued to local people, time taken to shift utilities</p> <p><u>PT</u>: No. of complaints should be 0. Effective and timely notification. Minimal time for utility shifting</p> | Interaction with concerned utility authorities and local public | Included under NHIDCL's costs | Contractor/ NHIDCL/utility company | NHIDCL /A.E |

| Environmental Issue/Component | Remedial Measure | Reference to laws/guideline | Location/Nos./ sections | Monitoring indicators (MI)/ Performance Target (PT) | Monitoring Methods | Mitigation Costs | Institutional Responsibility | |
|---|---|---|--|---|---|------------------------------|------------------------------|-------------|
| | | | | | | | Implementation | Supervision |
| | suitable locations with consent from local community. | | | | | | | |
| B. Construction Stage | | | | | | | | |
| 1. Air Quality | | | | | | | | |
| 1.1 Dust Generation due to construction activities and transport, storage, and handling of construction materials | <ul style="list-style-type: none"> Contractor to submit location and layout plan for storage areas of construction materials approved by A.E Transport, loading and unloading of loose and fine materials through covered vehicles. Paved approach roads. Storage areas to be located downwind of the habitation area. Water spraying on earthworks, unpaved haulage roads and Tunnel and other dust prone areas. Provision of PPEs to workers. | <p>MORT&H Specifications for Road and Bridge works Air (P and CP) Act 1974 and Central Motor and Vehicle Act 1988</p> <p>General Conditions of Bid Document</p> | Throughout project corridor | <p><u>MI</u>: PM10 level measurements Complaints from locals due to dust</p> <p><u>PT</u>: PM10 level< 100 g/m³Number of complaints should be 0.</p> | <p>Standard s CPCB methods Observations Public consultation</p> <p>Review of monitoring data maintained by contractor</p> | Included in civil works cost | Contractor | NHIDCL /A.E |
| 1.2 Emission of air pollutants(HC,SO ₂ ,NO _x ,CO etc.) from vehicles due to traffic congestion and use of equipment and machinery | <ul style="list-style-type: none"> Regular maintenance of machinery and equipment. Batching, asphalt mixing plants and crushers at downwind (1km) direction from the nearest settlement. Only crushers licensed by the SPCB shall be used DG sets with stacks of adequate height and use of low Sulphur diesel as fuel. LPG should be used as fuel source in | The Air (Prevention and Control of Pollution) Act, 1981(Amended 1987) and Rules 1982 | Asphalt mixing plants, crushers, DG sets locations | <p><u>MI</u>: Levels of HC, SO₂, NO₂, and CO. Status of PUC certificates</p> <p><u>PT</u>: SO₂ and NO₂ levels are both less than 80ug/m³. PUC certificate of equipment and machinery is up to date</p> | <p>Standard s CPCB methods</p> <p>Review of monitoring data maintained by contractor</p> | Included in civil works cost | Contractor | NHIDCL /A.E |

| Environmental Issue/Component | Remedial Measure | Reference to laws/guideline | Location/Nos./ sections | Monitoring indicators (MI)/ Performance Target (PT) | Monitoring Methods | Mitigation Costs | Institutional Responsibility | |
|---|--|--|--|--|--|---|------------------------------|---------------------------|
| | | | | | | | Implementation | Supervision |
| | <ul style="list-style-type: none"> construction camps instead of wood Ambient air quality monitoring Contractor to prepare traffic management and dust suppression plan duly approved by NHIDCL | | | | | | | |
| 2. Noise | | | | | | | | |
| 2.1 Disturbance to residents and sensitive receptors due to excessive noise from construction activities and operation of equipment and machinery | <ul style="list-style-type: none"> All equipment to be timely serviced and properly maintained. Construction equipment and machinery to be fitted with silencers and maintained properly. Only IS approved equipment shall be used for construction activities. Timing of noisy construction activities shall be done during night time and weekend near schools, Implement noisy operations intermittently to reduce the total noise generated Manage existing traffic to avoid traffic jams and accumulation of noise beyond standards. Restrict construction near residential, built up and forest areas construction today light hours. | <p>Legal requirement Noise Pollution (Regulation and Control) Rules, 2000 and amendments thereof</p> <p>Clause No 501.8.6. MORT&H Specifications for Road and Bridge works</p> | <p>Throughout project section especially at construction sites, Residential and identified sensitive locations.</p> <p>Refer supplementary tables to EMP for information on sensitive receptors.</p> | <p><u>MI: day and night</u></p> <p>Noise levels. Number of complaints from local people</p> <p>PT: Zero complaints or no repeated complaints by local people.</p> <p>Average day and night time noise levels are within permissible limits for work zone areas</p> | <p>As per Noise</p> <p>rule, 2000 Consultation with local people</p> <p>Review of noise level monitoring data maintained by contractor</p> <p>Observation of construction site</p> | <p>Included in</p> <p>civil works costs</p> | <p>Contractor</p> | <p>NHIDCL</p> <p>/A.E</p> |

| Environmental Issue/Component | Remedial Measure | Reference to laws/guideline | Location/Nos./ sections | Monitoring indicators (MI)/ Performance Target (PT) | Monitoring Methods | Mitigation Costs | Institutional Responsibility | |
|---|---|--|--|--|---|------------------------------|-----------------------------------|-------------|
| | | | | | | | Implementation | Supervision |
| | <ul style="list-style-type: none"> Honking restrictions near sensitive areas PPEs to workers Noise monitoring as per EMoP. | | | | | | | |
| 3. Land and Soil | | | | | | | | |
| 3.1 Land use Change and Loss of productive/topsoil | <ul style="list-style-type: none"> Non-agricultural areas to be used as borrow areas to the extent possible. If using agricultural land, topsoil to be preserved and laid over either on the embankment slope for growing vegetation to protect soil erosion. Land for temporary facilities like construction camp, storage areas etc. shall be brought back to its original land use | Project requirement | <p>Throughout the project section and borrow areas</p> <p>Land to be identified for camp, storage areas etc.</p> | <p>MI: Borrow pit locations/Topsoil storage area</p> <p>PT: Zero complaints or disputes registered against contractor by landowner</p> | Review borrow area plan, site visits | Included in civil works cost | Contractor | NHIDCL /A.E |
| 3.2 Slope failure and Soil erosion due to Construction activities, earthwork, and cut and fill, stockpiles etc. | <ul style="list-style-type: none"> Slope protection by providing frames, dry stone pitching, masonry retaining walls, planting of grass and trees at high embankments Side slopes of all cut and fill areas will be graded and covered with stone pitching grass and shrub as per design specifications. Care should be taken that the slope gradient shall not be greater than 2:1. The earth stockpiles to be provided with gentle slopes to avoid soil erosion. | IRC: 56 -1974 & 2011 recommended practice for treatment of embankment slopes for erosion control Clause No. 306 and 305.2.2 MORT&H Specifications for Road and Bridge works Guidelines IX for Soil erosion | Throughout the entire project road | <p>MI: Occurrence of slope failure or erosion issues</p> <p>PT: No slope failures. Minimal erosion issues</p> | Review of design documents and site observation | Included in civil works cost | Design consultant and Contractor, | NHIDCL /A.E |
| 3.3 Borrow area | <ul style="list-style-type: none"> Obtain EC from | IRC Guidelines on | Borrow area not | MI: Existence of borrow | Review of | Included | Contractor | NHIDCL |

| Environmental Issue/Component | Remedial Measure | Reference to laws/guideline | Location/Nos./ sections | Monitoring indicators (MI)/ Performance Target (PT) | Monitoring Methods | Mitigation Costs | Institutional Responsibility | |
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| | | | | | | | Implementation | Supervision |
| management | <p>SEIAA or State Authority as applicable prior to opening any new borrow area.</p> <ul style="list-style-type: none"> Comply to EC conditions of SEIAA or State Authority as applicable. Non-productive, barren lands, to be used for borrowing earth with the necessary permissions/consents. Depths of borrow pits to be regulated and sides not steeper than 25%. Topsoil to be stockpiled and protected for use at the rehabilitation stage. Transportation of earth materials through covered vehicles. Follow IRC recommended practice for borrow pits (IRC 10: 1961) for identification of location, its operation and rehabilitation Borrow areas not to be dug continuously. To the extent, borrow areas shall be sited away from habituated areas. Borrow areas shall be leveled with salvaged material or other filling materials which do not pose contamination of | <p>borrow areas and for quarries(Environ mental protection Act and Rules,1986; Water Act ,Air Ac t) Clause 305.2.2 MORTH Specifications for Road and Bridgeworks Guidelines for Borrow Areas management</p> | <p>required for this project However site locations as identified in DPR.</p> <p>However, contractor is free to select any other borrow area after consent from EA and securing all permits.</p> | <p>areas in inappropriate unauthorized locations. Poor borrow area management practices. Number of accidents. Complaints from local people.</p> <p><u>PT</u>: No case of non-compliance to conditions stipulated by DEIAA in clearance letter. Zero accidents. Zero complaints.</p> | <p>design documents and site observations</p> <p>Compare site conditions with EC conditions by SEIAA</p> | <p>in civil works cost</p> | | /A.E |

| Environmental Issue/Component | Remedial Measure | Reference to laws/guideline | Location/Nos./ sections | Monitoring indicators (MI)/ Performance Target (PT) | Monitoring Methods | Mitigation Costs | Institutional Responsibility | |
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| | | | | | | | Implementation | Supervision |
| | soil. Else, it shall be converted into fishpond. | | | | | | | |
| 3.4 Quarry Operations | <ul style="list-style-type: none"> Aggregates will be sourced from existing licensed quarries. Copies of consent/ approval / rehabilitation plan for a new quarry or use of existing source will be submitted to NHIDCL. The contractor will develop a Quarry Redevelopment plan, as per the Mining Rules of the state and submit a copy of the approval to EA. Obtain environmental clearance from DEIAA in case of opening new quarry | ClauseNo.111.3 MORT&H Specifications for Road and Bridgeworks Guidelines VI for Quarry Areas Management Environmental Protection Rules | However, the contractor is free to choose the source after securing all permit | <p>MI: Existence of licenses quarry areas from which materials to be sourced and Existence of a quarry redevelopment plan</p> <p>PT: Quarry license is valid.: No case of non- compliance to consent conditions and air quality meets the prescribed limit</p> | Review of design documents , contractor documents and site observation Compliance to EC conditions in case of opening new quarries | Included in civil works cost | Contractor | NHIDCL /A.E |
| 3.5 Compaction of soil and impact on quarry haul roads due to movement of vehicles and equipment | <ul style="list-style-type: none"> Construction vehicles, machinery, and equipment to be stationed in the designated ROW to avoid compaction. Approach roads/haulage roads shall be designed along the barren and hard soil area to reduce the compaction. Transportation of quarry material to the dumping site through heavy vehicles shall be done through existing major roads to the extent possible to restrict wear and tear to the village/minor roads. | Design requirement | Parking areas, Haulage roads and construction yards. | <p>MI: Location of approach and haulage roads Presence of destroyed/comp acted agricultural land or land which has not be restored to its original condition</p> <p>PT: Zero</p> | Site observation | Included in civil works cost | Contractor | NHIDCL /A.E |
| | Land taken for construction camp and | | | occurrence of destroyed/comp acted land | | | | |

| Environmental Issue/Component | Remedial Measure | Reference to laws/guideline | Location/Nos./ sections | Monitoring indicators (MI)/ Performance Target (PT) | Monitoring Methods | Mitigation Costs | Institutional Responsibility | |
|---|---|-----------------------------|--|--|--------------------|------------------------------|------------------------------|-------------|
| | | | | | | | Implementation | Supervision |
| | other temporary facility shall be restore to its original conditions | | | and undestroyed land | | | | |
| 3.6 Contamination of soil due to leakage/ spillage of oil, bituminous and non-bituminous debris generated from demolition and road construction | <ul style="list-style-type: none"> Construction vehicles and equipment will be maintained and refueled in such a fashion that oil/diesel spillage does not contaminate the soil. Fuel storage and refueling sites to be kept away from drainage channels. Unusable debris shall be dumped in ditches and low-lying areas. To avoid soil contamination Oil-Interceptors shall be provided at wash down and refueling areas. Waste oil and oil-soaked cotton/ cloth shall be stored in containers labeled 'Waste Oil' and 'Hazardous' sold off to MoEF-CC/SPCB authorized vendors Non-bituminous wastes to be dumped in borrow pits with the concurrence of landowner and covered with a layer of topsoil conserved from opening the pit. Bituminous wastes will be disposed off in an identified dumping site approved by the State Pollution Control Board | Design requirement | Fueling station, construction sites, and construction camps and disposal location. | <p>MI: Quality of soil near storage area Presence of spilled oil or bitumen in project area</p> <p>PT: Soil test conforming to no – contamination. No sighting of spilled oil or bitumen in construction site or camp site</p> | Site observation | Included in civil work cost. | Contractor | NHIDCL /A.E |

| Environmental Issue/Component | Remedial Measure | Reference to laws/guideline | Location/Nos./ sections | Monitoring indicators (MI)/ Performance Target (PT) | Monitoring Methods | Mitigation Costs | Institutional Responsibility | |
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| | | | | | | | Implementation | Supervision |
| 4. Water Resources | | | | | | | | |
| 4.1 Sourcing of water during Construction | <ul style="list-style-type: none">Requisite permission shall be obtained for abstraction of river/Nallah/Stream water from State Water Commissioned or Irrigation Department in view of National Green TribunalArrangements shall be made by contractor that the water availability and supply to nearby communities remain unaffected.Water intensive activities not to be undertaken during summer season. | | Throughout the Project section especially construction sites and labor camps | MI: Approval from competent authority Complaints from local people on water availability PT: Valid approval from competent authority. Zero complaints from local people. | Checking of documentation Talk to local people | Included in civil works cost | Contractor | NHIDCL /A.E |
| 4.2 Disposal of water during construction | <ul style="list-style-type: none">Provisions shall be made to connect to side drains with existing nearby natural Drain | Clause No.1010 EP Act 1986 MORT&H. Specifications for Road and Bridge works | Throughout the Project section | MI: Drainage system in construction site. Presence/absence of water logging in project area. PT: Existence of proper drainage system. No water logging in project area | Standard methods Site observation and review of documents | Included in civil works cost | Contractor | NHIDCL /A.E |
| 4.3 Alteration in surface water hydrology | <ul style="list-style-type: none">Existing drainage system to be maintained and further enhanced.Provision shall be made for adequate size and number of cross drainage structures esp. in the areas where land is sloping towards road alignment.Road level shall be | Design requirement, ClauseNo 501.8.6. MORT&H Specifications for Road and Bridge | Seasonal Nallah crossing the project road | MI: Proper flow of water in existing streams and rivers PT: No complain of water shortage by downstream communities. No record of overtopping/ water logging | Review of design documents Site observation | Included in civil works cost | Contractor | NHIDCL /A.E |

| Environmental Issue/Component | Remedial Measure | Reference to laws/guideline | Location/Nos./ sections | Monitoring indicators (MI)/ Performance Target (PT) | Monitoring Methods | Mitigation Costs | Institutional Responsibility | |
|---|--|---|---|--|--|------------------------------|------------------------------|-------------|
| | | | | | | | Implementation | Supervision |
| | <p>raised above HFL level as per IRC/MORTH guidelines.</p> <ul style="list-style-type: none"> Culverts reconstruction shall be done during lean flow period. In some cases, these minor channels may be diverted for a very short period (15-30 days) and will be bring back to its original course immediately after construction. | | | | | | | |
| 4.4 Siltation in water bodies due to construction activities/earthwork | <ul style="list-style-type: none"> Embankment slopes to be modified suitably to restrict the soil debris entering water bodies. Provision of Silt fencing shall be made at water bodies. Silt/sediment should be collected and stockpiled for possible reuse as surfacing of slopes where they must be re-vegetated. Earthworks and stonework to be prevented from impeding natural flow of rivers, streams and water canals or existing drainage system. Retaining walls at water bodies /Stream/nallah to avoid siltation near Stream/Nallah. | <p>Design requirement, Clause No 501.8. 6.MORT&H Specifications for Road and Bridgeworks</p> <p>World-wide best practices</p> | Seasonal Nallah crossing the project road | <p>MI: Presence /absence of siltation in rivers, streams, nallah and other water bodies in project area. Turbidity test levels</p> <p>PT: No</p> <p>records of siltation due to project activities. Surface water quality tests confirm to turbidity and TSS limit</p> | Field observation | Included in civil works cost | Contractor | NHIDCL /A.E |
| 4.5 Deterioration in Surface water quality due to leakage from vehicles and equipment's and waste | <ul style="list-style-type: none"> Parking and refueling away from water bodies/waterways Oil/ grease trap and | The Water (Prevention and Control of Pollution) Act, 1974 and amendments thereof. | Seasonal nallah crossing the project road | <p>MI: Water quality of ponds, streams, rivers, and other water bodies in project</p> <p>Presence of oil floating in</p> | Conduction of water quality tests as per the | Included in civil works cost | Contractor | NHIDCL /A.E |

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| Environmental Issue/Component | Remedial Measure | Reference to laws/guideline | Location/Nos./ sections | Monitoring indicators (MI)/ Performance Target (PT) | Monitoring Methods | Mitigation Costs | Institutional Responsibility | |
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| | | | | | | | Implementation | Supervision |
| | <ul style="list-style-type: none"> 1:7 Additional plantation Employment preference to vulnerable Regular maintenance trees planted. Provision of LPG in construction camp Trees should be offset 1m back from the ultimate edge of the roadway to prevent safety hazard and enable adequate sight distance. Additional plantation near sensitive receptors, riverbanks to minimize noise & air pollution, check erosion. Controlled use of pesticides/fertilizers. | | | | observations | cost. | | |
| 6. Construction Camps/sites Management and Occupational Health and Safety | | | | | | | | |
| 6.1 Impact associated with location | <ul style="list-style-type: none"> All camps should be established with prior permission from SPCB. Layout plan shall be recommended by A.E and approved by EA Camps to maintain minimum distance from following: <ul style="list-style-type: none"> # 500 m from habitation # 500 m from forest areas where possible # 500 m from water bodies where possible # 500 m from through traffic route | Design Requirement the Water (Prevention and Control of Pollution) Act, 1974 and its amendments thereof | All construction camps | MI: Location of campsites and distance from habitation, forest areas, water bodies, through traffic route and construction camps PT: Distance of campsite is less than 500m from listed locations | On site observation Interaction with workers and local community | Included in civil works cost | Contractor and EO | NHIDCL /A.E |
| 6.2 Worker's Health in construction camp/ construction sites | <ul style="list-style-type: none"> The location, layout and basic facility provision of each labor camp will be submitted to A.E and | The Building and Other Construction workers (Regulating of Employment and | All construction camps | MI: Camp health records Existence of proper first aid kit in camp site | Camp records Site | Part of the civil works costs | Contractor | NHIDCL /A.E |

| Environmental Issue/Component | Remedial Measure | Reference to laws/guideline | Location/Nos./ sections | Monitoring indicators (MI)/ Performance Target (PT) | Monitoring Methods | Mitigation Costs | Institutional Responsibility | |
|-------------------------------|--|---|-------------------------|--|---|------------------|------------------------------|-------------|
| | | | | | | | Implementation | Supervision |
| | <p>approved by EA.</p> <ul style="list-style-type: none"> The contractor will maintain necessary living accommodation and ancillary facilities in hygienic manner. Adequate water and sanitary latrines with septic tanks with soak pits shall be provided. Preventive medical facilities in camp Waste disposal facilities such as dust bins must be provided in the camps and regular disposal of waste The Contractor will take all precautions to protect the workers from insect and pest to reduce the risk to health. This includes the use of insecticides which should comply with local regulations. No liquor or prohibited drugs will be imported to, sell, give and barter to the workers of host community. Awareness raising to immigrant workers/local community on communicable and sexually transmitted diseases. No material will be so stacked or placed as to cause danger or inconvenience to any person or the public. All necessary fencing and lights will be provided to | <p>Conditions of service) Act 1996 and The Water (Prevention and Control of Pollution) Act, 1974 And amendments thereof</p> | | <p>Complaints from workers.</p> <p>PT: No record of illness due to unhygienic conditions or vectors. Zero cases of STD. Clean and tidy camp site conditions.</p> | <p>observation</p> <p>Consultation with contractor workers and local people living nearby</p> | | | |

| Environmental Issue/Component | Remedial Measure | Reference to laws/guideline | Location/Nos./ sections | Monitoring indicators (MI)/ Performance Target (PT) | Monitoring Methods | Mitigation Costs | Institutional Responsibility | |
|---|---|--|-------------------------------|---|--|-------------------------------|------------------------------|-------------|
| | | | | | | | Implementation | Supervision |
| | protect the public in construction zones. All machines to be used in the construction will conform to the relevant Indian Standards (IS) codes, will be free from patent defect, will be kept in good working order, will be regularly inspected and properly maintained as per IS provision and to the satisfaction of the „ Engineer“. | | | | | | | |
| 7. Management of Construction Waste/Debris | | | | | | | | |
| 7.1 Selection of Dumping Sites | <ul style="list-style-type: none"> Contractor to submit a waste/spoil disposal plan and get it approved by A.E and EA. Create controlled dumping sites with a non-permeable lining incorporated in the pit design to avoid leachate seepage into the soil, which may later affect ground water quality Unproductive/wastelands shall be selected for dumping sites away from residential areas and water bodies Dumping sites must be having adequate capacity equal to the amount of debris generated. Public perception and consent from the village Panchayats must be obtained before finalizing the location. | Design Requirement, MORTH guidelines and General Conditions of Contract Document | At all Dumping/Disposal Sites | <u>MI</u> : Location of dumping sites Number of public complaints. <u>PT</u> : No public complaints. Consent letters for all dumping sites available with contractor | Field survey and interaction with local people. Review of consent letter | Included in civil works cost. | Contractor. | NHIDCL/A.E |

| Environmental Issue/Component | Remedial Measure | Reference to laws/guideline | Location/Nos./ sections | Monitoring indicators (MI)/ Performance Target (PT) | Monitoring Methods | Mitigation Costs | Institutional Responsibility | |
|---|--|--|---|---|---|-------------------------------|------------------------------|-------------|
| | | | | | | | Implementation | Supervision |
| 7.2 Reuse and disposal of construction and dismantled waste | <ul style="list-style-type: none"> The existing bitumen surface shall be utilized for paving of crossroads, access roads, and paving works in construction sites and camps, temporary traffic diversions, and haulage routes. All excavated materials from roadway, shoulders, verges, drains, cross drainage will be used for backfilling embankments, filling pits, and landscaping. Unusable and non-bituminous debris materials should be suitably disposed off at pre-designated disposal locations, with approval of the concerned authority. The bituminous wastes shall be disposed in secure landfill sites only in environmentally accepted manner. For removal of debris, wastes and its disposal, MORTH guidelines should be followed. Unusable and surplus materials, as determined by the Project Engineer, will be removed and disposed off-site | Design Requirement, MORTH guidelines and General Conditions of Contract Document | Throughout the project corridor | MI: Percentage of reuse of existing surface material Method and location of disposal site of construction debris PT: No public complaint and consent letters for all dumping sites available with contractor or A.E | Contract or records Field observation Interaction with local people | Included in civil works cost. | Contractor. | NHIDCL/A.E |
| 8. Traffic Management and Safety | | | | | | | | |
| 8.1 Management of existing traffic and | Traffic Management Plan shall be | Design requirement and IRC: SP: 27 - | Throughout the project corridor especially at | MI: Traffic management plan. | Review traffic manageme | Included in civil | Contractor | NHIDCL /A.E |



| Environmental Issue/Component | Remedial Measure | Reference to laws/guideline | Location/Nos./ sections | Monitoring indicators (MI)/ Performance Target (PT) | Monitoring Methods | Mitigation Costs | Institutional Responsibility | |
|-------------------------------|------------------|-----------------------------|-------------------------|---|--------------------|------------------|------------------------------|--|
| | | | | | | | Implementation | Supervision |
| | | | | | | | safety | <p>submitted by the contractor and approved by the A.E.</p> <ul style="list-style-type: none"> The traffic control plans shall contain details of diversions; traffic safety arrangements during construction; safety measures for nighttime traffic and precautions for transportation of hazardous materials. Timing and scheduling to be done so that transportation of dangerous goods is done during least number of people and other vehicles on the road. The Contractor will ensure that the diversion/detour is always maintained in running condition, particularly during the monsoon to avoid disruption to traffic flow. On stretches where it is not possible to pass the traffic on the part width of existing carriageway, temporary paved diversions will be constructed. Restriction of construction activity to only one side of the existing road The contractor shall inform local community of changes to traffic routes, and |

| Environmental Issue/Component | Remedial Measure | Reference to laws/guideline | Location/Nos./ sections | Monitoring indicators (MI)/ Performance Target (PT) | Monitoring Methods | Mitigation Costs | Institutional Responsibility | |
|--|---|-----------------------------|---|--|---|-------------------------------|------------------------------|-------------|
| | | | | | | | Implementation | Supervision |
| | pedestrian access arrangements with assistance from “Engineer”. ▪ Use of adequate signage’s to ensure traffic management and safety. Conduct of regular safety audit on safety measures. | | | | | | | |
| 8.2 Pedestrians, animal movement | ▪ Temporary access and diversion, with proper drainage facilities. ▪ Access to the schools, temples and other public places must be maintained when construction takes place near them. ▪ Fencing wherever cattle movement is expected. ▪ Large number of box culverts has been proposed. All structures having vertical clearance above 3m and not catering to perennial flow of water may serve as underpass for animals | Same as above | Near habitation on both sides of schools, temples, hospitals, graveyards, construction sites, haulage roads, diversion sites. | <u>MI</u> : Presence/ absence of access routes for pedestrians. Road signage Number of complaints from local people <u>PT</u> : Easy access to schools, temples, and public places. Zero complaints | Field observation Interaction with local people | Included in civil works cost. | Contractor | NHIDCL/A.E |
| 8.3 Safety of Workers and accident risk from construction activities | ▪ Contractors to adopt and maintain safe working practices. ▪ Usage of fluorescent and retro refractory signage, in local language at the construction sites ▪ Training to workers on safety procedures and precautions. ▪ Appointment of a safety officer. ▪ All regulations regarding safe | Same as above | Construction sites | MI: Availability of Safety gears to workers Safety signage Training records on safety Number of safety related accidents PT: Zero fatal accidents. Zero or minor non- fatal accidents. | Site observation Review records on safety training and accidents Interact with construction workers | Included in civil works cost | Obligation of Contractor | NHIDCL /A.E |

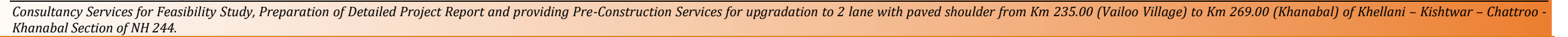
| Environmental Issue/Component | Remedial Measure | Reference to laws/guideline | Location/Nos./ sections | Monitoring indicators (MI)/ Performance Target (PT) | Monitoring Methods | Mitigation Costs | Institutional Responsibility | |
|--------------------------------------|---|-----------------------------|---|--|---|------------------------------|------------------------------|-------------|
| | | | | | | | Implementation | Supervision |
| | scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches and safe means of entry and egress shall be complied with. <ul style="list-style-type: none"> Provision of PPEs to workers. Provision of a readily available first aid unit including an adequate supply of dressing materials. The contractor will not employ any person below the age of 18 years Use of hazardous materials should be minimized and/or restricted. Emergency plan (to be approved by engineer) shall be prepared to respond to any accidents or emergencies. Safety Officer must be appointed by the contractor. | | | | | | | |
| 8.4 Accident risk to local community | <ul style="list-style-type: none"> Restrict access to construction sites only to authorized personnel. Physical separation must be provided for movement of vehicular and human traffic. All measures for the safety of traffic during construction viz. signs, markings, flags, lights, | Same as above | Construction sites and Accident-Prone Areas | MI: Safety signs and their location Incidents of accidents Complaints from local people <u>PT</u> : Zero incident of accidents. Zero Complaint | Site inspection Consultation with local people | Included in civil works cost | Contractor | NHIDCL /A.E |

| Environmental Issue/Component | Remedial Measure | Reference to laws/guideline | Location/Nos./ sections | Monitoring indicators (MI)/ Performance Target (PT) | Monitoring Methods | Mitigation Costs | Institutional Responsibility | |
|---|--|-----------------------------|---|--|---|-------------------------------|------------------------------|-------------|
| | | | | | | | Implementation | Supervision |
| | and flagmen as proposed in the Traffic Control Plan/Drawings shall be taken. Provision of temporary diversions and awareness to locals before opening new construction fronts. <ul style="list-style-type: none"> ▪ Alternate access facility to common properties near construction zones ▪ Fencing and speed limitation wherever cattle movement is anticipated. | | | | | | | |
| 9. Site Restoration and Rehabilitation | | | | | | | | |
| 9.1 Clean-up Operations, Restoration and Rehabilitation | <ul style="list-style-type: none"> ▪ Contractor will prepare site restoration plans, which will be approved by the 'Engineer'. ▪ The clean-up and restoration operations are to be implemented by the contractor prior to demobilization. ▪ All construction zones including river- beds, culverts, road-side areas, camps, hot mix plant sites, crushers, batching plant sites and any other area used/affected by the project will be left clean and tidy, to the satisfaction of the Environmental officer. ▪ All the opened borrow areas will be rehabilitated and 'Engineer' will certify | Project requirement | Throughout the project corridor, construction camp sites and borrow areas | <u>MI:</u> camp, Condition borrows areas and construction sites, Presence/absence of construction debris after construction works is over <u>PT:</u> Clean and tidy sites. No trash or debris left on site. Site restored/leveled | Site observation Interaction with locals Issue completion certificate after restoration of all sites are found satisfactory | Included in civil works cost. | Contractor | NHIDCL /A.E |
| Operation and Maintenance stage | | | | | | | | |
| 1. Air Quality | | | | | | | | |

| Environmental Issue/Component | Remedial Measure | Reference to laws/guideline | Location/Nos./ sections | Monitoring indicators (MI)/ Performance Target (PT) | Monitoring Methods | Mitigation Costs | Institutional Responsibility | |
|--|---|---|--|---|---|--|------------------------------|-------------|
| | | | | | | | Implementation | Supervision |
| 2.1 Air pollution due to due to vehicular movement | <ul style="list-style-type: none">Compensatory tree plantations shall be maintained as prescribed by forest department.80% survival rate for additional plantation shall be maintainedRegular maintenance of the road will be done to ensure good surface conditionAmbient air quality monitoring. If monitored parameters exceeds prescribed limit, suitable control measures must be taken.Signages shall be provided reminding the drivers/road users to properly maintain their vehicles to economize on fuel consumption.Enforcement of vehicle emission rules in coordination with transport department or installing emission checking equipment's | Environmental Protection Act, 1986; The Air (Prevention and Control of Pollution) Act, 1981 | Throughout the Corridor | <u>MI</u> : Ambient air quality (PM10, CO,SO2 NO2) <u>PT</u> : Levels are equal to or below baseline levels (Air Quality Standard, CPCB) | As per CPCB requirements Site inspection | Included in Operation / Maintenance cost | NHIDCL | |
| 2. Noise | | | | | | | | |
| 2.1 Noise due to movement of traffic | <ul style="list-style-type: none">Effective traffic management and good riding conditions shall be maintainedSpeed limitation and honking restrictions near sensitive receptors locations.Construction of noise barriers near | Noise Pollution (Regulation and Control) Rules,20 00 and amendments thereof | Sensitive receptors as identified by contractor/A.E. | <u>MI</u> : Noise levels <u>PT</u> : Levels are equal to or below baseline levels (Noise Quality Standard, CPCB) | Noise monitoring as per noise rules ,2000 Discussion with people at sensitive receptor | Included in Operation / Maintenance cost | NHIDCL | |

| Environmental Issue/Component | Remedial Measure | Reference to laws/guideline | Location/Nos./ sections | Monitoring indicators (MI)/ Performance Target (PT) | Monitoring Methods | Mitigation Costs | Institutional Responsibility | |
|---|---|-----------------------------|--|---|---------------------|--|------------------------------|-------------|
| | | | | | | | Implementation | Supervision |
| | <div>sensitive receptors with consent of local community</div> <ul style="list-style-type: none">The effectiveness of the multilayered plantation should be monitored and if need be, solid noise barrier shall be placed.Create awareness amongst the residents about likely noise levels from road operation at different distances, the safe ambient noise limits and easy to implement noise reduction measures while constructing a building near road. | | | | sites | | | |
| 3. Land and Soil | | | | | | | | |
| 3.1 Soil erosion at embankment during heavy rainfall. | <ul style="list-style-type: none">Periodic checking to be carried to assess the effectiveness of the stabilization measures viz. turfing, stone pitching, river training structures etc.Necessary measures to be followed wherever there are failures | Project requirement | At bridge locations and embankment slopes and other probable soil erosion areas. | <div>MI: Existence of soil erosion sites</div> <div>Number of soil erosion sites</div> <div>PT: Zero or minimal occurrences of soil erosion</div> | On site observation | Included in Operation / Maintenance cost | NHIDCL | |
| 4. Siltation/Waterlogging | | | | | | | | |
| 4.1 Siltation/ Contamination | <ul style="list-style-type: none">Regular visual checks shall be made to observe any incidence of blockade of drains. Regular checks shall be made for soil erosion.Monitoring of surface water bodies | Project requirement | Near surface bodies | <div>MI: Water quality</div> <div>PT: No turbidity of surface water bodies due to the road</div> | Site observation | Included in Operation / Maintenance cost | NHIDCL | |
| 4.2 Waterlogging due to | <ul style="list-style-type: none">Regular visual checks | Project requirement IRC: | Near surface Water | MI: Presence/ | Site | Included in | NHIDCL | |

| Environmental Issue/Component | Remedial Measure | Reference to laws/guideline | Location/Nos./ sections | Monitoring indicators (MI)/ Performance Target (PT) | Monitoring Methods | Mitigation Costs | Institutional Responsibility | |
|--|--|-------------------------------------|--|--|---|--|------------------------------|-------------|
| | | | | | | | Implementation | Supervision |
| blockage of drains, culverts or streams | and cleaning (at least once before monsoon) of drains to ensure that flow of water is maintained through cross drains and other channels/streams. - Monitoring of waterborne diseases due to stagnant water bodies | SP:21-2009 | bodies/cross drains/side drains | absence of water logging along the road PT: No record of overtopping/ Water logging | observation | Operation / Maintenance cost | | |
| 5. Flora | | | | | | | | |
| 5.1 Vegetation | - Planted trees, shrubs, and grasses to be properly maintained. - The tree survival audit to be conducted at least once in a year to assess the effectiveness | Forest Conservation Act1980 | Project tree plantation sites | MI: Tree/plants survival rate T: Minimum rate of 80% tree survival | Records and field observations. Information from Forestry Department | Included in Operation / Maintenance cost | NHIDCL | |
| 6. Maintenance of Right of Way and Safety | | | | | | | | |
| 6.1 Accident Risk due to uncontrolled growth of vegetation | - Maintain shoulder completely clear of vegetation. - Minimum offset as prescribed in IRC:SP:21-2009 to be maintained - Regular maintenance/trimming of plantation along the roadside - No invasive plantation near the road. | Project requirement IRC: SP:21-2009 | Throughout the Project route | MI: Presence and extent of vegetation growth on either side of road. Number of accidents. PT: No accidents due to vegetation growth | Visual inspection Check accident records | Included in Operation / Maintenance cost | NHIDCL | |
| 6.2 Accident risks associated with traffic movement. | - Traffic control measures, including speed limits, will be forced strictly. - Further encroachment of squatters within the ROW will be prevented. - No school or hospital will be allowed to be | IRC:SP:55-2014 | Accident Prone Areas especially at curves/Black Spot | MI: Number of accidents Conditions and existence of safety signs, rumble strips etc. on the road Presence/absence of sensitive receptor structures inside the stipulated planning line as per relevant local law | Review accident records Site observations | Included in Operation / Maintenance cost | NHIDCL | |



NHIDCL: National Highway Infrastructure Development Corporation Limited., EA: Executing Agency, A.E: Construction Supervision Consultant, CPCB: Central Pollution Control Board, CBR: California Bearing Ratio, DEIAA: District Environmental Impact Assessment Authority, EMP: Environmental Management Plan, EMOP: Environmental Monitoring Plan. EO: Environmental Officer, IRC: Indian Road Congress, MOEFCC: Ministry of Environment, Forests and Climate Change, MORTH: Ministry of Road Transport and Highways, NGO: Non-Governmental Organization, RP: Resettlement Plan

The “Project engineer” or “the engineer” is the team of Construction Supervision Consultants (A.E) responsible for approving the plans, engineering drawing, release of payments to contractor etc. on behalf of the employer (NHIDCL). It is usually the team leader of the A.E that takes the responsibility of signing approval documents on behalf of the A.E team. The “environmental officer” is the environmental specialist under the A.E who is responsible for providing recommendations to the A.E team leader for approving activities specific to environment safeguards on behalf of “the engineer”.

ENVIRONMENTAL MONITORING PLAN

| Env. Indicators | Project Stage | Parameters | Method/ Guidelines | Location | Frequency and Duration | Standards | Approximate cost (₹) | Implementation | Supervision |
|-----------------|--------------------|---|--|--|--|---|-------------------------|---|-------------|
| Air | Construction stage | PM 10 PM2.5 SO2, NOX, CO | High volume sampler to be located 50 m from the selected locations in the downwind direction. Use method specified by CPCB | Active construction site, HMP site and representative sample for residential, commercial/Industrial and Sensitive Locations (Total 4 Locations)- | 24 hr continuous, 4/year for 2 years | Air quality standard by CPCB | 288000 | Contractor | NHIDCL/A.E |
| | Operation stage | | | Representative sample 1 each for residential, commercial/Industrial and Sensitive Locations (Total 3 Locations)- | 24 hr continuous, 2/year for 1 year | Air quality standard by CPCB | 54000 | NHIDCL | NHIDCL |
| Water Quality | Construction stage | Ground water: (IS: 10500:1991) | Grab sample collected from source and analyse as per Standard Methods for Examination of Water and Wastewater | Groundwater at Construction Camps, HP of residential area and Surface water of Perennial Rivers/Ponds (4 Samples) | 4/year for 2 years | Water quality standard by CPCB | 96000 | Contractor | NHIDCL/A.E |
| | Operation stage | Surface water criteria for freshwater classification | | Groundwater at 2 locations and surface water at 1 location and Nalla developed due to Borrows areas (Total 4 Samples) | 3/year for 1 year | Water quality standard by CPCB | 144000 | NHIDCL | NHIDCL |
| Noise levels | Construction stage | Equivalent Noise levels on dB (A) scale for day and night | IS:4954-1968 as adopted by CPCB for Identified Study Area CPCB/IS:4954- | Construction sites, Construction Camp and 1 each at residential and sensitive locations along the alignment. (4 Locations) - | 24 hr continuous Quality, 4/year for 2 years | National Ambient Noise Standard specified in Environment Protection Act, 1986 | 112000 | Contractor | NHIDCL/A.E |
| | Operation stage | | 1968 Using Noise level meter | 1 each at Sensitive and residential Commercial areas (3 Locations) | 3 / year for 1 year | | 31500 | NHIDCL through approved monitoring agency | NHIDCL |
| Soil Quality | Construction Stage | NPK (ICAR standard) and heavy metals | As specified by the site engineer NHIDCL / CSC | Camp/ HMP sites Dumping Site and one random sample from agricultural Land | Once in a year for 2 years | ICAR standard | 9000 | Contractor through approved monitoring agency | NHIDCL/A.E |
| | Operation stage | Oil and grease | | At oil spillage locations and other probable soil contamination location | Twice for the first year of operation | CPCB standard | 20000 | NHIDCL | NHIDCL |

| Env. Indicators | Project Stage | Parameters | Method/ Guidelines | Location | Frequency and Duration | Standards | Approximate cost (₹) | Implementation | Supervision |
|-----------------------------------|--------------------|---|--------------------------------------|---|---|---|------------------------------------|--|-------------|
| | | | | (2 Locations) | | | | | |
| Soil Erosion | Construction Stage | | | Throughout the Project Corridor especially at | After first rain | Visual Checks | Included in Engineering Cost | Contractor | NHIDCL/A.E |
| | Operation Stage | Visual check for Soil erosion and siltation | | Riverbanks, bridge locations and river training structures | Once during operation of 1st year | Visual Checks | Routine Engineering Work | Engineering Team of NHIDCL | NHIDCL,R.O |
| Drainage Congestion | Construction stage | Visual Checks | | Throughout the Project Corridor especially Probable drainage congestion areas | Once in a year before rainy season | Non-Specific | Included in Engineering Cost | Contractor | NHIDCL/A.E |
| | Operation Stage | | | | Once in a year before rainy season | Non-Specific | Routine Engineering Work | NHIDCL | NHIDCL,R.O |
| Borrow Areas | Construction Stage | Visual Checks | IRC guidelines | Borrow areas to be operated | Once in a month | IRC guidelines + Compliance conditions of SEIAA | Part of the Contractor's quote | Contractor with approval from NHIDCL | NHIDCL/A.E |
| | Operation Stage | Visual Checks | Rehabilitation as per IRC guidelines | Closed Borrow Areas | Quarterly for 1 year | | | NHIDCL | NHIDCL |
| Construction Sites and Labor Camp | Construction stage | Hygiene, drainage Medical Facilities Etc. | Rapid audit as per reporting format | Construction Sites and Camp | Quarterly during construction period | IRC guidelines | Part of the regular monitoring | Contractor with approval from NHIDCL/ NHIDCL | NHIDCL/A.E |
| Tree Plantation | Construction Stage | Surveillance monitoring of trees felling | | Throughout the Project Section | During site clearance in construction phase | As suggested by Forest Dept. | Compensatory: NHIDCL | Compensatory: NHIDCL/Local Forest Departments Additional Plantation: NHIDCL through contractor of forest dept. | NHIDCL,R.O |
| | Operation stage | Audit for survival rate of trees plantation | | Throughout the Project Section | IRC: SP:2009 | | Additional Plantation: NHIDCL Cost | The Engineer will be responsible for monitoring up to the Defect Liability Period in any particular stretch. After this period NHIDCL will be responsible for monitoring additional plantation | NHIDCL R.O |
| Record of | Construction | Type, nature, | | Throughout the stretch | occurrence | As suggested | Part of the | Contractor | NHIDCL/A.E |



FINAL DETAILED PROJECT REPORT

Consultancy Services for Feasibility Study, Preparation of Detailed Project Report and providing Pre-Construction Services for upgradation to 2 lane with paved shoulder from Km 235.00 (Vailoo Village) to Km 269.00 (Khanabal) of Khellani – Kishtwar – Chattroo - Khanabal Section of NH 244.

| Env. Indicators | Project Stage | Parameters | Method/ Guidelines | Location | Frequency and Duration | Standards | Approximate cost (₹) | Implementation | Supervision |
|----------------------------|-----------------|---|-----------------------|---|----------------------------|-----------|-------------------------|---|-------------|
| Accident | Stage | and cause of accidents. Methodology as suggested by CSC and approved by NHIDCL | | including construction sites, crusher, diversions, HMP, earthwork, demolition site etc. | of accidents. IRC SP 55 | by PMC/SC | regular monitoring | | |
| | Operation stage | | | Throughout the stretch | occurrence of accidents | - | - | Road Safety unit of NHIDCL with support from local police | NHIDCL,R.O |
| Monitoring Costs:754500.00 | | | | | | | 754,500.00 | | |

NHIDCL: National Highway Infrastructure Development Corporation Limited, NPK: Nitrogen, Phosphorous and Potassium, A.E: Authority Engineer, EIA: Environmental Impact Assessment, IRC: Indian Road Congress, SPCB: State Pollution Control Board, CPCB: Central Pollution Control Board, IS: Indian Standard

APPENDIX 2: WORLD BANK AND GOI AMBIENT AIR QUALITY STANDARDS

A comparison between the ambient air quality requirements between the World Bank (WB) Environment, Health and Safety (EHS) guidelines and the National Ambient Air Quality standards (NAAQS) under the Air (Prevention and Control of Pollution) Act, 1981 of GOI as given in table below shows that the NAAQS has requirements on three more parameters (Pb, Co and NH₃) in comparison to the WB EHS. The NAAQS has differentiated standards for two types of areas:

- i) industrial, residential, rural and other areas and
- ii) ecologically sensitive areas.

The WB EHS has guidelines values which are the required standards but allows for gradual compliance to the guideline values through staged interim targets. Most WB EHS guideline requirements are more stringent than NAAQS except for the NO₂ one-year average in ecologically sensitive areas where the NAAQS requirements are more stringent.

| Ambient Air Quality Parameter | Averaging Period | WB Guideline Value | | GOI Standards for Industrial, Residential, Rural and Other Areas | GOI Ecologically Sensitive Area (notified by Central Government) |
|--|------------------|--------------------|--------------------|--|--|
| Sulfur dioxide (SO ₂) (ug/m ³) | 24-hr | 125 | (Interim target 1) | 80 | 80 |
| | | 50 | (Interim target 2) | | |
| | | 20 | (guideline) | | |
| | 10 min Annual | 500 | (guideline) | | |
| Nitrogen dioxide (NO ₂) (ug/m ³) | 1 Year | 40 | (guideline) | 40 | 30 |
| | 24 Hour | None | | 80 | 80 |
| | 1 Hour | 200 | (guideline) | | |
| PM ₁₀ (ug/m ³) | 1 Year | 70 | (Interim target 1) | | |
| | | 50 | (Interim target 2) | | |
| | | 30 | (Interim target 3) | | |
| | | 20 | (guideline) | 60 | 60 |
| | 24-hr | 150 | (Interim target 1) | | |
| | | 100 | (Interim target 2) | | |

FINAL DETAILED PROJECT REPORT

Consultancy Services for Feasibility Study, Preparation of Detailed Project Report and providing Pre-Construction Services for upgradation to 2 lane with paved shoulder from Km 235.00 (Vailoo Village) to Km 269.00 (Khanabal) of Khellani – Kishtwar – Chattroo - Khanabal Section of NH 244.

| Ambient Air Quality Parameter | Averaging Period | WB Guideline Value | | GOI Standards for Industrial, Residential, Rural and Other Areas | GOI Ecologically Sensitive Area (notified by Central Government) |
|-------------------------------|------------------|--------------------|--------------------|--|--|
| PM2.5 (ug/m3) | 1 year | 75 | (Interim target 3) | | |
| | | 50 | (guideline) | 100 | 100 |
| | | 35 | (Interim target 1) | | |
| | | 25 | (Interim target 2) | | |
| | | 15 | (Interim target 3) | | |
| | 24-Hour | 10 | (guideline) | 40 | 40 |
| | | 75 | (Interim target 1) | | |
| | | 50 | (Interim target 2) | | |
| | | 37.5 | (Interim target 3) | | |
| | | 25 | (guideline) | 60 | 60 |
| Ozone (O3) (ug/m3) | 8-hr daily max | 160 | (Interim target 1) | | |
| | | 100 | (guideline) | 100 | 100 |
| Lead (Pb) (ug/m3) | Annual | | | 0.5 | 0.5 |
| | 24 hours | | | 1.0 | 1.0 |
| Carbon Monoxide (CO) (ug/m3) | 8 hours | | | 2000 | 2000 |
| | 1 hour | | | 4000 | 4000 |
| Ammonia (NH3) (ug/m3) | Annual | | | 100 | 100 |
| | 24 hours | | | 400 | 400 |

APPENDIX 3: NOISE LEVEL STANDARDS OF WORLD BANK EHS AND THE GOI NAAQS

A comparison on noise level requirements between the WB EHS guidelines and the NAAQS under the Air (Prevention and Control of Pollution) Act, 1981 of GOI as given in table B shows that the required levels are equal for residential, institutional and educational areas. The NAAQS requirements for commercial areas are more stringent while the WB EHS requirement for daytime noise in industrial area is more stringent.

| Receptor | WB EHS in dB(A) | | GOI NAAQS in dB(A) | |
|----------------------------|-----------------|------------|--------------------|------------|
| | Daytime | Night time | Daytime | Night time |
| | 7:00-22:00 | 22:00-7:00 | 6:00-22:00 | 22:00-6:00 |
| Residential | 55 | 45 | 55 | 45 |
| Institutional; educational | | | None | None |
| Industrial | 70 | 70 | 75 | 70 |
| Commercial | | | 65 | 55 |
| Silence Zone | None | None | 50 | 40 |

Permissible Exposure in Case of Continuous Noise for Work Zone Area [as per Model Rules of Factories Act, 1948]

| Total Time of Exposure (continuous or a number of short-term exposures) per day, in hr | Permissible Sound Pressure Level in dB(A) |
|--|---|
| 8 | 90 |
| 6 | 92 |
| 4 | 95 |
| 3 | 97 |
| 2 | 100 |
| 1 | 102 |
| 1&1/2 | 105 |
| 1/2 | 107 |
| 1/4 | 110 |
| 1/8 | 115 |

Notes: 1. No exposure in excess of 115 dB (A) is to be permitted.

2. For any period of exposure falling in between any figure and the next higher or lower figure as indicated in column 1, the permissible sound pressure level is to be determined by extrapolation on a proportionate basis.

APPENDIX 4: DRINKING WATER QUALITY STANDARDS

(As per IS: 10400-1991)

| Sl. No. | Parameter and Unit | Desirable Limit | Permissible Limit in Absence of Alternate Source |
|---------|--|-----------------|--|
| 1. | Colour (Hazen units) | 5 | 25 |
| 2. | Odour | Unobjectionable | - |
| 3. | Taste | Agreeable | - |
| 4. | Turbidity (NTU) | 5 | 10 |
| 5. | pH | 5-8.5 | No relaxation |
| 6. | Total Coliforms (MPN/100 mL) | nil | - |
| 7. | Pathogenic Organisms or Virus | nil | - |
| 8. | TDS (mg/L) | 500 | 2000 |
| 9. | Mineral Oil (mg/L) | 0.01 | 0.03 |
| 10. | Free Residual Chlorine (mg/L) | 0.2 | - |
| 11. | Cyanide (mg/L as CN) | 0.05 | No relaxation |
| 12. | Phenol (mg/L C ₆ H ₅ OH) | 0.001 | 0.002 |
| 13. | Total Hardness (mg/L as CaCO ₃) | 300 | 600 |
| 14. | Total Alkalinity (mg/L as CaCO ₃) | 200 | 600 |
| 15. | Chloride (mg/L as Cl) | 250 | 1000 |
| 16. | Sulphate (mg/L as SO ₄) | 200 | 400 |
| 17. | Nitrate (mg/L as NO ₃) | 45 | 100 |
| 18. | Fluoride (mg/L as F) | 1 | 1.5 |
| 19. | Calcium (mg/L as Ca) | 75 | 200 |
| 20. | Magnesium (mg/L as Mg) | 30 | 100 |
| 21. | Copper (mg/L as Cu) | 0.05 | 1.5 |
| 22. | Iron (mg/L as Fe) | 0.3 | 1 |
| 23. | Manganese (mg/L as Mn) | 0.1 | 0.3 |
| 24. | Zinc (mg/L as Zn) | 5 | 15 |
| 25. | Boron (mg/L as B) | 1 | 5 |
| 26. | Aluminium (mg/L as AL) | 0.03 | 0.2 |
| 27. | Arsenic (mg/L as As) | 0.05 | No relaxation |
| 28. | Mercury (mg/L as Hg) | 0.001 | No relaxation |
| 29. | Lead (mg/L as Pb) | 0.05 | No relaxation |
| 30. | Cadmium (mg/L as Cd) | 0.01 | No relaxation |
| 31. | Chromium (VI) (mg/L as Cr) | 0.05 | No relaxation |
| 32. | Selenium (mg/L as Se) | 0.01 | No relaxation |
| 33. | Anionic Detergents (mg/L MBAS) | 0.2 | 1 |
| 34. | PAH (mg/L) | nil | - |
| 35. | Pesticides (µg/L) | Absent | 0.001 |
| 36. | Alpha Emitters (10 ⁻⁶ µCi/mL) | nil | 0.0001 |
| 37. | Beta Emitters (10 ⁻⁶ µCi/mL) | nil | 0.001 |

APPENDIX 5: STANDARDS FOR FRESHWATER CLASSIFICATION (CPCB 1979)

| Parameters | BOD mg/l | pH | D.O. in mg/l | Oil & Grease mg/l |
|--|-------------|-----------|-----------------|----------------------|
| CPCB standard Class A (drinking water without conventional treatment but after disinfections) | ≤2.0 | 6.5 – 8.5 | ≥6.0 | -- |
| CPCB standard Class B (for outdoor bathing) | ≤3.0 | 6.5 – 8.5 | 5.0 | -- |
| CPCB standard Class C (drinking water after conventional treatment and disinfections) | ≤2.0 | 6 – 9 | ≥4.0 | -- |
| CPCB standard Class D (for propagation of wild life, fisheries) | -- | 6.5 – 8.5 | ≥4.0 | ≤0.1 |
| CPCB standard Class E (for irrigation) | -- | 6.0-8.5 | -- | -- |

‘ -- ‘ Indicates not applicable/relevant