BUILDING INFRASTRUCTURE - BUILDING THE NATION

राष्ट्रीय राजमार्ग एवं अवसंरचना विकास निगम लिमिटेड

NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.

FINAL DETAILED PROJECT REPORT

APRIL2020

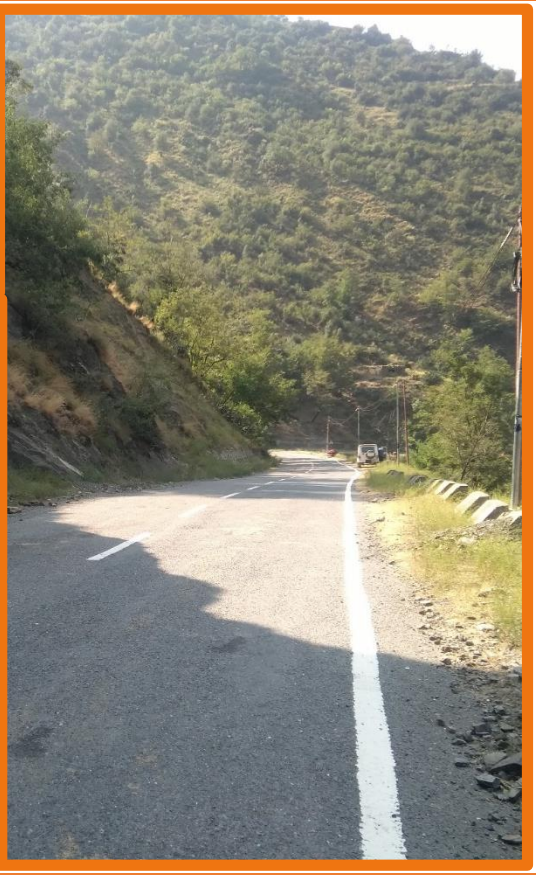
CONSULTANCY SERVICES FOR PREPERATION OF DETAILED PROJECT REPORT AND PROVIDING PRE-CONSTRUCTION ACTIVITIES IN RESPECT OF THE FOLLOWING STRETCH ON NH-244 (OLD NH-1B) IN THE STATE OF JAMMU AND KASHMIR.

(1) SUDHMAHADEV- DRANGA TUNNEL OF APPROX. LENGTH 4.5 KM AND ITS APPROACH ROAD ON CHENANI - SUDHMAHADEV-GOHA ROAD PORTION.

(2) VAILOO TUNNEL OF APPROX. LENGTH 10.0 KM UNDER SINTHAN PASS AND ITS APPROACH ROAD ON GOHA-KHELLANI- KHANABAL ROAD PORTION.

(3) ROAD PORTION FROM 82.675 TO 82.925 AT KM 83 ON BATOTE-KISHTWAR ROAD SECTION OF NH-244.

(4) EXTENDED ROAD SECTION FROM GOHA TO KHELLANI OF 30 KM LENGTH



GOHA - KHELLANI ROAD
PACKAGE-IA (KM 12.850 to KM 20.300)
VOLUME - IV - EIA & RAP REPORT

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ENVIRONMENTAL ASSESSMENT REPORT

INCLUDING ENVIRONMENTAL MANAGEMENT PLAN

(EMP)

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CHAPTER 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.

NHIDCL has been assigned the work of Consultancy Services for Preparation of Detailed Project Report and providing Pre-Construction activities for the construction of a Road Tunnel and its approaches enabling all weather connectivity along the stretches on NH-244 in the UT of Jammu and Kashmir. ***NHIDCL has entrusted TPF Getinsa Eurostudios SL in association with Rodic Consultants Private Limited, to carry out Consultancy Services for Preparation of Detailed Project Report and providing Pre-Construction activities to Goha Khellani roads portion of NH-244 (old NH-1B) in the UT of Jammu and Kashmir***.

Package	Chainage		Length (Km)	Remarks
	From	To		
I A	**12+850**	**20+300**	**7.450**	**Road, Bridges/Viaduct and Link road to Goha**
	0+000	**2+016**	**2.016**	
I B	20+300	29+030	8.730	Road, Bridges
II	29+030	31+449	2.419	Road, Bridges & Tunnel

This document contains Package-I A, Link Road 0+000 to 2+016 (2.016 Km) & I A: Goha - Khellani (Km 12.850 to Km 20.300(7.450 Km) report

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'.

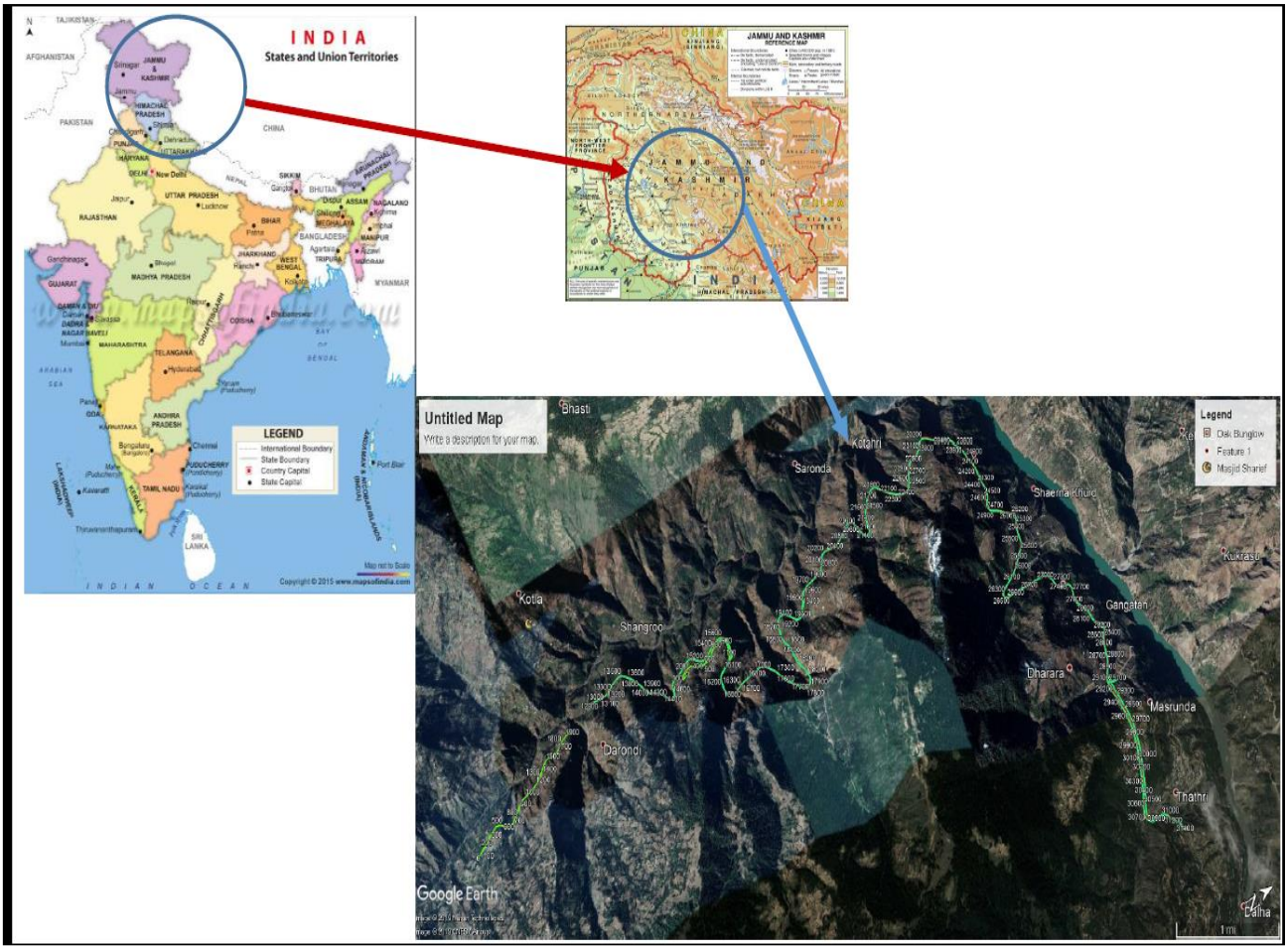
1.2 Project Description

The Scenic and tourist resort of Patni Top ridge on Pir Panjal Range located at an EL.2050 m, divides the Serene Chenab Valley Districts of Ramban, Doda, Baderwah & Kishtwar of Jammu Province from its other Districts. The National Highway NH-244 (old NH-1B) towards Doda, Baderwah & Kishtwar Districts takes off from Main Jammu – Srinagar NH-1A from Batote Town located on downhill of Patni Top towards Chenab Valley.

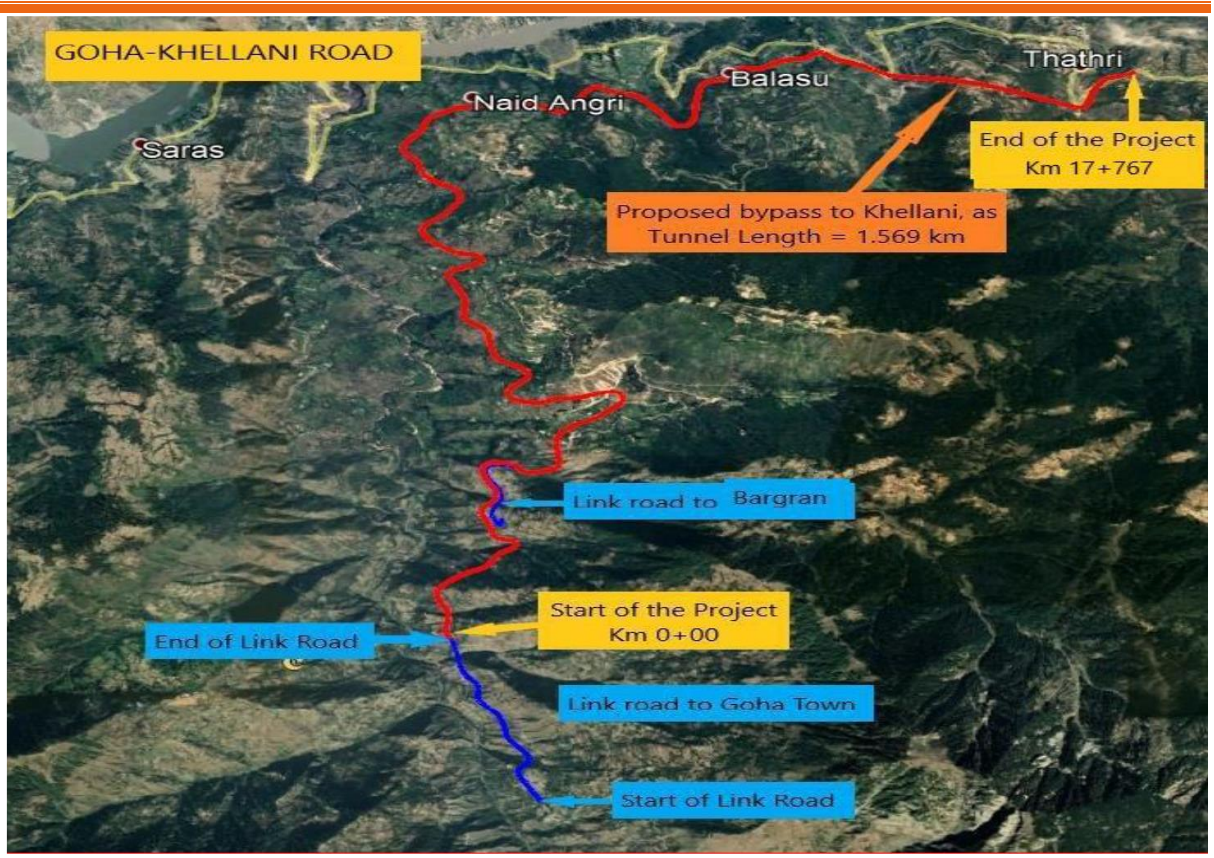
The traffic volume on main Jammu – Srinagar National Highway is increasing exponentially causing huge traffic jams especially during summer / monsoon periods and during winter, when the main Jammu – Srinagar National Highway NH-IA, remains either heavily congested during Tourist season, Amar Nath Ji Yatra, Fruit Season and / or frequently blocked due to regular slides in monsoon season and winter months. Heavy snow fall & blizzards occur on either side of the Patni Top ridge, which makes the road risky and unsafe even after snow clearance due to severe frost conditions on steeply sloping road, fraught with frequent accidents. Anti-freezing compounds, mostly the common salt, is frequently sprayed in severe frost zones of this ridge road to make it traffic worthy. To bypass Patni Top ridge & to avoid regular traffic jams on National Highway from Chenani to Batote, the Chenani – Nashri Tunnel has recently been commissioned in April – 2017, thereby successfully destressing this reach of Highway, providing huge relief for the commuters. The existing stretch of this National Highway from Chenani to Batote via Patni Top shall now loose its importance and shall face chronic maintenance problems, as such, any disruption of traffic on this portion of abandoned Highway from Chenani to Batote, shall disconnect the Chenab Valley

Districts of Doda, Bhaderwah & Kishtwar from rest of the State or otherwise they shall have to take the route through Chenani – Nashri Tunnel.

A Road through this Patni Top / Sudhmahadev ridge from Sudhmahadev (Chenani side) to Goha- Khellani (Doda side) shall be the shortest all-weather connectivity with the Chenab Valley Districts of Doda. Though the nomads and local populace use the pedestrian track from Goha to Khellani in place of taking to a much longer route along main National Highway but same is fraught with risks and hazards due to treacherous path and adverse vagaries of weather. This alternate connectivity by way of a proposed Road through Sudhmahadev Hills shall be a great boon and give a huge respite to the local population with rapid socio-economic development, due to ease in all-weather connectivity with a travel time of just 1 hours for a reduced distance of 60 Km from Chenani to Khellani as against 2.5 hours via main National Highway across Patni Top through a distance of about 90 Km.



Index Map of the Project



Location Map of the Project

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 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 Constructed to 2-lane 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 associate facilities viz. quarry operation, borrow areas, construction camp, transportation/haulage routes etc. The study area is considered up to 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 addressee all environmental impacts triggered by the entire project which EMPs have been prepare 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 govt. agencies, J&K govt 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 wildlife, 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 Climate risk screening:

Identified increased temperature as major risk which has the potential to affect and reduce the life of asphalt road pavements through softening and traffic- related rutting. Extreme heat can also stress the steel in bridges through thermal expansion and movement of bridge joints and paved surfaces. Although the period of prediction is far longer than the design life of asphalt which will require maintenance overlay periodically, mitigation measures and feasible options to reduced impact on pavement have been included in the environmental management plan-operation phase.

1.7.6 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.

1.7.7 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.

Executive Summary

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

CHAPTER 2. 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 (UNFCC), 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 Goha -Khellani Road in Goha Village and other village Proposed road will 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- 1986	To protect and improve overall environment	Yes	It is umbrella legislation and notifications; rules and schedules are promulgated under this act.	MOEFCC. Gol; J&K State Gov. SPCB
2	Environmental Impact Assessment Notification,14th 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 top soil, 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	Yes	Batote Division Dense forest Area fall under Road Construction. Forest Clearance Required for Diversion of forest land for non-forest purpose.	J&K State Forest Dept. and Parivesh
7	Forest(Conservation & afforestation) Rules,.	To restore tree, cover equal to or more for trees likely to be cut	Yes	Significant Tree cutting is involved in Projects.	DFOs, FCC
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 Control of Pollution) Act1974	To control water pollution by controlling discharge of pollutants as per	Yes	This act will be applicable during construction for (establishments of	SPCB

Sr. No	Act / Rules	Purpose	Applicable	Reason for Applicability	Authority
		the prescribed standards		hot mix plant, construction camp, workers' camp, etc.	
10	Permission of Abstraction of Ground water	To conserve and augment the groundwater resources	Yes	All infrastructure projects used Chasma (Springs Water) 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 Rules1989	To check vehicular air and noise pollution.	Yes	These rules will be applicable to road users and construction Machinery.	Motor Vehicle Department
15	Forest Conservation Act 1927	To maintain ecological stability through conservation and restoration of biological diversity.	Yes	Forest lands need to be diverted for non-forestry purpose.	Forest Dept. UT of Jammu and Kashmir,Parivesh

Sr. No	Act / Rules	Purpose	Applicable	Reason for Applicability	Authority
16	Construction and Demolition Waste Management Rules, 2016	To ensure all such waste are disposed in environmentally acceptable manner and prevent from land and water pollution	Yes		Municipal Corporation and SPCB
17	Solid Waste Management Rules, 2016 and Plastic Waste Management Rules 2016	Mandated the source segregation of waste in order 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
18	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
19	Batteries (Management and Handling) Rules, 2001 as amended 2010.	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.	
20	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 practices that results into higher pollution	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
		and less recovery,			
21	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	A large number of construction workers skilled, semiskilled or unskilled will be employed temporarily during Construction Phase of the project	Ministry of Labor and Employment Government of India
22	Bonded Labour (Abolition) Act,1976 and Rules, 1976	Abolition of bonded labor.	Yes	- Do-	- Do-
23	Contract Labour (Regulation and Abolition) Act1970 and rules, 1971	Prevent exploitation of contract labor and to introduce better conditions of work.	Yes	- Do-	- Do-
24	Employees Provident Funds and Miscellaneous Provisions Act1952	Promote and secure the well-being of the employees where contractors employ more than 20 persons during Construction	Yes	- Do-	- Do-
25	Minimum Wages Act 1948 along with Central Rules1950	Ensure that workers get at least minimum wages as fixed by the state/central Govt. whichever is higher	Yes	- Do-	- Do-
26	Public Liability and Insurance Act 1991	Protection form hazardous materials and accidents.	Yes	Contractors need to stock hazardous material like diesel, Bitumen, Emulsions	- Do-

CHAPTER 3. DESCRIPTION OF PROJECT

3.1 Location of the Project

Project road section falls in the Doda Districts of Jammu and Kashmir. The UT of Jammu and Kashmir in two divisions structurally as Jammu, Kashmir. The project road starts at approach road of Goha -khellani village. It passes through Bari, Goha and other Village in Doda districts of UT of Jammu and Kashmir. The project road traverses through Mountainous & Hilly terrain and is new alignment. 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

3.2 Importance of Projects and Need for the Project

1) Projects are strategically linked either with national highways or Major District 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 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 (v) acceleration in social and economic development through increased employment opportunities and better accessibility to socio-economic services.

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 new Construction 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.

3.4 Projected Traffic

The appreciation of traffic characteristics is one of most important activity to evaluate the potential of the existing network and identify the major issues to develop various components of road. Traffic survey begins with identification of homogeneous sections with similar traffic volume and composition. Traffic survey for each homogenous section was conducted to determine the existing traffic volumes in several vehicular categories. The peak and seasonal correction factors were worked out and applied on the Average Daily Traffic to obtain the Annual Average Daily Traffic (AADT) on the project roads. Various vehicle types having different size and characteristics were converted into Passenger Car Equivalents using Passenger Car Units (PCU) as suggested in IRC-64-1990; Guidelines for Capacity of Roads in Rural Areas to determine the relative effect of different types of vehicle on the traffic flow as compared to car as a standard vehicle. Traffic composition of project roads road varies from each other. Some roads have higher percentage of heavy commercial vehicle whereas some is dominated by cars/jeep and 2 wheelers. The traffic projection on the road normally consists of normal traffic diverted traffic and induced/generated traffic. Annual growth rates adopted range between 5.5% to 8% for cars and 2-wheelers, 5% for buses, and 5% to 7% for trucks. The traffic growth rates have been estimated based on the latest socio-economic and vehicle registration data.

Table: Vehicle Classification System adopted

Motorized Traffic		**Non-motorized traffic (NMT)**
Passenger vehicles Public Transport	2 wheelers / Auto Rickshaw / Passenger Car: Car, Jeep, Taxi / Van / Tempo/Minibus / Government Bus / Private Bus / School Bus	Bicycle, Cycle Rickshaw/Rickshaw Van / Animal Drawn/ Hand Cart
Commercial Vehicles	Light Commercial Vehicle (LCV) / 2 – Axle Truck / 3 – Axle Truck / Multi Axle Truck - Semi Articulated & Articulated (MAV)	
Agri Tractor	Tractor, Tractor with Trailer	

PCU factors adopted for study

Fast Vehicles	PCU	Slow Vehicles	PCU
Car	1.0	Agricultural Tractor	1.5
Minibus	1.5	Agricultural Tractor	4.5
Standard Bus	3.0	& Trailer	6.0
LCV	1.5	Animal Drawn	0.5
2 Axle Truck	3.0	Cycle	2.0
3 Axle Truck	3.0	Cycle Rickshaw	8.0
MAV	4.5	Hand Drawn Cart	
Two-Wheeler	0.5		
Auto Rickshaw	1.0		
Van/Tempo	1.0		

Source: IRC: 64-1999

3.5 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 26th October 2018 to 1st November 2018. 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: Traffic Survey Locations Justification/Rational

Sr. No.	Location	Justification/Rational
Classified Volume Count Surveys (CVC)		
1	Khellani on NH-244	Khellani has been selected to get the idea of traffic in homogeneous section of Sudhmahadev Dranga tunnel up to Khellani town

3.6 Average Daily Traffic (ADT)

7-Day, 24 hrs. Continuous volume counts were undertaken to obtain a realistic picture of the current volume and composition of the traffic. The analysis of traffic counts provided an estimate of the Average Daily Traffic (ADT) and the analysis has been carried out in terms of total number of vehicles as well as in respect to Passenger Car Unit (PCU). Location wise results of traffic analysis are discussed below:

Khellani

Classified Volume count survey was carried out at Khellani. Total ADT at this station were recorded as 3024 in terms of number and 4657 in terms of PCU. Fast moving vehicles were recorded as 100% of the total traffic (in No.). The directional distribution for all vehicles observed is 49.70 percent flow towards up direction and 50.30 percent towards down direction. Summary of classified traffic volume count survey results is shown in Table 3.6.

Table Summary of Classified Volume Count Survey at all count stations

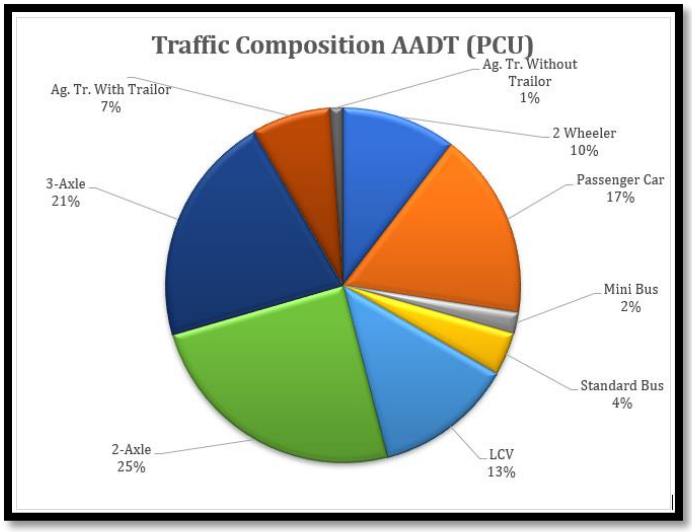
Sr. No.	Location	Total AADT (No)	Total AADT (PCU)	Directional Distribution (%)		Total ADT (No)	Total ADT (PCU)	Directional Distribution (%)	
				Up	Dn			Up	Dn
1	Khellani	2947	4538	49.50	50.50	3024	4657	49.70	50.30

Survey has been carried out for seven days 24 hours continuously; the traffic flow on all the days in the week will not be same. There will be variation of traffic for each day.

3.7 Traffic Composition

The traffic compositions observed in survey locations are presented graphically in below **Figure**. At location Near Khellani vehicle's compositions by type and percentage of volume are 2-wheelers (10%), car/jeep/van (17%), Mini Bus (2%), LCV (13%), 2 Axle (25%), 3 Axle (21%), Multi Axle Truck (21%).

Figure : Composition of Traffic by PCU at Khellani Town



3.8 Annual Average Daily Traffic (AADT)

The seasonal correction factors presented above are used to convert Average Daily Traffic

(ADT) to Annual Average Daily Traffic (AADT).

PCU Equivalents	0.5		1		1.5		3		1.5		3		3		4.5		4.5		1.5		Total All Vehicles	
Vehicle Type	FAST MOVING VEHICLES																					
	2 Wheeler		Passenger Car		Bus				LCV		Truck						Agricultural Tractor					
					Mini Bus		Standard Bus		4 Tyre		2-Axle		3-Axle		Multi Axle		With Trailor		Without Trailor			
Direction	UP	DN	UP	DN	UP	DN	UP	DN	UP	DN	UP	DN	UP	DN	UP	DN	UP	DN	UP	DN	UP	DN
Day 1	445	463	392	369	27	29	27	23	184	195	171	176	146	156	18	12	31	37	16	19	1456	1478
Day 2	478	477	386	370	28	30	22	28	185	192	172	178	152	153	18	20	33	36	19	17	1493	1501
Day 3	463	461	370	358	27	29	28	26	175	194	182	189	149	156	16	18	36	32	14	19	1459	1482
Day 4	412	478	367	379	27	29	36	28	188	182	180	188	141	163	21	12	37	36	16	18	1426	1513
Day 5	453	464	360	379	25	30	31	36	184	182	172	175	160	145	20	21	36	35	17	18	1457	1486
Day 6	465	439	351	388	27	30	23	28	175	178	185	182	163	144	20	19	36	34	16	17	1461	1460
Day 7	461	438	371	358	29	26	28	26	192	182	175	181	160	166	19	17	33	35	18	16	1485	1444
Total	3178	3219	2595	2600	189	204	197	197	1283	1307	1236	1269	1072	1083	131	117	243	246	113	121	10237	10364
Total Up/Down	6397		5196		394		394		2590		2506		2155		248		488		234		20601	
Average	453	459	370	371	27	29	28	28	183	186	176	181	153	154	18	16	34	35	16	17	1458	1476
AADT No.	914		743		57		57		370		358		308		36		70		34		2947	
AADT PCU	457		743		86		171		555		1074		924		162		315		51		4538	

3.9 Estimation of Corridor Traffic and Projection

Consultant has adopted growth rate as given in Table 5.4 provided that annual rate of growth of commercial vehicles shall not be less than 5% for traffic projection and pavement design.

Traffic demand projections for the horizon year (2035) on homogeneous sections are shown in Table 5.5 shows the summary of projected traffic volume for homogeneous sections as per adopted realistic growth rates.

Table 5.5: Summary of Projected Total AADT Traffic PCU Volume/ day

Homogeneous Section	Year 2018	Year 2021	Year 2028	Year 2030	Year 2035
Goha-Khellani	4538	5903	10404	12053	17000

3.10 Lane Requirements

Based on the assessment of the traffic demand on the various homogeneous sections of the Project Highway, the Consultant have carried out detailed option analysis for Two-lane. Based on the estimated Capacity & Design Service Volume, the number of lanes required for the project road is worked out for LOS B which is presented in Table below.

Table: Lanning Requirement for the Project Corridor

Homogeneous Sections	LOS B	LOS C
	2-Lane with Paved Shoulder	2-Lane with Paved Shoulder
Goha- Khellani	2018	2028

3.11 Traffic Survey Analysis and Forecast

It is very important, that the existing information on traffic flow, commodity movement and traffic pattern is required to assess the traffic behavior on a project road. After the construction of tunnel and road stretch from Goha- Khellani, there could be increase in the traffic en-route to Doda Town and beyond. However, the proposed road configuration shall cater to the design service volume 4538 (PCU). Further the road has been designed for 20 MSA against the projected 9.448 MSA.

MSA Calculation									
Year	**Standard Bus**	**LCV**	**2 Axle**	**3 Axle**	**MAV**	**Yearly Design ESA**	**Cumulative Design ESA**	**MSA**	**Design Period**
VDF	**0.62**	**0.46**	**4.93**	**0.76**	**3.93**				
2018	**114**	**370**	**358**	**308**	**36**	347906		**Base Year**	
2019	120	407	376	323	38	366541			
2020	126	448	395	340	40	386231			
2021	132	488	414	357	42	406742			
2022	139	532	435	374	44	428387	428387	**0.428**	**1-year**
2023	145	580	457	393	46	451232	879619		
2024	153	632	480	413	48	475347	1354966		
2025	160	689	504	433	51	500808	1855774		
2026	168	744	529	455	53	527233	2383007	**2.383**	**5-year**
2027	177	803	555	478	56	555090	2938096		
2028	186	868	583	502	59	584459	3522555		
2029	195	937	612	527	62	615426	4137981		
2030	205	1012	643	553	65	648081	4786062		
2031	215	1083	675	581	68	681841	5467903	**5.468**	**10-year**
2032	226	1159	709	610	71	717384	6185287		
2033	237	1240	744	640	75	754806	6940093		
2034	249	1327	781	672	79	794208	7734300		
2035	261	1420	821	706	83	835696	8569996		
2036	274	1505	862	741	87	878431	9448427	9.448	15-year

3.12 Growth Rate

The various methods specified vide IRC 108: 2015 are taken into consideration for arriving at reasonable growth rate for traffic in future.

The results of such methods along with proposed growth rate for each type of vehicle are presented vide Table below:

Table 3.12Comparative Analysis

Growth Rate of Economic Indicators for the UT of Jammu and Kashmir													
Sr.No.	Year	Per Capita Income (PCI)			Population			NSDP			GSDP		
		Rs.	Growth	Gr. rate (%)	In 000's	Growth	Gr. rate (%)	Rs. (In crores)	Growth	Gr. rate (%)	Rs. (In crores)	Growth	Gr. rate (%)
1	2004-05	21734			10717			23292			27305		
2	2005-06	22406	672	3.09	10877	160	1.49	24371	1079	4.63	28883	1578	5.78
3	2006-07	23375	969	4.32	11035	158	1.45	25794	1423	5.84	30602	1719	5.95
4	2007-08	24470	1095	4.68	11192	157	1.42	27387	1593	6.18	32561	1959	6.40
5	2008-09	25641	1171	4.79	11350	158	1.41	29102	1715	6.26	34664	2103	6.46
6	2009-10	26518	877	3.42	11506	156	1.38	30512	1410	4.85	36225	1561	4.50
7	2010-11	27666	1148	4.33	11659	153	1.33	32256	1744	5.72	38270	2045	5.65
8	2011-12	28790	1124	4.06	11806	147	1.26	33990	1734	5.38	41203	2933	7.66
9	2012-13	30035	1245	4.32	11952	146	1.24	35898	1908	5.61	43402	2199	5.34
10	2013-14	31448	1413	4.70	12096	144	1.20	38039	2141	5.96	45847	2445	5.63
11	2014-15	30612	-836	-2.66	12235	139	1.15	37453	-586	-1.54	45126	-721	-1.57
12	2015-16	35034	4422	14.45	12261	26	0.21	42955	5502	14.69	51757	6631	14.69
Average yearly growth rate (%)				**4.50**			**1.23**			**5.78**			**6.05**

Table 3.12 Adopted of Growth Rates

Growth Rates of Vehicular Traffic for the UT of Jammu and Kashmir								
Sr.no.	**Description**	**2 Wheelers**	**Cars/jeeps**	**Buses**	**Trucks**			**LCV and Mini LCV**
1	Trend Growth of Vehicles	9.04	15.56	3.66	4.16			17.62
2	Growth from regression analysis	9.45	14.95	3.31	3.33			17.21
3	Considered for Revenue/Capacity	9.24	15.26	3.49	3.75			17.42
Sr. no.	**Period**	**2 Wheelers**	**Cars/jeeps**	**Buses**	**Trucks**			**LCV and Mini LCV**
					2 Axle	**3 Axle**	**M Axle**	
1	Up to 2020	10.0	10.0	5.0	5.0	5.0	5.0	10.0
2	2021 -2025	9.0	9.0	5.0	5.0	5.0	5.0	9.0
3	2026 – 2030	8.0	8.0	5.0	5.0	5.0	5.0	8.0
4	2031 – 2035	7.0	7.0	5.0	5.0	5.0	5.0	7.0
5	Beyond 2035	6.0	6.0	5.0	5.0	5.0	5.0	6.0

3.13 Design Parameters

Project road improvement will broadly follow special code provisions relevant to National highways prescribed by Indian Road Congress (IRC: SP: 73-2007 updated in 2015) and Ministry of Road Transport and Highways (MoRT&H) Guidelines. In case of any compromise with these guidelines, has been specifically mentioned with reasons. All efforts have been made to maintain following table is a summary of the recommended design standards proposed to be adopted for the project road other than service road and intersections:

Table 3.13 : Summary of Recommended Design Standard

(i)	**Design Speed (Km/hr.)**		
	Mountainous Terrain	:	50 (Ruling), 40(Minimum)
(ii)	**Level of Service**	:	B
(iii)	**Roadway Widths (m)**	:	
	Mountainous Terrain		10 m for 2-lanes with paved shoulders/ Granular Shoulder
(iv)	**Roadway Elements**		
	Mountainous Terrain		
	With Retaining wall and parapet	:	Carriageway
			2-lane- 2X3.5m

			Paved Shoulder 2-lane with PSS- 2x1.5m
(v)	**Camber**		**Carriageway**
			Flexible- 2.50%
			Rigid - 2.00 %
			Paved Shoulder
			Flexible- 2.50%
			Rigid - 2.00 %
			Unpaved Shoulder
			Flexible- 3.50%
			Rigid - 3.00 %
(vi)	**Right of Way**		As per Plan and Profile
(vii)	**Embankment/ Cutting Slope**		
	Fill height, up to 3.0 m		In filling- 1V: 2 H
	Fill height from 3.0 m to 6.0 m		In filling- 1V: 1.5 H
	Fill height exceeding 6.0 m		To be designed based on soil parameters, (IRC:75-1979) In cutting- 1V:1H
(viii)	**Stopping Sight Distance**		20 m for design speed of 20 km/hr
			25 m for design speed of 25 km/hr
			30 m for design speed of 30 km/hr
			40 m for design speed of 35 Km /hr
			45m for design speed of 40km/hr
			60 m for design speed of 50km/hr
	Intermediate sight distance		40 m for design speed of 20 km/hr
			50 m for design speed of 25 km/hr
			60 m for design speed of 30 km/hr.
			80 m for design speed of 35 Km /hr.
			90 m for design speed of 40km/hr.
			120 m for design speed of 50km/hr.
(ix)	**Super-elevation**		
	Mountainous Terrain (As per IRC: SP:48-1998) Clause No-6.8.2.2		With snow bound area Maximum 7% Without snow bound area Maximum 10% Adopted maximum 7%
(x)	**Radii for Horizontal Curves**		
	Mountainous Terrain		Ruling Minimum 150 m
			Absolute minimum 75 m
(xi)	**Gradient (As per IRC: SP:73-2015) Clause 2.9.7.2**		
	Mountainous Terrain		
	Ruling		5.00%

	Limiting		6.00%
	Steep Terrain		
	Ruling		6.00%
	Limiting		7.00%
(xii)	**Minimum k factor**		
	Summit Curve		
	Mountainous Terrain		Desirable: 8
			Minimum: 5
	Valley Curve		
	Mountainous Terrain		Desirable: 10
			Minimum: 7
(xiii)	**Bridge Clearance**		
	Vehicular underpass		5.5 m
	Cattle and Pedestrian		3.0m
(xiv)	**Design Flood Frequency**		
	Bridges		100 years
	Sewers and Ditches		60 years

CHAPTER 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 Doda district of UT 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 Topography of District Doda

Doda is the largest district in the Jammu region. Doda town after which the district is named is situated at an altitude of 5000 feet above the sea level. The district boundaries do not touch with international borders or the LOC. The district shares border with Anantnag, Ramban, Kishtwar, and Udhampur & Chamba district of Himachal Pradesh. The entire district is hilly.

It has 01 Sub-district, 03 Sub-divisions, 17 Tehsils and 31 Niabats. Doda is divided in 02 assembly constituencies viz. Doda (53) and Bhaderwah (54). There are 237 panchayats in the district.The district is known for its rich mineral deposits. lead, mica, gypsum, manganese, marble, graphite copper etc are found here. The district is pre-dominantly rural and has agricultural and pastoral economy.The district has good potential for tourism including pilgrimage and adventure. Monuments of archaeological importance in the distt. include a fort at Bhadarwah.Kashmiri, Dogri, Bhadarwahi, Siraji, Punjabi etc are the languages being spoken here in different areas.

4.2 Physical Environment:

4.2.1 Climate and Rainfall

Doda:

The climate of the area is not uniform due to wide variations in altitude from place to place. The area, in general, enjoys temperate to sub-tropical type of climate. The climate of the district is almost dry. The rainfall is scanty. The temperature of the district varies from place to place. Ramban and Doda tehsils are fairly hot while as Padder, Marwah and Warwan remain snow bound for five-six months of the year. Summer is generally

without rain and precipitation. The regions with elevations more than 1500 m above msl, experiences snowfall in the winter. The regions below 1000 m (amsl) during summer months viz. from April to July are quite hot, but the winters are pleasant. The precipitation occurs either in the form of snowfall in higher regions and as rainfall in the lower regions. Monsoons prevail from July to September. Rainfall in the Doda district is heavy during July and September. The average annual rainfall is 926 mm and snowfall of about 135 mm.

4.2.2 Geomorphology and Soils

Doda:

The geomorphic forms recognized in the area are structural hills, erosional hills, plateaus, river terraces and hill slopes. Structural hills cover about 90% of the area and they belong to mainly Salkhalas, Dogra slates and Murees. The erosional hills have developed over Dul Quartzite and Gneissic outcrops. The plateau surface (Kishtwar plateau) forms a conspicuous geomorphic feature in the area. Present studies reveal that the plateau appears to be tectonic depression which, in the later phases of evolution supported a lacustrine domain over it. Sediments of the Chenab formation are, in general, fine to coarse textured and exhibit moderate to wide depression, presence of pollen and spores in Kishtwar formation indicate a temperate dry climate phases in the part. 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. Major part of Doda district comprises hill slopes of various gradients which are not conducive for development of soil profiles. Soils have therefore formed only on the gentle slopes of hills. Podsols are the dominant group of soils in the area. The Deodar forested area of Batote mountains are underlain by the brown earth soils. In the glaciated northern and eastern parts of Doda district, skeletal soils have developed due to diverse climatic conditions. Localized wedges of alluvial soils are also present in the various valleys of the area. In the valley portion clay predominantly form the upper layer whereas at higher altitude coarse grained soil exists. In the weathered horizons there are also good soil mantles of few inches thickness to support the crop like wheat and maize. Talus and scree also preapproved soil for such crops mostly in the slopes of mountains.

4.2.3 Geology

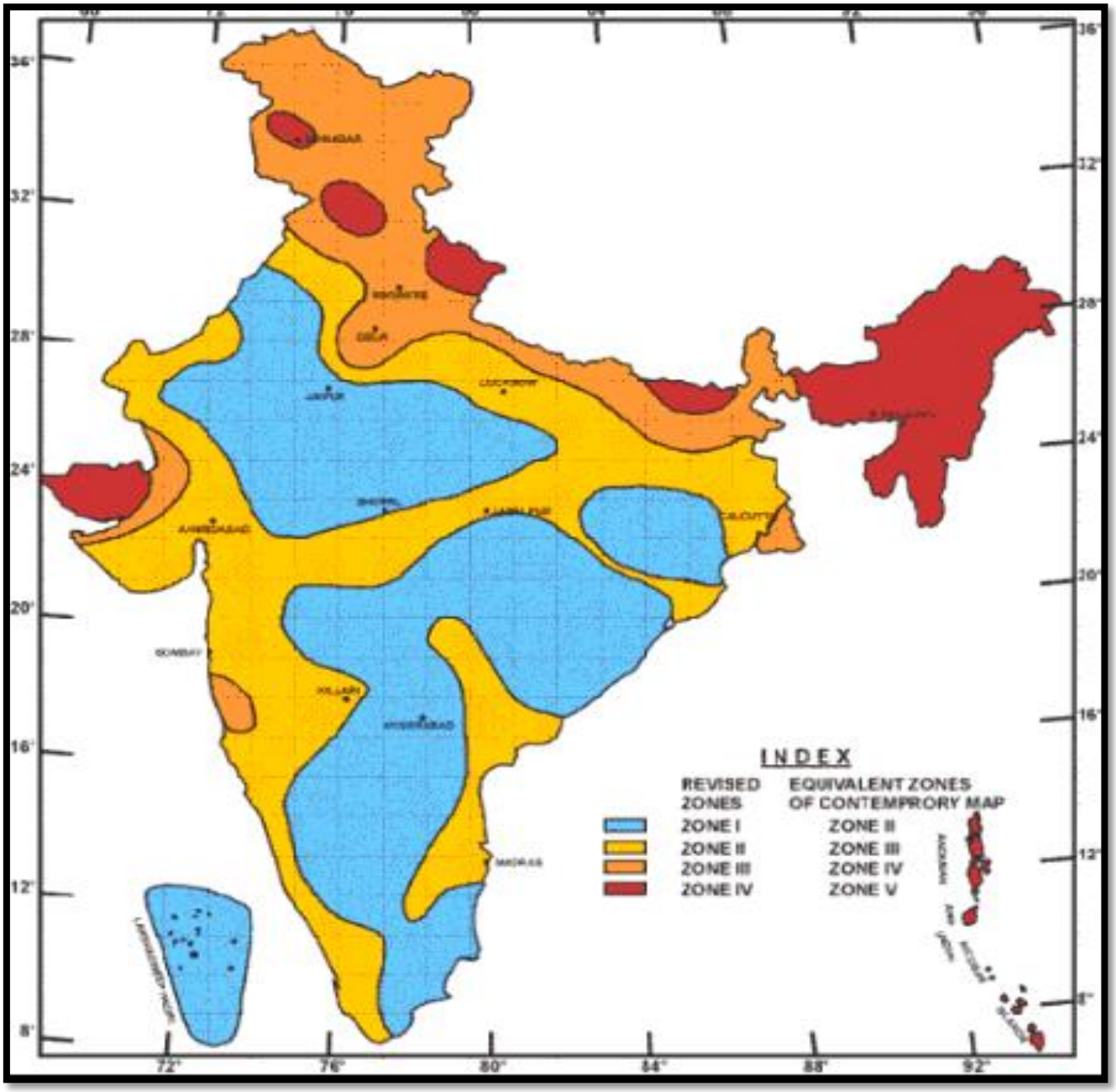
Paddar formation of Early Proterozoic comprises high grade schists and granitoids, gneisses, Ramban formation consist of phyllite, slate, quartzose sandstone, diamictite and lenticular bands of limestone and gypsum and Bhadarwah formation of Late Proterozoic consists of slate, phyllite and quartzite. The Permian rocks in Singhpore area of Doda is represented by Nishatbagh formation and Triassic rocks in Desa and Warwan Valleys consist of black shale and sandstone. In BhaderwahBhallesh basin shale, shaly limestone, massive limestone with shale partings and sandstone comprises the Triassic rocks.The Kaplas Batholoth occupies an area of about 500 sq.km in part of Doda. It intrudes into Salkhala and Bhadarwah Slate formations.

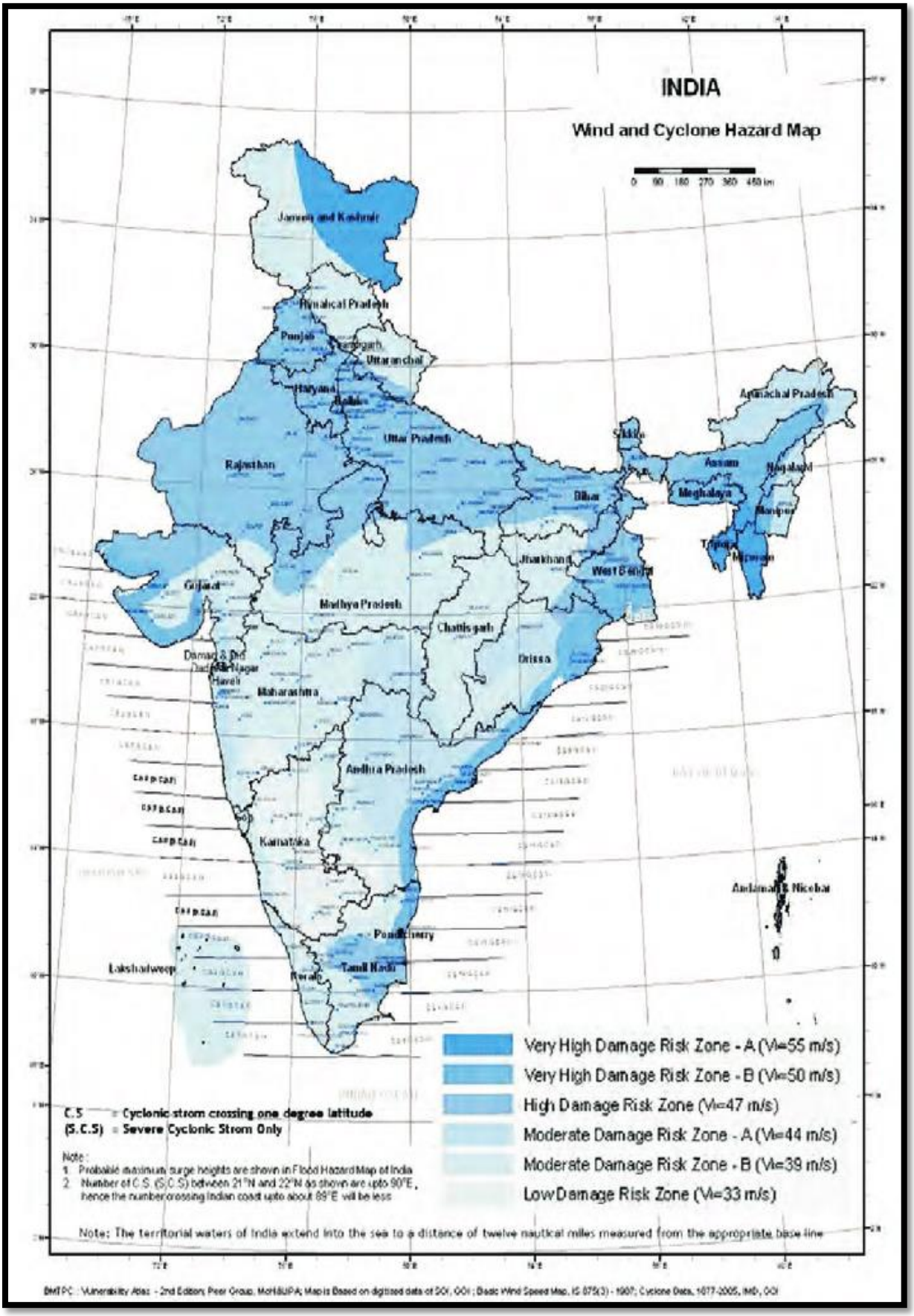
Soil: The Kashmir valley lies in temperate zone with an alluvial soil rich in nitrogen and organic matter. There are different types of soils in the valley which include slit (Gurti), loam (Bahil), sandy (Sekil), vegetable soil (Surzamin), kerewa soil (Wuder) and peaty (Nambal soil). No wonder, in Kashmir,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

Natural Hazard:

Major part of the state is prone to one or multiple natural hazards like earthquake, floods, cyclone, drought etc. as shown in multi hazard zone map of J&K. Sometimes two of the major hazards visit different parts of the state during the same period. Following paragraphs describes the extent and magnitude of different natural hazards of the state, project districts and project area.

Map 3: Multi Hazard Map of J&K




INDIA
Wind and Cyclone Hazard Map
0 90 180 270 360 450 km
Jammu and Kashmir
Himachal Pradesh
Punjab
Chandigarh
Uttaranchal
Haryana
Delhi
Uttar Pradesh
Rajasthan
Arunachal Pradesh
Sikkim
Assam
Nagaland
Meghalaya
Manipur
Tripura
Mizoram
Bihar
Jharkhand
West Bengal
Gujarat
Madhya Pradesh
Chattisgarh
Orissa
Daman & Diu
Dadra & Nagar Haveli
Maharashtra
Andhra Pradesh
Karnataka
Andaman & Nicobar
Pondicherry
Lakshadweep
Kerala
Tamil Nadu
Very High Damage Risk Zone - A (Vb=55 m/s)
Very High Damage Risk Zone - B (Vb=50 m/s)
High Damage Risk Zone (Vb=47 m/s)
Moderate Damage Risk Zone - A (Vb=44 m/s)
Moderate Damage Risk Zone - B (Vb=39 m/s)
Low Damage Risk Zone (Vb=33 m/s)
C.S = Cyclonic strom crossing one degree latitude
(S.C.S) = Severe Cyclonic Strom Only
Note :
1. Probable maximum surge heights are shown in Flood Hazard Map of India
2. Number of C.S. (S.C.S) between 21°N and 22°N as shown are upto 90°E, hence the number crossing Indian coast upto about 88°E will be less
Note: The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line
BMTPC : Vulnerability Atlas - 2nd Edition; Peer Group, MoH&UPA; Map is Based on digitised data of SOI, GOI ; Basic Wind Speed Map, IS 875(3) - 1987; Cyclone Data, 1877-2005, IMD, GOI

4.2.4 Earthquake:

The UT of Jammu and Kashmir is the western most extension of the Himalayan mountain range in India. According to Global Seismic Hazard Assessment Programmed (GSHAP data) , the State of Jammu & Kashmir falls in a region of high to very high seismic hazard zone. As per the 2002 Page 19 of 133 Bureau of Indian Standards (BIS) map, J&K is classified in Seismic Zone IV and V, with intensity MSK of VIII to IX or more. Historically, parts of J&K have experienced seismic activity in the M 6.0 - 7.0. In the past, the J&K region of the Himalayas has faced many earthquakes of M>7; 1770 M 7.7 Srinagar Earthquake and 2005 M7.6 Muzaffarabad earthquakes are the largest documented events in the J&K region. The Mw5.8 event of 1 May 2013 is a smaller event in comparison with these two big events. Preliminary information suggests that the earthquake occurred by shallow intra-plate strike slip faulting on the Eurasian Plate transverse to the prominent MCT and MBT features of the region. As per IMD, this earthquake was followed by four aftershocks of magnitudes 3.7, 4.6, 3.7 and 3.5 till 5 May 2013, and nine events of magnitude 3+ till 16 May 2013. The Mw5.8 that struck the J&K state at 12:27pm IST on 1 May 2013, caused a maximum intensity of shaking of about VI+ on the MSK scale. The earthquake was centered about 17 km northeast of Bhadarwah (Doda District of J&K) at a shallow depth of 15 km. This earthquake caused shaking in many areas adjoining area lasting about 40 seconds.

4.2.5 Landslides

Besides earthquakes, landslides are geological hazards that are common and peculiar to the region. In District Doda, the mass movement varies in magnitude from soil creep to landslides. Solifluction is another type of mass movement that is common on the higher snow-covered ranges of the district. Flash floods particularly in narrow river gorges are the cause of some of the major landslides in the district. These flash floods trigger landslides in the region eventually jeopardizing the stability of the hill as a whole. The vulnerability of geologically young unstable and fragile rocks of the district has increased many times in the recent past due to various unscientific developmental activities. Deforestation, unscientific road construction and terracing, encroachment on steep hill slopes are anthropogenic activities which have increased the frequency and intensity of landslides.

4.2.6 Snow Avalanches, Snow Storm and Snow Fall

Avalanches, river like flow of snow or ice descending from mountain tops are common in the high ranges of Jammu and Kashmir. It is very difficult to predict avalanches as they are rarely observed closely and normally occur during a short time period of one or two minutes. During winter, some parts of district Doda receive the snow fall and rainfall. Windstorms are high velocity winds that sweep with a wind speed of more than 55 km per hour. The windstorm occurrence in the district is mostly during spring and summer and often leads negative impact to lives and property. One of the major reasons for the catastrophe is due to the lack of early warning procedures and preparedness measures. Non-availability of technical expert to aware the people to construct wind proof roof tops as well as the deficiency in building code standard also put the lives and property of people under risk. Recently, on 14th May 2017 five persons were killed while several others injured when a minibus was hit by an avalanche on the Bhaderwah-Basholi Highway of Doda district

4.2.7 Hailstorm

Hailstorm creates great devastation to the standing crops in the state. Every year thousand acres of crops are being affected due to the hailstorm resulting in the loss of crop yield. The government of Jammu and Kashmir has imparted crop insurance schemes to support the agrarian population who has been affected by natural disasters such as hailstorm, drought, lightning etc. The insurance schemes are meant to support Rabi crops such as wheat, mustard and potato.

4.2.8 Biological Hazards

Biological hazards with respect to Jammu and Kashmir could be understood in terms of epidemics among humans, livestock and pest and disease with respect to agriculture. The prevalence of livestock disease has been recorded in the UT of Jammu and Kashmir. Outbreaks normally occur during the post monsoon season. The prominent diseases reported are Black Quarter (BQ), Hemorrhagic Septicemia (HS), SG-POX and Foot and Mouth Disease (FMD). Pest related problems are another biological hazard prevalent in the state. Pest attack not only decreases the productivity of the fruits but also the quality of the fruits which in turn affect the livelihood of the people who depend on agriculture. The need to provide effective and ecological sound insect and disease management is

very essential. Kashmir North and Kashmir South districts lie in Zone V. Gilgit, Chilas, Gilgit Wazarat, Muzaffarabad, Punch, Anantnag, Mirapur, Riasi, Udhampur, Jammu, Kathua, Leh, Ladakh and Tribal Territory districts lie in Zone IV. Since the earthquake database in India is still incomplete, especially with regards to earthquakes prior to the historical period (before 1800 A.D.), these zones offer a rough guide of the earthquake hazard in any region and need to be regularly updated

4.2.9 Drought:

The south-west monsoon plays a significant role in determining the sustenance of agriculture depended population in the state of Jammu & Kashmir. More than 75 % of the populations in Jammu & Kashmir are directly or indirectly depended on agriculture for livelihood. The deficiency in monsoon rain quite often results in drought, affecting the livelihood of the rural population. The State is prone to deficient rainfall once in three years, putting lives of the majority of population at stake. Doda as well is considered as drought-prone district.

4.2.10 Fire

The District Doda is also prone to building fires. Several incidents of building fires have been witnessed so far in the district. Every year, numerous buildings including residential houses/shops gut due to fire incidents.

4.2.11 Tourism / Crowd Management / Stampede

The Doda District is highly vulnerable to crowd related disasters. The main attractions of the destination include, Bhaderwah, Chinta Valley, Seoj Meadow, and Bhal Padri, to name a few. Bhaderwah is known for a pilgrimage for the Hindus known as the Kailash Yatra. Pilgrimage- tourism in district Doda that is promoted widely needs to take appropriate crowd management measures. Most often, the situation becomes chaotic due to large movement of people that could result in stampede, damage to limbs, injury and loss of life.

4.2.12 Railway Safety

The Kashmir Railway route officially termed the Jammu-Udhampur-Srinagar-Baramulla Railway link, cross major earthquake zones and is subjected to extreme temperatures of cold and heat. Due to the inhospitable terrain, the railway link is also susceptible to

landslides. As the State plans to expand its railway network within the State as well as to rest of the country, one need to judiciously plan appropriate disaster mitigation and response plans pertaining to rail accidents including technical failures, fires and sabotages.

4.2.13 Road Accident

The district due to its terrain is prone to road accidents. Appropriate Incident Command System, to deal with road accidents, has to be developed taking into account the nature of the roads, terrain and frequency of accidents happening on the roads of the district. There have been numerous road accidents claiming loss of lives and property to a great extent. Recently in JanuJanuary8 two people were killed and 50 people were seriously injured in a road accident at Kahara, tehsil Thathri, In District Doda. This is one of the major concerns which needs due attention so that no more lives are lost in such accident

4.3 Prevention and Mitigation Measures

The prevention and mitigation strategies need to be both structural and non-structural strategies. While the former generally indicates investment made on physical constructions or other development works (such as engineering measures and construction of hazard resistant / protective structures), the latter refer to soft measures such as awareness creation and education, policies strengthening techno-legal systems and practices, training, capacity development etc.

4.4 Geological Hazards

The hazard wise mitigation measures are as follows:

Earthquake the following principles could guide effective earthquake risk mitigation strategies for policy makers and practitioners in the District: -

1. As a commitment towards a safe Doda, each stakeholder involved in disaster risk reduction need to ensure that earthquake resistant designs are incorporated in the construction of any new structures.
2. Administrative authorities need to facilitate and promote the selective strengthening and seismic retrofitting of existing lifeline structures on a priority basis.

3. The compliance regime needs to be enhanced and improved through appropriate regulation, enforcement and monitoring mechanisms.

4.5 Structural Mitigation Strategies for Earthquake

4.5.1 Enhancing Structural Capacities

- Retrofitting and earthquake proofing of all lifeline structures.
- Monitoring of seismic activity.
- Retrofitting of existing weak buildings in the seismic zone.
- Construction and operationalization of District Hazard Safety Cell.
- Construction of earthquake resistant model houses tested through simulated environments.
- Equip buildings with basic first aid facilities.
- Develop earthquake resistant design features for the construction of public utility/residential structures.
- Establish seismological network and round-the-clock monitoring.

The function of Hazard Safety Cells towards Earthquake Risk Mitigation includes:

1. Establishing proper mechanisms for implementation of all the building codes in all future constructions.
2. To ensure the safety of buildings and structures from various hazards; and
3. To carry out appropriate design review of all government buildings to be constructed in the District.
    - Implementation of laws regulating developmental activities/ human activities in earthquake prone area.
    - Strict enforcement of building by law residential structure.

4.6 Landslides

It is hereby envisioned that each stakeholder involved with disaster risk reduction in district Doda is fully aware of landslide hazards and routinely takes action to reduce both the risks and costs associated with these hazards. The landslide mitigation strategy

envisioned below not only aims at converging the different line departments, but also in bringing together relevant scientific, engineering, construction, planning and policy making actors of the District. As a prior requisite, hazard identification is a cornerstone of landslide hazard mitigation. Nevertheless, as part of the mitigation strategy, we need to gather a comprehensive understanding of landslide processes and mechanisms to predict the behavior of differing types of landslides affecting the region.

Structural Mitigation Measures

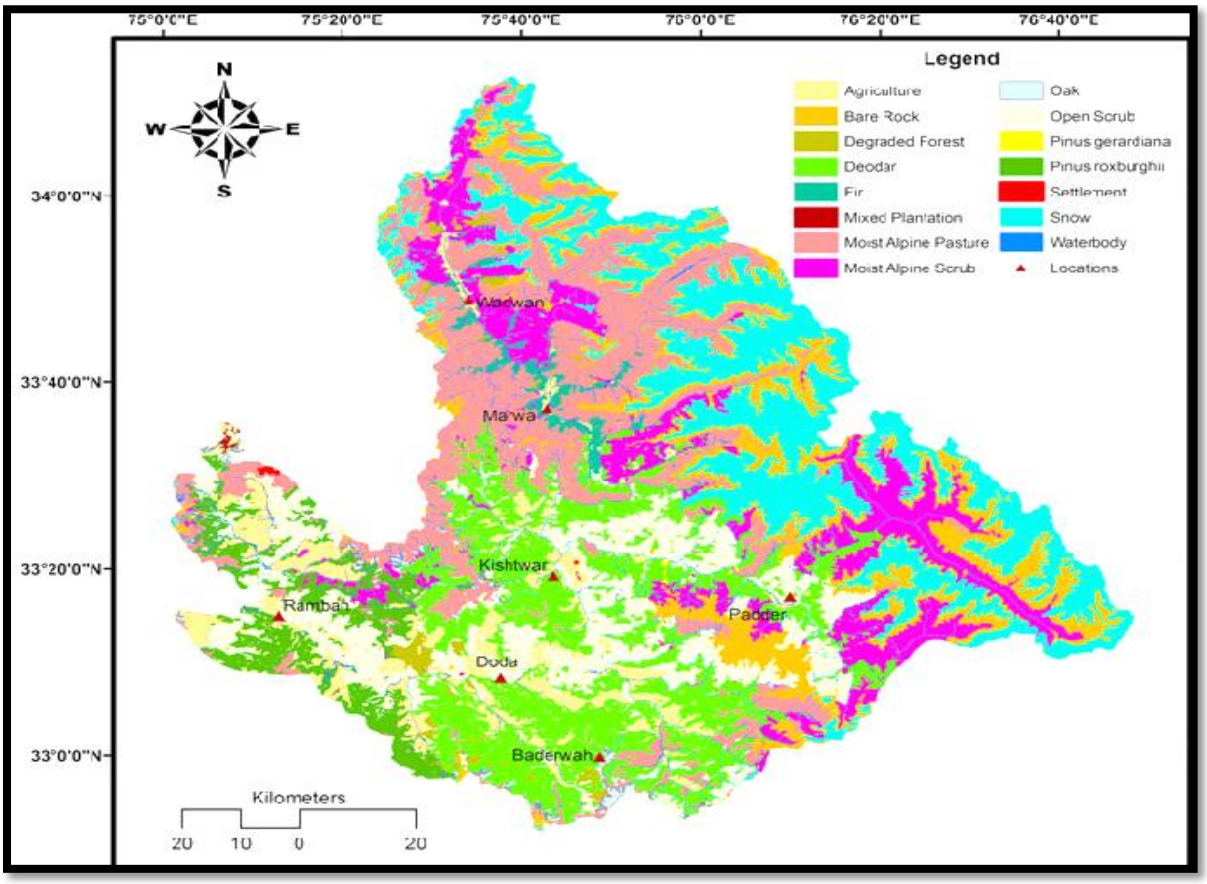
Enhancing Structural Capacities

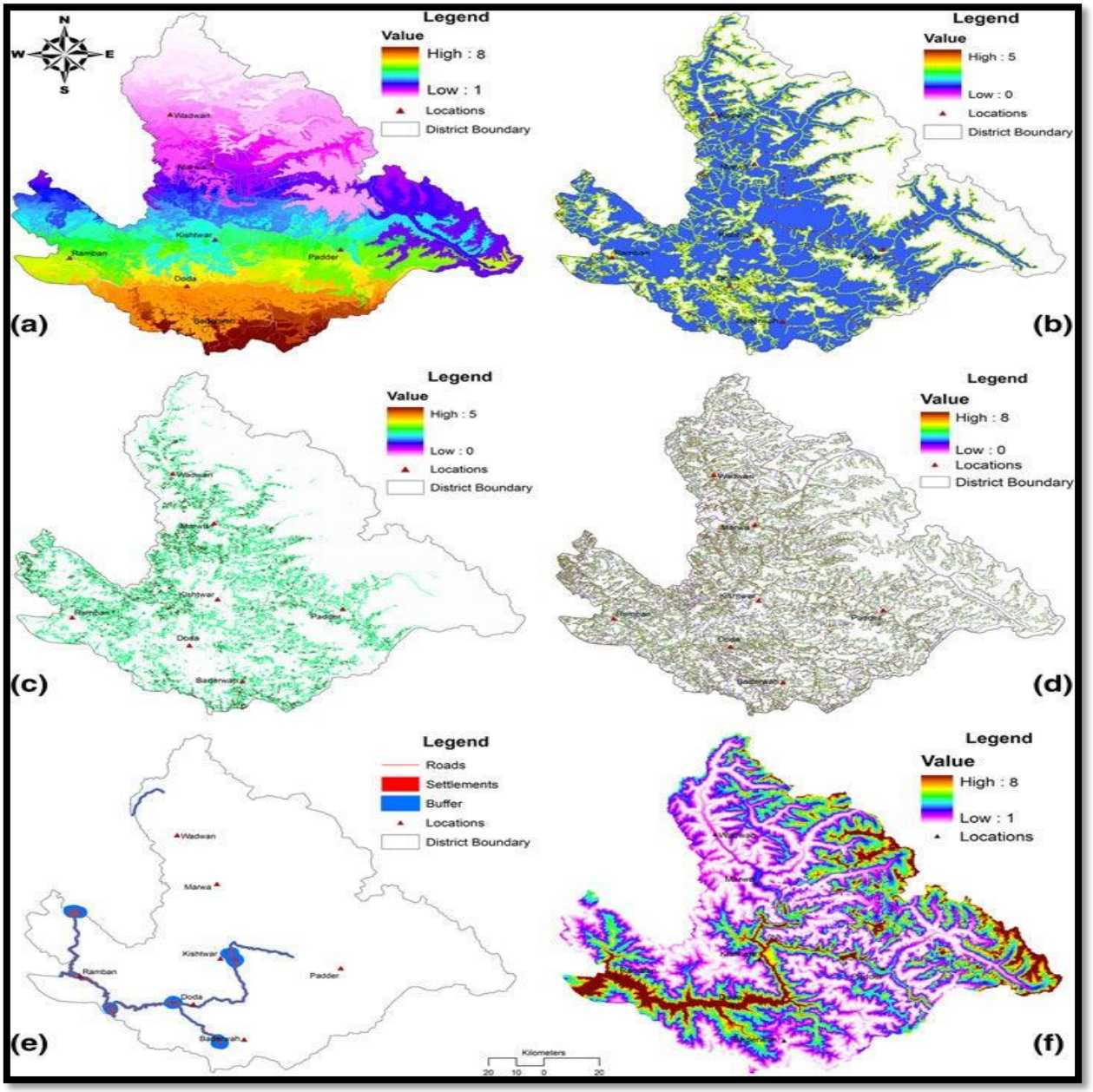
- Construction of deep drains, cut-off walls.
- Setting up of indigenous, alternative and innovative contour bunds and similar structures for diverse terrains.
- Construction of check dams, gully plugs, vegetative barriers, etc.
- Carryout drainage correction.

4.7 Hydro-Meteorological Hazards

Windstorm Windstorms can create significant structural damages to land and property in the Doda District of UT of Jammu and Kashmir. Structures need to be thus designed and built to withstand the projected wind speeds. Wind-resistant construction techniques include proper anchoring of walls to foundations, use of straps and clips to hold the roof of a structure to its walls. Other techniques include lateral roofing and wall bracing. Structural retrofitting of existing structures such as the anchoring of roof, windows and doors need to be given high priority. Windstorm shelters need to be constructed with hardened safe roofs. Retrofitting and anchoring of loose objects, water heaters, removing trees from immediate vicinity of buildings could be other mitigation strategies. Nevertheless, enhancing natural vegetation and setting up windbreaks across the wind paths could reduce the impacts as well.

Land Use Land Cover:




Legend
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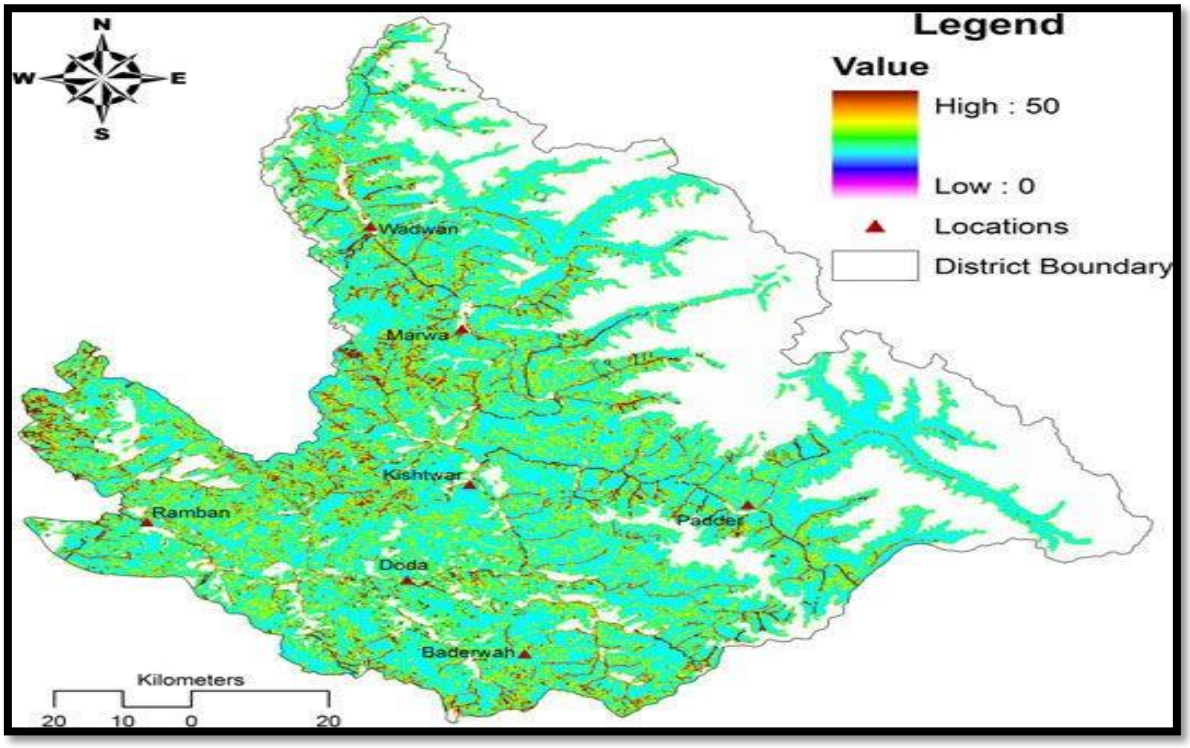


Disturbance index for Doda district

4.8 Air Quality

Project area is characterized mainly by rural/open Hilly areas and intermittently traversed by few settlements/built-up areas. Sources of air pollution in the project area are mainly vehicular emission, dust emanation due to use of unpaved shoulders/deteriorated roads by vehicles and domestic fuel burning. All such emissions will be very well dissipated. Reference made from previous studies in the project district, establishes that the ambient air quality levels with respect to particulate matter (PM), Sulphur die Oxide and nitrogen oxides (NOx) are within the National Ambient Air Quality Standards (NAAQS) as appended in **Appendix-2.** Monitored parameters of ambient air quality largely meet the prescribed limit **(Appendix 5)** of National Ambient Air Quality Standard (NAAQS) and Central Pollution Control Board (CPCB).

Table 15: Ambient Air Quality in the Project Area

WB EHS (in µg/m^3)	GOI NAAQS (in µg/m^3)	Remarks
✓	✓	All parameter is meeting WB interim Target/guideline and GOI limit.
✓	✓	

Source: Primary Monitoring

4.9 Noise Level

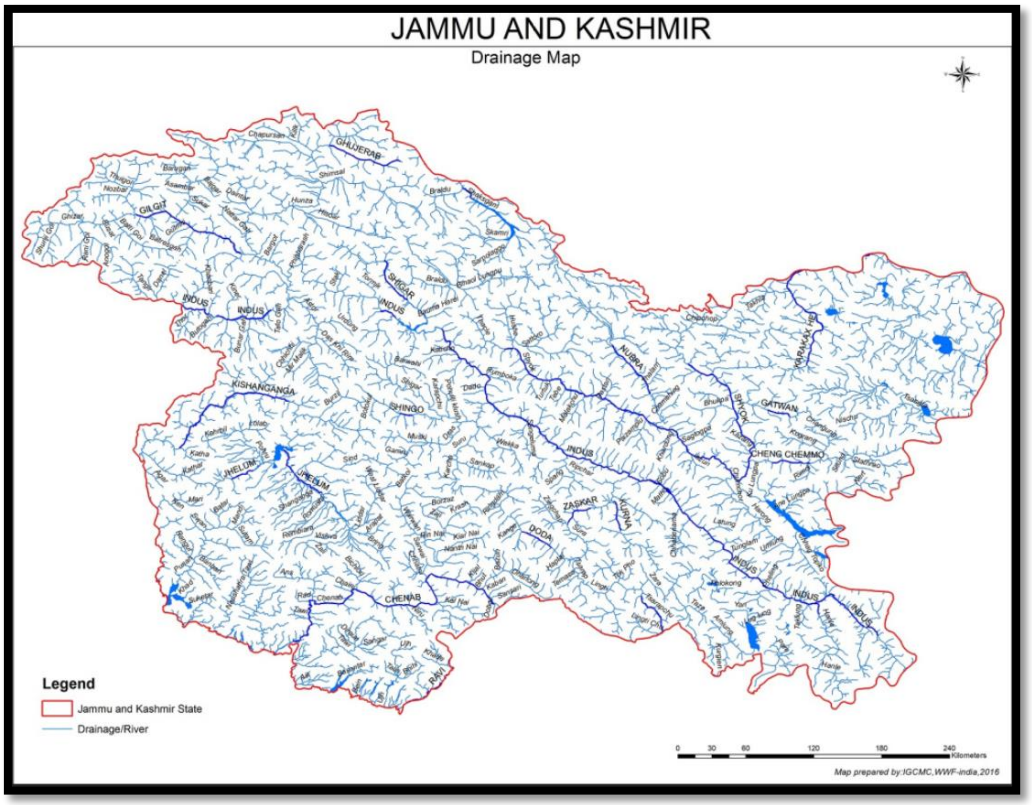
Traffic is the principal source of noise in the project area. The area mostly includes rural open areas with intermittent built-up locations. There is no continuous sound frequency of impulsive nature. Noise level during night is within limits **(Appendix 3)**. Daytime noise exceeds in some Nallah in Entire stretches due falling water. It is anticipated that noise level will decrease significantly after road expansion and improvement work enabling decongestion at existing built up areas. Noise level in the project area has been summarized in Table

Table 16: Noise Level in the Project Area

WB EHS				GOI /CPCB					
Resi/ Inst/ Educational		Ind/ Com		Resi		Com		Silence	
D	N	D	N	D	N	D	N	D	N
✓	✓	✓	✓	✓	✓	✓	✓	--	--

Source: Primary Monitoring

D: Day Time, N: Night time, Resi: Residential, Ind: Industrial, Commercial



Drainage Map of Jammu & Kashmir

Table- 2: Rivers Crossing the Project Roads

Road	Rivers/Stream Name
Goha Khellani Road and Tunnel	Seasonal Nallah

4.10 Surface Water Quality:

Surface water is used for drinking purpose in the project area. Main usage of surface water in the project area is for Domestic, outdoor bathing, irrigation activity in some water bodies. Therefore, surface water samples from Seasonal Nallah have been analyzed to confirm its suitability for different classes prescribed for freshwater classification by CPCB (Appendix 5). Analyzed samples confirm the prescribed limits.as summarized in Table 20. Results of sampling is given in Appendix 9.

Table 20: Surface Water Quality in the Project Area

Roads	GOI (CPCB)			
	Drinking Water Source without treatment	Outdoor Bathing	Fish and other aquatic Life Propagation	Irrigation
Goha-Khellani	X	✓	✓	✓

Source: Onsite samplings, BDL- below Detection Limit

4.11 Forest in the Project Districts

Forest area Identification chainage wise details in given below table of Batote Forest Range

4.12 Tree along the Project Corridors:

Table: Status of Tree Cutting and Forest Diversion proposals and Indicative Timeline

Road	Status	Action to be taken	Timeline
Goha - Khellani	Application for joint verification submitted to DFO Batote.	1. Joint Verification and correction if any 2. Forest Dept. to provide estimates for tree cutting/compensatory plantation 3. NHIDCL to deposit money in CAMPA Fund 4. Forest Department to issue permission	1. Feb-2020 2. March 2020 3. May 2020 4. June 2020

4.13 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 including sensitive receptors like schools and health centers. Complete List of sensitive receptors and community structures is attached as a supplementary Table to the EMP. Most of the religious structures are notional/symbolic as small shrines and hence not considered for solid noise barrier.

CHAPTER 5. IMPACT ASSESSMENT AND MITIGATION MEASURES

Road and Tunnel 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 and Tunnel 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: (i) reduction in travel time (ii) better mode and frequency of transport (iii) access to quality health care, educational and other infrastructural facilities (iv)improved quality of life of rural population (v) reduced accident events and (vi) 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 and Tunnel are: (i) economic displacement of sizeable number of households mainly Title/non-title holders including vulnerable populations impacting their livelihood, (ii) cutting of Tentative 2000 green and mature trees (iv) adverse impacts due to borrowing and quarrying, (v) 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 Impacts

5.3.1 Land and Assets

Extent of Total land acquisition is 26.1068 Hectare in which Forest Land 6.8322 Hectare, Muck Disposal area 5.796 Hectare, Private/State land is 7.3626 Hectare and for Link Road Pvt Land 6.116 Hectare is required for this project

5.3.2 Tree Cutting

Tree Cutting under scrutiny by UT of J&K Forest Department, Horticulture Department. However, the tree cutting will be restricted to toe line of the formation width. The mandatory compensatory plantation will be done on 1:3 basis by the Forestry Department. Additional plantation on 1:7 basis will be done as a strategy to minimize GHG emissions from increase in traffic due to road and Tunnel. 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.

5.4 Construction phase

5.4.1 Topography and Geology

Since project scope is limited to Construction and Widening 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 course and fine aggregates.
- The CSC will ensure that the quarries have environmental clearance from DEIAA, 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

5.4.2 Landslide Mitigation

Landslides are natural hazards occur naturally or which can be human induced. Earthquakes also trigger landslides. In the study area these need to be tackled on scientific way. The following preventive measures be adopted to check and mitigate those.

- Check and toe walls are recommended for reinforcing stability to steep slopes, which in turn safeguard the foundations of the engineering structures, in potential landslide and debris flow areas.
- The guide and sausage walls (wire crated masonry) are proposed to give structures a flexible characteristic so that these can adjust to any settlement at base.
- In the rolling terrain, the method of cut and fill is proposed so that the earth cut from the hill face is fully utilized on the valley side of the hill as natural ground slopes are gentle and the slope of the fill will be stable.
- Slope dressing of the formation cutting on the hill face is very essential to avoid any landslips during rains and choking of the side drain. Quantities should be based on the slope of the cut face. Back filling behind abutments/revetments and retaining walls will further impart strength.
- Catch water drains need to be provided on the outer periphery of the slide area to prevent water entering in the slide zone. Water from catch water drains should be taken down to the side drain and thereafter to the nearest cross drain. Catch water drains should be lined with dry stone. Where the grade of the catch drains is steep, small check walls in dry stone need to be provided to check erosion of sides and bed.

- Biological measures for the control of landslides can also be planned and implemented.
- A provision of requisite amount be incorporated in the DPR of the project for implementation of landslide measures.

5.4.3 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. Hot mix plant will be fitted with stack of adequate height as prescribed by SPCB 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/CSC prior to construction.
- Additional plantation proposed on 1: 7 bases will improve the micro-climate

5.4.4 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, Tunnel Boring Machine, Blasting 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. There is a number of noise sensitive receptors especially schools close to the alignment. 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

5.4.5 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/DEIAA 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.

5.4.6 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.

5.4.7 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/DEIAA 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 CSC.
- Opening of new quarries only after environmental clearness from SEIAA/DEIAA, NOC from SPCB and permission from state mines department.

5.4.8 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/ 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.

5.4.9 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/ Nala is not envisaged. Few Number of stream/nala 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/Nala 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.

5.4.10 Siltation and Deterioration in Surface Water Quality:

Construction activities may increase turbidity level increasing the sediment load. Sometimes contamination of surface water may take place due to accidental spills of construction materials, oil, grease, fuel, and paint. Degradation of water quality is also possible due to accidental discharges into watercourses from drainage of workers camps and from spillages from vehicle parking and/or fuel and lubricant storage areas. During construction phase, care would be exercised to control silt so that the water available in the Nala and Stream especially those located very near to the ROW may not be contaminated. Extraction of sand from the riverbed will increase turbidity and affect propagation of fishes and other aquatic life mainly benthic organisms. The macro-benthic life which remains attached to the riverbed material may get dislodged and carried away downstream by turbulent flow. Mining and dredging activities, poorly planned stockpiling and uncontrolled dumping of overburden, and chemical/fuel spills

from equipment's and machinery involved in dredging may cause deterioration of water quality for downstream users and poisoning of aquatic life. However, the riverbed sand quarries identified for the project have no density and diversity of benthic fauna. No fishing was observed or reported. This is mainly because all riverbeds are dry for most part of the year. Moreover, any extraction of river bed material is regulated by different authorities like State Environmental Impact Assessment Authority, State Pollution Control Board and State Mining Department with an objective of to conserve top soil, avoid impact on aquatic biodiversity, hydrological regime etc. by haphazard and unscientific mining of minor minerals. The project will utilize riverbed materials from existing licensed quarries with all stipulated conditions of above-mentioned authorities.

➢ **Mitigation Measures**

- Construction works near waterways/water bodies will not be undertaken during the monsoon season
- Retaining wall sand breast wall shave been proposed to prevent erosion
- Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies.
- No construction camp within 500m of any water body
- Locate all parking, repair and fuel and hazardous material storage area away from any water body. Vehicle parking and maintenance areas will have waterproof floors from which drainage is collected and treated to legal standards.
- Refuel vehicles only in dedicated areas with waterproof floors from which drainage flows to an oil/water separator before discharge
- Collect all waste oil, store in sealed damage-proof containers and dispose it to recyclers.
- All equipment operators, drivers, and warehouse personnel will be trained in immediate response for spill containment and eventual cleanup.
- temporary retention ponds, interception drains, and silt traps are installed to prevent silt laden water from entering adjacent water bodies/waterways.

- The slopes of embankments leading to water bodies should be modified and recanalized to prevent entry of contaminants.
- Comply with requirements of the clearance issued by the relevant state authority for mining in rivers

5.4.11 Hydrology and Drainage:

Some number of river/streams/nallahs drains the project area. Although most of them are seasonal in nature water logging/flood situation may arise due to construction of road embankment which may act as impediment to flow of water to its outfall in absence of adequate cross drainage/side drain. Water logging along the road will also have ill effects on the stability of embankment especially in the area of shallow water table. Diversion of water channels during construction of cross drainage structures or otherwise is not envisaged. Substructure construction should be limited to the dry season and cofferdams may be constructed and utilized to lift the spoil directly out of it and carried to the riverbank for land disposal.

➢ **Mitigation Measures**

- Adequate cross drainage structures have been provided to avoid impediment to natural flow of water. Additional balancing culverts have been provided. The embankment height has been designed in consistent with the existing topography of the region.
- Effective drainage system will be provided to drain the storm water from the roadway and embankment and to ensure minimum disturbance to natural drainage of surface and subsurface water of the area.
- The design of drainage system such as surface and sub-surface drainage will be carried out as per IRC: SP: 42 and IRC: SP: 50. Surface runoff from the main highway, embankment slopes and the service roads will be discharged through longitudinal drains, designed for adequate cross section, bed slopes, invert levels and the outfalls. If necessary, the walls of the drains will be designed to retain the adjoining earth.
- The design discharge will be evaluated for flood of 50-year return period for calculation of waterway and design of foundations. Proposed water way will not

be reduced from existing one.

5.4.12 Soil and Water Conservation

- **Soil bioengineering activities**

Soil bioengineering is state-of-the-art using the living vegetation, either alone or in conjunction with non-living plant material and civil engineering structures, to stabilize slopes and/or reduce erosion. Such measures utilize live plants and plant parts, either alone or in conduction with non-living plant material and hand measures usually referred to as civil engineering structures, where they provide additional mechanical support to soil, present barriers to earth movement, function as hydraulic drains, and act as hydraulic pumps. Soil bio-engineering system use live plant cuttings, rooted plants, and plant stems that are placed in the ground, or in earthen or other structures that commonly incorporate inert materials such as rock, wood, geo-synthetics, geo-composites or other products.

Control of severe landslide or gully erosion usually requires engineering structures to avoid slope failure and gully cutting. However, such measures involve exorbitant investment and a high degree of technology. It has been experienced that lack of timely and adequate maintenance has resulted in spectacular failure of measure undertaken and the resultant erosion is more serious than before the treatment. The exclusive use of vegetative measures for control of major land slide and severe gully erosion often results in failure. However, when vegetative measures are combined with engineering measures, i.e. bio-engineering, the end result can be effective stabilization of the area from mass movement and gully cutting, and dramatic reduction of surface erosion, at relatively low cost and high sustainability and with added benefit of fodder and fuel wood production for local people. The successful results of bio-engineering techniques have been observed in gully control, waste land reclamation and slope stabilization. By for these have been observed to be economically desirable and most effective for erosion control in degraded area. Soil bio-engineering measures shall be adopted in landslide zones and area degraded due to road excavation. The work shall involve fixing of brush wood check dams, spraying of grass and legume seeds, plantation of trees @ 1100 trees/ha, fencing of the area and maintenance for three years. The most common method of hill and slope stabilization is the seeding of grass and herb mixture

Dry Seeding is an easy method where seed (5 g/m2) and organic fertilize (100 g/m2) are scattered by hand or machine. It can be applied on flat slopes with rough surfaces. It is also possible to use hay-flowers instead of common seeds.

On steeper slopes where it is necessary to cover the soil quality, a cover crop seeding is used. Special types of rye (in fall) and barley (in spring) are spread in a mixture of 5 gm/m2 and covered with soil. On the surface normal seed (5 g/m2) are spread. On less steep slope with rough surface and no erosion problems tree and shrub seeding can be spread. Seeds of trees and shrubs are mixed with sand in a ratio of 1:3 and spread as broadcast, pit oar row seeding

Impact due to Construction Debris/Waste:

Muck and Debris can be generated by Excavation of Road Tunnel, dismantling of pavement, Quarry dust and unused iron bars or damaged support structures constitute significant wastes. Mitigation for solid waste from construction camp has been given in construction camp section.

- **Mitigation Measures**

  - The existing bitumen surface can be utilized for paving of crossroads, access roads, and paving works in construction sites and camps, temporary traffic diversions, haulage routes etc.
  - All excavated materials from Road Tunnel and roadway, shoulders, verges, drains, cross drainage and the like will be the property of the EA and will be used for backfilling embankments, filling pits, and landscaping.
  - Unusable debris material should be suitably disposed at pre-designated disposal locations to the satisfaction of CSC. The bituminous wastes will be disposed in secure landfill sites only in environmentally accepted manner.
  - Unusable and surplus materials, as determined by the Project Engineer, will be removed and disposed off-site.
  - Following consideration will be made during selection of dumping sites.
  - 1.5 km from habitation and forest area sand 500 m from Nallah/Stream.
  - Dumping sites do not contaminate any water sources, rivers etc., and

- Consent from the village council has to be obtained before finalizing the location.
- Form works will be re-used to the extent possible. All stripped formworks will be examined for any damage and rectified in the workshop for re-use.

5.4.13 Ecological Resources:

Terrestrial

There are no national parks, wildlife sanctuaries or any other similar eco- sensitive areas in the project area. Project road passes through some forest patches. The cutting of trees will impact the local environment but will be compensated through panting of large number of trees along the road that will improve the local climate in long term. No loss of any rare/endangered species is envisaged. Risk of forest fire cannot be ruled out due to uncontrolled burning of grasses/shrubs for clearance of ROW, fuel accumulation due to accidental spillage.

➢ **Mitigation Measures**

- Requisite permission from Forest Department will be secured for cutting of roadside trees.
- Mandatory compensatory plantation will be done by forest department after depositing requisite money by NHIDCL to the Compensatory Afforestation Fund Management Authority (CAMPA).
- Additional compensatory afforestation on 1:7 basis will be carried out the mode of implementation already discussed above in the chapter
- For safe traffic operation, vertical clearance between the crown of the carriageway and lowest part of overhang of the tree available across the roadway will conform to IRC: SP: 21-2009. The pit size, fencing, watering, and manuring requirements will also conform to the above standard. Use of pesticides will be restricted.
- Immediate removal of fuel accumulations near forest areas.
- Clearance of vegetation will not be done by burning along forested/vegetated areas.
- Planting and management of fire-resistant species adjacent to and within ROW.

- Provision of fire lines to avoid further spread over of fire.

Establishment of invasive species

Soil brought into the project area from outside may contain seeds of alien invasive species. Also, the construction machinery and vehicles can accidentally introduce seeds of such plants if used without proper cleaning. Temporary facilities such as labor camps, dumping sites, soil storage sites are potential locations where invasive plant species can get established in quick succession. This will negatively affect both the natural and manmade habitats. Securing soil from locations close to the project area will reduce the chances of transporting any seeds of alien invasive species to the project area. Land area of labor camps, dumping sites and soil storage sites should be frequently checked for any growth of invasive plant species. If found, they should be burned and destroyed within the premises which they were found.

Aquatic Ecology:

Temporary sedimentation and water quality deterioration is expected during the construction stage. Increase in turbidity due to erosion will lead to reduction of light penetration and make it an undesirable place for aquatic fauna and flora. Further due to the reduced light penetration to the water body, the primary productivity of the biota in the water body will be reduced resulting in increased mortality. In addition, when these particles settle on the bottom it will affect the breeding ground of aquatic animals. Improvement of existing embankments particularly along the waterways may increase silt while accidental spill of materials, chemicals, and fuels will deteriorate receiving water quality. The impact is insignificant since most of the waterways are non-perennial and construction of bridges will be mostly during summer. Siltation will be avoided by measures suggested above in impact on surface water resource section.

Impacts due to Construction Camp and Immigration of Workers

Poor sitting and improper management of construction camp may lead to several adverse impacts on environment like: (i) loss of vegetation due to use of wood as fuel source for cooking, (ii) deterioration in nearby surface water bodies' quality, (iii) compaction and contamination of soil due to uncontrolled disposal of solid waste, and (iv) poor sanitation may result to transmission of communicable diseases among the

workers and the host communities. This include the possible spread of sexually transmitted disease, diseases from improper handling and supply of foodstuffs, poor water supply, insect-borne diseases, and alcoholic and drug.

- **Mitigation Measures**

  - No productive land will be utilized for camp. All sites must be graded and rendered free from depressions to avoid water stagnation. Accommodation and ancillary facilities will be erected and maintained to standards and scales approved by the resident engineer. All camps will be sited at 500 m from habitation and water bodies.
  - All construction camps will be provided sanitary toilet with provision of septic tanks attached with soak pits. Storm water drains will be provided for the flow of used water outside the camp. Drains and ditches will be treated with bleaching powder on a regular basis. Garbage bins must be provided in the camp and regularly emptied and disposed in a hygienic manner. LPG cylinders will be provided as fuel source for cooking to avoid any tree cutting.
  - At every workplace, the Contractor will ensure that a readily available first-aid unit. Workplaces away from regular hospitals will have indoor health units. Suitable transport will be provided to approach the nearest hospital. At every workplace, an ambulance containing the prescribed equipment and nursing staff will be provided.
  - The Contractor will ensure the good health and hygiene of all workers to prevent sickness and epidemics. These include the HIV/AIDS prevention program to reduce the risk and transfer of HIV virus. Activities under the program include monthly information, education, and communication campaigns to workers, drivers, delivery crew, and communities on the risk.
  - The Contractor will provide adequate and safe water supply for workers. No alcoholic liquor or prohibited drugs will be imported to, sell, give, and barter to the workers of host community.
  - Migrant workers may be the potential carriers of various diseases. Regular health check-up and immunization camps will also be organized for the workers and

nearby population.

5.4.14 Safety of Construction Workers and Accident Risk to Local Community

The following safety aspects will be observed:

- safety of construction workers,
- safety of road users including pedestrians,
- safety to cattle,
- safety of local community,
- unsafe/ hazardous traffic conditions due to construction vehicle movement need to be considered during design and construction stage, and
- Conduct of safety audit. Impact and mitigations due to blasting operation as already been detailed in Noise and Vibration section.

➢ **Mitigation Measures**

- During the construction phase, contractors will be required to adopt and maintain safe working practices. Internationally accepted and widely used safety procedures should be followed during: (i) road and Tunnel works (ii) handling of large construction equipment and machineries, (iii) handling of chemicals and hazardous materials and inflammable substances, (iii) welding, and (iv) Electrical works etc.
- Contractor will arrange all PPEs for workers, first aid and firefighting equipment at construction sites. An emergency plan will be prepared duly approved by engineer in charge to respond to any instance of safety hazard.
- To avoid disruption of the existing traffic due to construction activities, comprehensive traffic management plan will be drawn up by the concessionaire. Traffic in construction zones will be managed as per the provisions of IRC SP 55.
- After construction is completed in a particular zone, it will be opened for normal operation. All diversions should be closed before start of normal operation.
- Use of retro-reflectorized traffic signs, and cantilever/gantry type's overhead

signs, thermoplastic road marking paints, delineators, traffic cones, empty bitumen drums, barricades, and flagmen will be used to ensure traffic management and safety. Conduct of regular safety audit on safety measures adopted during construction.

5.4.15 Obstruction and Disruption of Traffic

Disruption of access to infrastructure or social resource due to construction activity will cause nuisance and to a certain extent additional cost to the public in terms of longer travel period due to diversion or heavier traffic. It will also pose risk of accident to motorist at night if these blockages and disruption are not clearly demarcated.

- **Mitigation Measures**

  - The contractor will submit a traffic plan to the Project Engineer before the construction. This Plan will recommend for approval, the safe and convenient temporary diversion of traffic during construction, design of barricades, delineators, signs, markings, lights, and flagmen, among others.
  - For widening of existing carriageway and part of it will be used for passage of traffic, paved shoulder will be provided on one side of the existing road by the contractor
  - At least one 3.5 m lane to remain to traffic at all times.
  - The surface used by the through traffic will be firm bitumen all times surface free of defect
  - The maximum continuous length over which construction under traffic may take place is limited to 750 meters.
  - Construction activity will be restricted to only one side of the existing road.
  - On stretches where it is not possible to pass the traffic on the part width of existing carriageway, temporary paved diversions will be constructed.

Transportation of quarry material to the construction sites through heavy vehicles will be done through existing major roads to the extent possible. This will restrict wear and tear to the village/minor roads. Small vehicles/un-motorized vehicle can also be used for its further transportation to the construction sites from temporary storage areas.

5.4.16 Transports and Storage of Materials

The construction material primarily will consist of aggregate, sand, cement, bitumen, and lubricating oil and fuel for vehicle and construction equipment. These will be primarily stored temporarily at construction camps. The oils, fuels and chemicals will be stored on concreted platform with spills collection pits. The cement will be stored under cover. All these temporary storage areas will be located at least 150 M away from the habitat. The likely impacts due to transportation and storage including fugitive emission have already been covered under different sections above.

5.4.17 Chance find of Cultural or Archaeological significance

During construction activities sites, structures or artifacts of archaeological, cultural or religious importance may be found. In such instances all construction work must immediately be stopped in the respective construction area and the contractor and CSC environmental specialist must immediately inform the PIU. The PIU will then coordinate with the concerned local agency on procedures for recovering the artifacts or restoring and maintaining the site.

Operational Phase

Road aesthetics will be improved after tree plantation, landscaping of embankment slopes, improving the road cross sections providing more bus bays, side drains installation of safety signages, crash barriers, and road markings. The aesthetics will further be improved due to the enhancements/creation of new ponds as a rehabilitation measures for borrow areas. However, due to lack of proper maintenance may deteriorate the road condition over the years resulting into numerous problems such as rise in accidents, disruption of transportation services, tree survival, and functioning of side drains. NHIDCL will allocate adequate resources to ensure that the road and its furniture is being maintained and intended benefits are generated thereof.

5.4.18 Soil Erosion and its Cumulative Impacts:

The consequences of soil erosions are far wider than repair and maintenance of the road. Along the project road, the inflow of water into ponds during rains causes erosion of the embankment besides seepage of water into embankment and sub-grade resulting in softening of the sub grade. This may also increase siltation in water bodies. Project

design includes provisions of retaining walls for the protection. Regular checks will be made to check its effectiveness.

5.4.19 Impacts on water resources

Improvements to the road drainage will result in improved storm water flows and reduce the tendency of blockages to occur in roadside drains. Risks to the public health caused by such stagnant water bodies by acting as disease vector breeding places will be reduced. By designing the drains to withstand appropriate storm events and regular maintenance will further reduce the chances of drainage system failure. Accidental oil spillage, washing of vehicles, used engine oils, paints used in maintenance can contaminate the water bodies. Proper handling of such chemicals under strict supervision will help to minimize the water pollution during the maintenance period. Rejuvenation of the drainage system by removing encroachments/ congestions will be regularly conducted

5.4.20 Pedestrian and commuter safety

Improvements to the road surface will be conducive to safe vehicle travel at higher speeds. Such speeds may increase the incidences of accidents. Incorporating the following measures could offset this negative impact.

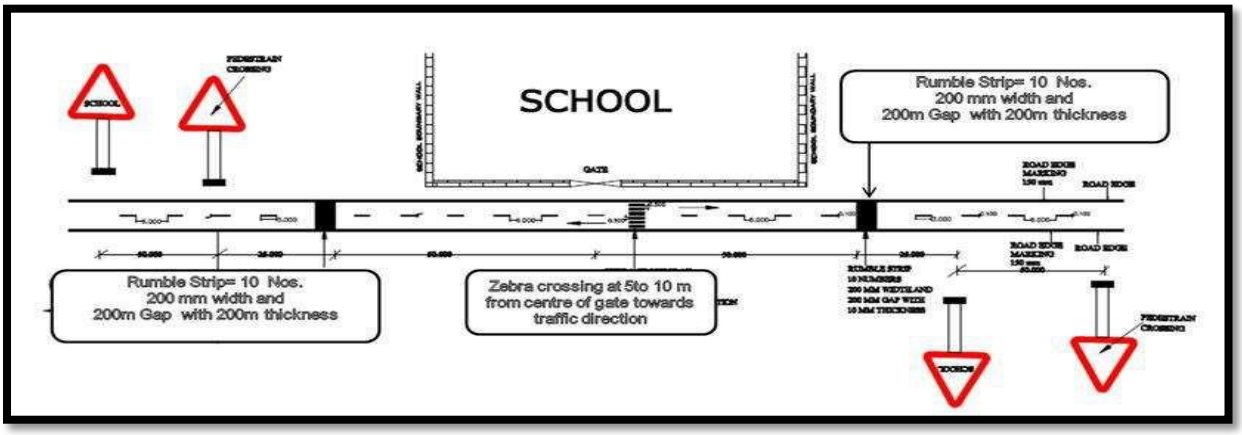
- Mandatory provision of centerline road marking, edge delineation in design
- Provision of sign boards near built-up areas, sensitive locations
- Enforcement of speed limits by reminding driver through sign boards and installing rumble strips.
- Safety of road users could be ensured during Construction and Widening of carriageway and CD structures by placing sign boards and barricading of the Construction sites

5.4.21 Specific Measures for Safety at Schools

With intent to provide easier accessibility to education and health services, most of the schools and primary health centers were constructed close to roads. In absence of any safety measures, incidences of futile accidents at these locations are increasing. `UT of Jammu and Kashmir in its special drive for road safety have launched various programs.

Most importantly is the decision to install road safety measures at all schools and other institutions in phased manner. Govt is making budgetary provisions for the same. Typical design for safety measures comprising, rumble strip, signage, zebra crossings etc. have been worked out and under approval process.

Typical Design for Safety Installations at Schools



5.4.22 Air Quality Predictions during Operation Phase

Air emissions due to vehicular movement are one of the prime sources of air pollution in the study area. The project roads are currently having two lanes. The New/widening and upgradation of the road will result into ease of traffic movement and reduction of traffic congestion, to assess the impact of current traffic volume on the surrounding areas as well as for prediction of impact on air quality due to future projected growth of traffic volume with road improvement this air quality dispersion modelling study has been performed. Quantitative assessment for predicted level of pollutants concentration has been done using AERMOD, a recommended model by USEPA for prediction of air quality from point, area and line sources. It is based on Gaussian dispersion which incorporates the Mooning Bouchon boundary layer dispersion parameters for estimating horizontal cross wind and vertical dispersion. In ISC-AERMOD View software, the line sources are characterized as volume sources. After drawing the road alignment and putting the information related to carriageway width, vertical dimension, source elevation, base elevation and release height, the model converts the road alignment to the number of volume sources. The model, then simulates the effect of emissions from continuous/variable volume sources on neighborhood air quality and identified discrete receptors. The model is an hour-by-hour steady state Gaussian model

which considers special features like Terrain adjustments, Gradual plume rise, Buoyancy-induced dispersion, Complex terrain treatment, etc. The total road alignment has been taken into consideration for the prediction of vehicular exhaust emission. Major criteria pollutants generated due to vehicular exhaust are oxides of nitrogen (NOx), carbon monoxide (CO), fine particulate PM2.5 and Sulphur dioxide (SO2). Hence these four pollutants are taken into consideration in this study. Various input parameters for the prediction of pollutant concentrations have been considered as given below:

1. Traffic Density

A detailed study of the traffic density along the project roads was conducted as part of the detailed project designing. In order to consider worst case, minimum traffic of homogenous sections of the project roads were considered. Summary of traffic projection in terms of vehicles per day and PCUs at Proposed Project taking into consideration the optimistic scenario has been presented in project description chapter. The projected traffic density clearly indicates that the project roads will not be having sufficient capacity within 24 years of operations due to the road widening and upgradation, which is primarily due to large percentage of non-motorized vehicles movement in the project roads. Based on the assessment of current traffic speed and projected traffic speed due to road improvement, it is assumed that weighted average for cars in the base case will be 30 km/hr., whereas in post-project case it will be 50 km/hr. throughout the project design life of 20 years.

2. Emission Rate

To assess the contribution of the vehicle's emission, which will play on the project road sections, the emission factors for NOx and CO were generated by using MOBILE 6 Vehicle Emission Modelling Software, which takes into consideration the road type, surface, average speed as well as improvement in fuel efficiency over a period of time into consideration for generation of emission factors. The tail pipe emissions of PM2.5 were taken from the study carried out by the Automotive Research Association of India (ARAI) for different vehicle types. No dust emission due to resuspension of road dust during vehicle movement and wind have been considered in this modelling study. SO2 emissions rate has been calculated based on the Sulphur content of fuel (250 ppm) and

fuel economy (mileage) of the passenger cars. The emission factors are based on speed. It is to be noted that the after road widening and strengthening, the ruling design speed is considered to be 50 km/hr. However, considering that the road is passes through various small towns and villages and also to be used by non-motorized/ slow moving traffic, as a conservative approach average speed is considered to be about 45 km/hr. The emission factors used for criteria pollutants are presented below in Table.

Emission Factors for Criteria Pollutants

Pollutant	Year 2024		Year 2032		Year 2041	
	Avg. Speed (miles/hr.)	Emission Rate (g/mile)	Avg. Speed (miles/hr.)	Emission Rate (g/mile)	Avg. Speed (miles/hr.)	Emission Rate (g/mile)
NOx	40	0.45	40	0.35	40	0.3
CO	40	10.69	40	10.43	40	10.43
PM2.5	40	0.18	40	0.18	40	0.18
SO2	40	0.22	40	0.22	40	0.22

This modeling study does not take into consideration particulate matter generation because of resuspension of road dust, which may occur due to movement of vehicles on the road as well as wind conditions.

3. Predicted Ground Level Concentrations

The prediction of maximum ground level concentration on road section has been carried out. The prediction for CO was conducted for 8-hourly concentrations, whereas for NOx, PM2.5 and SO2were conducted for 24 hourly concentrations. Predicted concentrations of each homogenous road section for Year 2020 (base case) and for Year 2024, 2032 and 2041. The predicted concentrations at identified receptors.

4. Prediction results:

Analysis of modelling results ascertains that the predicted level of concentrations due to emissions from vehicle exhaust for all the four parameters along all the project roads will be well within the permissible limit for entire project horizon for SO2.

5. Conclusions:

In the existing scenario, due to lesser width and higher roughness, the average vehicle speed is low, which results in more exhaust gas emissions. In the post-project scenario, Hill road conditions, Land Sliding Zone and congestion free traffic movement will reduce

emissions. Furthermore, higher growth of traffic and better road conditions with improved average speed, will have significant increase in concentration of the criteria pollutants. This will result into exceedances during the later phase of the project life and would require further upgradation of the roads.

5.4.23 Noise Impacts during Operation Phase

During the operational phase, movement of traffic, traffic congestion, pedestrian interferences and increased use of horns due to interface between local/slow moving traffic with through traffic will be the prime source of noise. The noise levels at nearby schools, religious place may cause nuisance and irritation.

I. Prediction of Noise Level

Noise modelling has been carried out for the all Projects by using noise prediction tool (Sound PLAN). The noise prediction standards of Traffic Noise Model – FHWA; 1998 (TNM) was applied to predict the noise generation due to the traffic movement as well as its propagation in the surrounding environment. The road noise module is splatted into 5 separate road-sections; first the emissions of the line source are evaluated and assigned to the road source objects in the Geo-Database. In a second step, noise levels are calculated for standalone receivers or as part of the Grid Noise Map. Sound PLAN has implemented the TNM 2.5 rules and regulations of the FHWA standards. Assumptions considered in the modelling study include:

- Height of sources is 0.5 m above the carriageway.
- Model does not take into account background noise such as noise generated due to anthropogenic activities, industrial activities, movement/ operation of other noise generating sources, such as trains, aero planes, etc.
- Model does consider the ground level absorption of the noise, however, due to very limited specific information with respect to absorbing media all along the project road (e.g. walls, solid barriers, dense vegetation, etc.), same was not considered in this study. This also helps in considering the worst-case scenario for the modelling study.
- Average meteorological conditions had been taken into consideration.
- During the pre-project scenario (Year 2018), average speed was considered as

25kmph and 40 kmph for buses and heavy vehicles during day and nighttime, respectively considering use of roads by non-motorized vehicles as well. Furthermore, for other vehicle categories same is considered as 40 kmph during daytime and 60 kmph during nighttime. Though the design speed of the project road is 100 kmph, however as a conservative approach, post project speed for heavy vehicles is considered as 40 kmph during daytime and 60 kmph during night time, whereas for other vehicles same is considered as 60 kmph and 80 kmph, respectively.

- Traffic forecast data provided in the DPR has been used to generate different scenarios of noise propagation during the project lifecycle.
- Considering the minor change in topography, terrain effect has also been considered.

II. Conclusions:

It is evident from the above tables that there will be significant increase in the noise levels due to increase in traffic intensity as well as average speed of vehicles over the road's design life. However, with appropriate mitigation measures such as lowering of speed from 80km/hour to 30km/hour in residential and commercial areas which has already been included in the project design, the natural barrier effect from the wall of houses, and the provision for noise barriers near sensitive receptors the noise levels will be kept even below the baseline levels.

5.4.24 Ecological Impacts

1. **Flora:** Provision of extensities avenue plantation (1:7 on top of 1: 3 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, incidences of Land Sliding, 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,

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.

5.4.25 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.
- Minimum10-15% of total plot area shall be under landscape, which will help to

contain the emission within permissible norms.

5.4.26 Water Environment

1. **Construction Phase**: The source of water pollution during construction phase will 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 judicial 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 sausage, 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 wastewater generation from project activities, rainwater, sludge generated from wastewater 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.

5.4.27 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.

5.4.28 Sanitation and solid waste management plan

1. Introduction

During the construction phase of the project, there will be an influx of technical staff, laborers and other service providers into the project area. The proposed project has also envisaged one colony to house project employees including personnel for other utility services with their families. Sewage and solid waste will be generated from the colonies. It is very essential that from the planning stage, sewerage management and solid waste disposal facilities should be conceptualized to maintain the health of the people and the environment. The main sources of wastes in case of the proposed project can be divided into following categories:

- Municipal waste from residential areas
- Solid wastes from labour camps
- Bio-medical wastes from Dispensary

Since most of the dam operations shall be automated or mechanized, very few people shall be staying in the project during the operation phase. The solid waste is primary problem during the construction phase of the project. Solid waste generated from temporary and permanent colonies in construction as well as operation phase requires special management to dispose of as warranted under the Municipal Solid Wastes (Management and Handling) Rules, 2000.

2. Municipal Solid Waste

The project authority shall, within the territorial area of the project complex/ colony, be responsible for the implementation of the provisions of Municipal Solid Wastes (Management and Handling) Rules, 2000 issued by MOEFCC vide so 908 (E) dated 25, September 2000, and for any infrastructure development for collection, storage, segregation, transportation, processing and disposal of municipal solid wastes.

3. Municipal waste from residential areas

The permanent and temporary project colonies for staff shall be created at Goha Village and other suitable location. The Colonies will have family accommodation Bachelor

Accommodation beside accommodations for floating population. The total expected population in the project colony will be 350 people. In the colony, use of plastic bags be discouraged and use of biodegradable cotton and jute bags be encouraged. The average solid waste generated in the colony has been assumed to be approx. 0.75 kg [dry weight]/ per person/day. Thus, the solid waste generated by 350 persons in the project colony on average daily, weekly, monthly and annual basis is given in the Table-. All households need to be instructed to sort their wastes and store the food, biodegradable and non-biodegradable wastes viz. bottles, cans etc in separate containers. Two numbers of doorstep waste collectors per house will be arranged and given to each family. A handcart shall be deployed to collect the wastes from the doorsteps daily.

Table Solid Waste Generated from Project Colony (kg dry weight)

Garbage Generation	Per Day (kg)	Per Week (kg)	Per Month (kg)	Per Year (kg)
Per Person	0.75	5.25	22.5	270
By 350 persons	262.5	1837.5	7875	94500

4. Solid waste from labour colony

The executing agency shall ensure employment to Bonafede Kashmiri in all the unskilled /skilled and other non-executive categories of staff with the contractors and sub-contractors as may be required for implementation of the project. If it is not possible to recruit 100% staff from local populace for justifiable reasons, then not less than 50% of the total employees from bona fide resident shall be affected. About 1050 workers (labour and staff) would be engaged temporarily during peak construction period and on an average 700 workers shall be deployed. It is expected that 70% of the total work force shall be locally available from adjacent areas and thus labour colony shall be designed to house 350 workforces. It is proposed to provide family residences to 10 workers while the balance shall remain in bachelor accommodation. Around 10 labors are expected to reside in the labour colonies with their families and 15 numbers in bachelor accommodation at any given time. Proper care must be taken to manage the solid waste generated from the labour colony for a population of 385 residential persons and 20 floating population i.e. for 405 persons.

It is estimated that total solid waste generation per day by labour population residing in

the labour colony would be approximately 262.5 kg dry weight. This would be to 7875 kg dry weight, and 94500 kg dry weight per month and per annum, respectively. For maintaining the cleanliness of the labor colony and to restrict from disposing the solid waste into the river, this solid waste management plan has been formulated. No dumping of solid waste should be allowed near any water body or nalla. For solid waste collection 10 iron storage vats, each of 5 cum capacity, will be located at convenient dumping locations in the colonies. Each vat will have the capacity of holding 500 kg dry weight of garbage, which will be emptied at regular time intervals and the biodegradable waste will be transported to the municipal corporation sites. Use of plastic bags need to be totally banned in the labour colony. Periodical awareness should also be provided in order to avoid use of plastic bags.

5. 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.

6. 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.

7. 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.

8. 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.

9. 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.

10. 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 17500 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 enough 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

5.4.29 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.

5.4.30 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.

5.4.31 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.

5.4.32 Energy Alternative

Some village or population settlement shall directly come under impact zone of the proposed project. Mostly the people living at lower and Higher altitudes of the project area are not poor and their livelihood is tied to the agriculture sector; and some are related to the underdeveloped farm sector and its allied activities and while some are associated with pastoral activities. There is a presence of other sector of economy that is tourism.

In the higher areas of the proposed project people are mainly dependent on the fuel wood collected mainly from the forest areas for domestic cooking and heating. The people are unable to use the modern alternative sources of energy like electricity, LPG and Solar energy. A strong labour-force (technical as well as non-technical) will be needed for a considerable period of time for the construction of the project. This will have further pressure on the forest resources of the region.

In order to meet energy requirements of the labour force working in the project during the construction process it is proposed that alternative means of energy be made available to the work force to save the forest from their brunt. The labour force involved in the construction work need to be encouraged to use kerosene and LPG so that illegal cutting of bushes and forest trees is avoided during the construction period. This will greatly help in reducing the pressure on the forest areas and thereby in protecting the natural habitat

5.4.33 Risk & Hazard

- Construction workers are exposed to a wide variety of health hazards on the job. Exposure differs from trade to trade, from job to job, by the day, even by the hour. Exposure to any one hazard is typically intermittent and of short duration but is likely

to reoccur.

The construction practices that shall be followed are given under:

- Information about chemical, physical and other health hazards shall be available at the work site in the languages that workers use.
- Contracts between contractors and subcontractors shall include safety features.
- Provisions could include establishing a unified safety organization at multi- employer work sites, performance requirements and rewards and penalties.
- Accidents and injuries shall be investigated and recorded. The purpose of reports is to identify causes that could have been controlled so that, in the future, similar occurrences can be prevented.
- Workers and supervisors shall receive training and education in safety. This education consists of teaching general principles of safety and health, is integrated into task training, is specific for each work site and covers procedures to follow in the event of an accident or injury.

5.4.34 Lighting Protection

- The structures shall be protected against lightning in accordance with the requirement of IS 2309: 1989 with latest amendments.
- The risk factor requires provision of lightning protection and in addition considered necessary for the safety of tall buildings and human life.
- The lightning protection system shall comprise of a grid of horizontal air terminations and vertical finials provided at the terrace of each high-rise tower at the highest point and that of the low-rise buildings which are not within the protective angles of the high rise terminations.
- The horizontal & vertical air terminations shall be connected through a series of down earth conductors running along the sides of the building with earth tapes to the Pipe type earth electrodes / earth stations.
- Earth test points shall be provided.
- The lightning protection system shall be based on use of hot dip galvanized iron

- i.e. GI strip conductors and GI earth stations. OR
- Alternatively, controlled steamer emission system along with chemical earth pits may be employed, if client prefers so, but this system of lightning protection shall not be as per IS codes.
- All towers shall be protected from lightning by providing Controlled streamer emission (CSE) lightning arrestors installed at the highest point at the terrace level duly connected to GI tape/cable as per system design criteria.

5.4.35 Electric Hazard

- Proper selection of equipment's.
- There shall be provision of an accessible and clearly identified switch near each fixed machine to cut off power in an emergency.
- For portable equipment, there shall be use of socket-outlets which are close by so that equipment will be easily disconnected in an emergency.
- The ends of flexible cables shall always have the outer sheath of the cable firmly clamped to stop the wires (particularly the earth) pulling out of the terminals.
- Damaged sections of cable shall be replaced completely.
- There shall be use of proper connectors or cable couplers to join lengths of cable
- There shall be proper protection of light bulbs and other equipment which could easily be damaged in use. And creates risk of electric shock if they are broken.

Electrical equipment used in flammable/explosive atmospheres shall be designed.

CHAPTER 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 with regard to all aspects of the environment which may have direct or indirect impact on local people. Summarizes the details of consultation with local people.

Photographs






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 and Tunnel 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.

- Adequate compensation and rehabilitation assistance to affected households
- 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 and sensitive receptors
- Lighting in built-up areas and sensitive receptors
- Measures to minimize air and noise pollution
- Bus Shelters
- Parking areas in markets and truck lay-byes near industries.

CHAPTER 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 UT 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 on the basis of 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 PM2.5, PM10, CO, NOx and SO2 at selected location.
- Water quality with reference to DO, BOD, Oil and grease, COD, Suspended Solids and Turbidity, Alkalinity streams/Nala and water bodies at selected points.
- Noise levels at sensitive receptors (schools, hospitals, community/religious places).
- Survival rates of trees planted as compensatory plantation and additional plantations 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 PM2.5, PM10, Carbon Monoxide (CO), Oxides of Nitrogen (NOx) 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 and Tunnel 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 Muck Generation

The project shall generate a total quantum of about **1121104** M^3 of muck. The details are given in the Table. The excavated rock from the tunnel would be generally moderately hard to very hard; these include Volcanic Traps- basalts, phyllites, limestones and slates etc. Apart from hard component the soft material comprise overburden which is existing as debris upon the slopes on the two ends of the tunnel alignment and at proposed shaft locations. The theoretical excavated estimated quantities are below Table Likely Volume of Muck to be generated from Goha Khellani road.

Muck Disposal for Goha Khellani Road			
Sl. No.	**Excavation**		
	Description	**Unit**	**Quantity**
1	Road Construction	Cu. m.	1121104
Total Quantity of Excavation		**m^3**	**1121104**
Consumed Quantity		**m^3**	**76744**
Quantity for Muck Disposal		**m^3**	**1044360**

Monitoring of Muck Disposal

It has already been made eloquent in the relevant muck management plan that the excavated material shall be evacuated from site with suitable usable muck to be utilized in project works by the project proponents and also allowed to be used by private users and the non-usable muck is to be disposed off on designated areas so as not be interfere with either environment/ecology or the river flow regime. Thus, these is an imperative need to regularly monitor the quantum of muck generated and its disposal for which purpose the project proponent shall furnish monthly statement of muck/debris disposal to project proponent and J&K. Pollution Control Board.

- **Sharing of Monitoring Results**

The results of monitoring of various environment attributes either during or post construction would be shared by the monitoring agency, whosoever including State Pollution Control Board, with the project proponents and other agencies of the Government as and when required. Monitoring agency may disseminate the results in any other forms.

Muck Management Plan

➢ GENERAL

For construction of different components of Goha Khellani Road to be evacuated, disposed of and roller compacted or laid on mild slopes with the excavation work, to such designated areas where the muck piles do not substantially interfere with either environment/ ecology or the river flow regime and cause turbidity impairing the quality of water. The disposal of muck has to be scientifically planned to keep in view the pecuniary aspects necessitating nearness to the generating component of work, which understandably reduce the travel time of dumpers, interference to surface flow and ground water aquifer, and disposition of habitation. In the present case, the total quantity of muck / debris, to be generated due to the project, shall be 11.2 lac cum, out of which 0.76 lac cum shall be consumed on project work leaving 10.4 lac cum, to be disposed-off away from sites so as to make available the clear site for construction activities. The muck which is suitable for use as aggregate material for concrete on non-wearing surface, backfill concrete and for widening of the road shall be properly stacked. The muck unsuitable for use in concrete etc. shall be dumped on slopes and treated to mix and match with the surrounding environment with least change in landscape. During construction of the project, huge quantities of excavation will be carried out from the Road and shall be either roller compacted to provide stable terraces for erection of labor camps, job facilities and storage area, or dumped in designated areas to provide stable slopes.

➢ Muck Disposal and Possible Sites

A huge quantity of muck (about **1121104** m^3), which will be generated during the construction work, needs to be disposed of (Table). The dumping of rock spoil can potentially be a cause for environmental problems and land degradation. It would cause landslides and be an aesthetical damage to the natural landscape.

All Highway works in India are to be in accordance with the MORTH specifications and guidelines of Indian Roads Congress (IRC). The MORTH specifications have special provisions towards protection of environment under Clause 501, Annexure A and the contractor is to satisfy these provisions. Apart from this there are provisions for control of erosion, drainage, dust suppression, borrow area and haul road management under

relevant sections.

Provisions of clause 501 Annexure A, cover the environmental aspects regarding the disposal of the muck, etc. For example, it is unambiguously clarified that

a. The contractor shall take all necessary measures and precautions to carry out the work in conformity with the statutory and regulatory environmental requirements

b. The contractor shall take all measures and precautions to avoid nuisance or disturbance from the work.

c. In the event of any spoil, debris, waste or any deleterious material from site being deposited on adjacent land, the same shall be removed and affected area shall be restored to its original state

d. The contractor shall prevent any interference with supply/abstraction of water resources

e. Water used for dust suppression shall be reused after settlement of material in collected water

f. Liquid waste products to be disposed of such that it does not cause pollution

g. No debris is to be deposited or disposed into/adjacent to water courses Substantial quantity of muck can be put to various uses.

Table: Details Regarding the Utility of Muck Generated

Total Muck Generation	1121104 m^3
Re-use of Muck Quantity	76744 m^3
Balance Muck Requiring Disposal	1044360 m^3

Depending upon the characteristics of the excavated material, it can be used for different purposes after appropriate sorting from the areas where it is dumped. The following can be the chief reuses:

- Producing aggregate for construction purposes. Basalts and limestones can be used. The use as backfill material, material for road, Bridge as well as material for filter and drainage layers is most suitable. If the material has sufficient quality for use as in sub-base layers or as mineral aggregates for concrete must be further investigated.

- Earth filling works. Slope debris material, slates and phyllites can only be used for unloaded/uncharged landfills.

TOTAL AREA FOR MUCK DISPOSAL			
Total Excavation	**Total Disposal**	**Required Land**	**Identified disposal Land in Kanal**
1121104 m^3	1044360 m^3	516.134 Kanal	735 Kanal
		261090 sq.m.	372500 sq.m.

The muck to be generated shall have to be appropriately dumped in tips at various suitable locations so that it does not degrade the various elements of the natural environment. For final disposal of the material convenient locations have been identified viz-a-viz to environmental aspects. The most suitable locations for dumping the muck that would be generated from the Goha Khellani road

Sl. No	Area name	Pocket	Approx. Area in Kanal (1 Kanal = 505.857 sq.m)	Location	Photograph	Coordinates
1	Sangru	P-1	39500	Near Sangru	Not Available	33° 5′ 5″ N 75° 27′ 24.5″E
2	Near Bari Village	P2	150000	Near Bari	Not available	33° 4′ 29″ N 75° 27′ 3.5″E
3	Near Bari Village	P3	183000	Near Bari	Not Available	33° 4′ 14.25″ N 75° 26′ 56″E
Total			**372500/735**			

The details of Muck Disposal plan as **Annexure**

Stabilization of Dumped Muck

The utilization and management of the remaining muck needs to be planned well in advance. The spoil tips have to be built where flatter to moderate spaces are available enabling the tips to maintain an angle of repose. The efforts will be made to relocate and rehabilitate the material within short distances from sites of its generation. For the stabilization of the dumped muck, various engineering measures (construction of wire crate retaining walls, breast walls, sausage walls, gabions etc. wherever needed) and biological measures are recommended. All efforts should be made to find ways to dispose of the material in such a manner that negative impacts on the environment are avoided and its washing away into the river water.

Spoil tips be spread and levelled. Stabilization of dumped muck through biological measures include adopting measures like turfing, resurfacing and re-vegetating of exposed areas to grow a plant cover on it. Biotechnological approach is also currently in vogue as a restoration measure for the consolidation of unused dumped material to stabilize the same with vegetation by employing traditional method of afforestation supplemented by modern biotechnological approach. The spoil tip areas are treated through turfing and afforestation of suitable plant species, using VAM-Vasicular Arbuscular Mycorrhiza-and nitrogen fixing bacteria. This method be also tried. Under this combined approach the fungi form partnership with plant roots. The fungus grows on and extends the reach of plant roots for water and nutritional requirements. The seedlings inoculated with VAM survive better after transplanting and grow faster in nutrient poor soils. Plants required for re-vegetating the dumping areas can be obtained from the nursery developed for Bio-conservation Plan and as such no provision has been kept for the procurement of plant material for re-vegetation under Muck Disposal programmed.

- **Implementation of Engineering & Biological Measures**

As already explained engineering measures like providing of GI wire crates and retaining walls and compaction of muck will provide stability to the profile of muck piles.

- **Engineering Measures**

It has been observed that after excavation the disposal of muck creates problem as it is susceptible to scattering unless the muck disposal yards are supported with engineering measures such as retaining structures, crate walls and gabions. All the dumping sites need proper handling to avoid spilling of muck either on the adjoining and or into the river water while dumping and in the post dumping stages. The muck disposal sites shall have to be developed from below the ground level by providing retaining wall with height of 4.0 m including 0.75 m of buffer to avoid any rollover falling to the riverbed. 8 SWG GI wire crates for side protection with 10 cm x 10 cm mesh and dimension 1.15 m x 1.15 m x 1.15 m in multi tiers will be laid with 0.5 m wide offset, concurrently with the dumping of muck. After preparing the RCC wall at muck disposal site, the muck brought in dumpers shall be dumped and manually spread behind the wall in such a manner that rock mass is properly stacked behind the wall with minimum of voids. The muck pile

shall be later rehabilitated by afforestation of herbs and shrubs. Geo-coir textile should also be provided on surface of muck piles where top surface is to be vegetated.

- **Biological Measures**

Biological measures, however, require special efforts as the muck disposed in disposal yards will in general be devoid of nutrients and soil contents to support vegetation. The selection of soil for spreading over such an area would require nutrient profiling of soil for different base elements. Suitable admixture of nutrients would be done before placing the soil on the top surface of muck disposal areas to have administered growth of forest canopy.

- **Plantation Technique**

In view of the peculiar site conditions particularly the soil conditions, the planting technique for all the categories of the plants must be very site specific and suited to the stress conditions as anticipated and discussed above. The planting substrates would need to be considerably improved to support the plants in their initial stages of establishment. The moisture retention capability, availability of nutrients and soil aeration, permeability and porosity would require intervention and assistance.

Multistoried and multipurpose plantations are proposed to be raised on the muck dumping sites as also in roadside strips using grasses, shrubs and bushes in the under story and trees in the upper story. Nursery raised grass slips, seedlings of shrubs & bushes and tree species would be planted in the area combined with grass sowing in patches. In addition, cuttings of bushes and shrubs can also be planted to supplement the nursery raised stock, but this would substitute requirement of raising the nursery of these species. Intimate mixture of species would be avoided right at the planning stage and would be strictly followed during planting. Each patch should contain maximum of two species. Grasses would be mixed by groups in rows, shrubs and bushes by group again in rows.

Grass slip planting and grass seed sowing would be done in strips at 0.10 m x 0.10 m spacing in the prepared staggered patches of 1 m x 0.5 m with a depth of 0.30 m. Soil mixture would be used while filling the patches. Balance dug up soil/muck will be stacked along the patch on the downhill side for rain water tapping and enhanced

percolation in the patch. Number of such patches in each hectare is proposed at 500.

Shrubs and bushes would be planted in elongated strips of 1.5 m x 0.5 m with a depth of 0.45m. Soil mixture would be used while filling the patches. Balance dug up soil/muck will be stacked along the patch on the downhill side for water tapping and better percolation in the patch. These would be staggered throughout the area numbering 500 per hectare. Each patch would have two rows of planting with staggered spacing between plants in a row as 15 cm and distance between rows as 15 cm.

Planting of trees would be done in contour staggered pits of 0.45 m x 0.45 m x 0.45 m size numbering 800 per hectare. Out of these 800 plants, about 200 plants per hectare are meant for planting along the periphery of the area. If the periphery gets filled up with lesser numbers, the remainder would be planted in the core/main area. Soil mixture would be used while filling the pits. Balance dug up soil/muck will be stacked on downhill side of the pit for trapping the rainwater and allowing it to percolate in the pit.

It is proposed to use soil mixture in the pits & patches consisting of soil imported from nearby areas mixed with compost or human or vermin-compost or all of these. The ratio for the mix would be 5 parts: Compost/manure 2 parts: Sand 2 part: and humus or vermin-compost 1 part. This will make nutrients available for the plants in the preliminary stages and help increase soil aeration, porosity & permeability and improved moisture available for the plants. The stabilization sites from the time of execution of biological measures would be protected with barbed wire fencing on 2m high RCC posts and provided with inspection paths. Since the muck dumping sites are being provided with either RCC walls or the wire crate (gabion) wall on the valley side (towards river) which is not negotiable by animals and human beings, fencing would not be required along the entire perimeter. Hence, it would be done on the vulnerable sections i.e. towards the hillside only. The proposed costs include nursery costs for initial planting and also for mortality replacement. The biological measures shall be taken up towards the end of construction. The plantations would be maintained for a period of 5 years by irrigating the plantation during dry seasons, mortality replacement and repair of fencing & inspection paths within the area. The task of irrigation would be performed by the watch & ward (chowkidar / rakha) provided in the cost estimate.

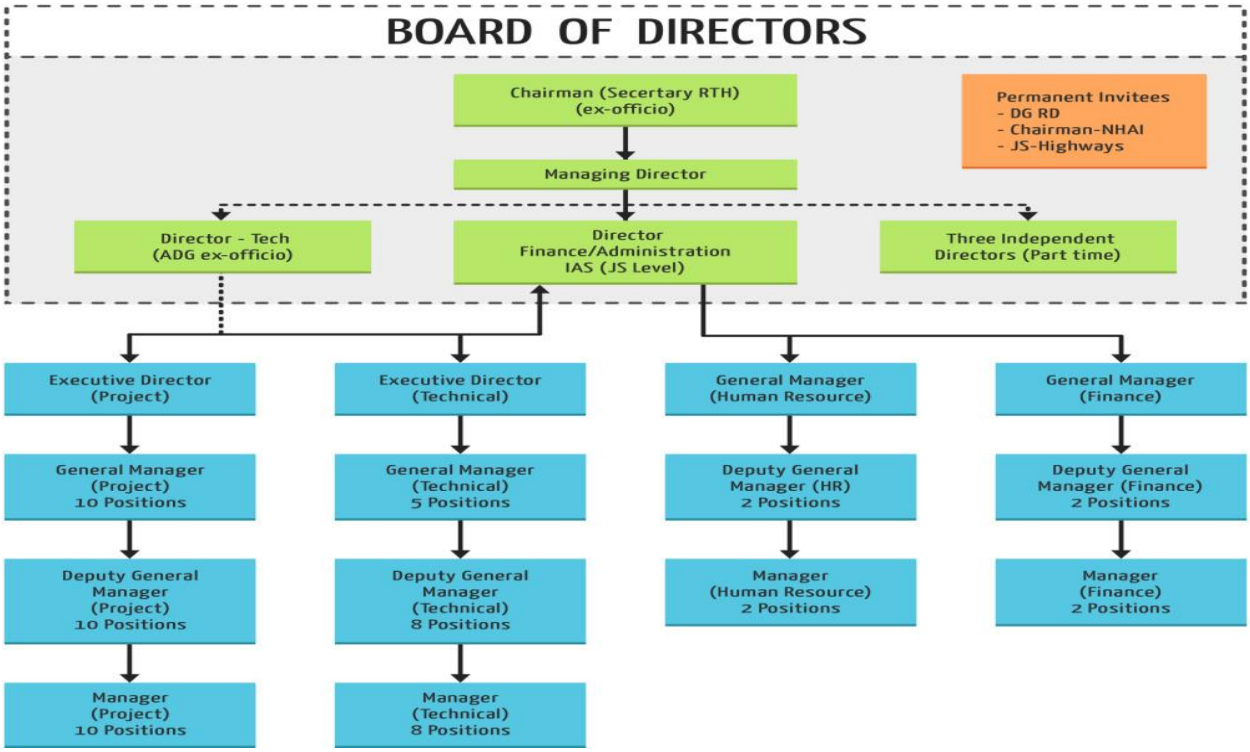
➢ **Species for Plantation**

Afforestation with suitable plant species of high ecological and economic value and adaptable to local conditions will be undertaken at the rate of 800 plants per hectare in accordance with canopy cover requirement. The major plant species which can be used in the area shall belong to indigenous species.

7.5 Organizational Set-up of Implementing Agency

NHIDCL is the implementing agency for the project. It is an independent agency under the ambit of MoRT&H, NHAI 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



7.6 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)/construction supervision consultant (CSC) 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 CSC 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: Responsibilities for Environmental Safeguards Implementation

S. No.	Agency	Responsibility
1	NHIDCL (HQ)	Ensure that project complies with Multi-lateral Funding Agency World bank/ADB's SPS,2009 and GOI laws and regulations
		Ensure that contract documents include all relevant parts of the environmental assessment and project agreements.
		Ensure that enough 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 CSC
		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 make a decision 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, Government of Jammu and Kashmir laws and regulations

S. No.	Agency	Responsibility
		Ensure that the environment checklist is completed on time by contractor, reviewed by CSC 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
		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
		Settle grievances if any at field level.
		Review and approve the EMP's and EMOP's and make necessary modifications if required.
		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 CSC
		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, Construction Supervision Consultant (CSC)	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.

S. No.	Agency	Responsibility
		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
		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
4	Contractor	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 CSC 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

S. No.	Agency	Responsibility
		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/CSC.
		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

7.7 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 CSC budget.

Table : 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,	Lectures cum interaction	Before beginning of the implementation of the project.

Sl. No	Target group	Subject(s)	Method	Time Frame
		Procedures of EC and FC, process and methodology for IEE, EMPs		
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 implications, protection of flora and fauna Environmental monitoring during construction	Workshops and Site visits	Before the 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	Workshop	During

Sl. No	Target group	Subject(s)	Method	Time Frame
		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	and seminars	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 6 years of operation
7	NHIDCL, CSC and Contractor.	Restoration of sites viz borrow areas, construction Camps, Crushing units, HMP etc. And Reporting Formats/procedure	Lecture/ Presentations	before Contractor Demobilization

7.8 Grievance Redress Mechanism

- All the three parties involved in this project implementation i.e. Contractor, CSC and executing agency will maintain complaint registers at their following respective offices:
- Contractor's main site offices i.e. office of the Project Manager.
- CSC'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 CSC 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 CSC 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, CSC
- 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.

CHAPTER 8. CONCLUSION AND RECOMMENDATION

8.1 Summary of Environmental Cost

1.4 Cr Estimates for Different Management Plans for Goha Khellani Road Project contains Package-I A, Link Road 0+000 to 2+016 (2.016 Km) & I A: Goha -Khellani (Km 12.850 to Km 20.300(7.450 Km) Road, Bridges/Viaduct .

8.2 Goha Khellani Roads.

1. The scope of works under involves Detailed Project Report and providing Pre-Construction activities National Highway Infrastructure Development Corporation limited aggregating contains Package-I A, Link Road 0+000 to 2+016 (2.016 Km) & I A: Goha -Khellani (Km 12.850 to Km 20.300(7.450 Km) through roads into 2 lanes. Since it is an expansion and new project, stress on existing natural resource viz, land, water, soil and aggregates are not significant. 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 Construction Supervision Consultant (CSC), 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

APPENDIX 1: RAPID ENVIRONMENTAL ASSESSMENT CHECKLIST

Road and Highway

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. However, some religious structures exist along the project road which may get partially impacted. Disfiguration of landscape is not envisaged since it is expansion/improvement of existing roads. Quarry material will be procured from existing licensed quarries. Opening and operation of new quarry, if needed will follow consent conditions of Pollution Control Board. and environmental clearance from DEIAA.
▪ 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 Nala and also intersecting some of project roads. Most of them is non-perennial in nature. Bridge construction on rivers will be done during lean flow period. In some cases, minor channels may be diverted for a very short period and will be bring back to its original course immediately after construction.
▪ 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/Nala. Adequate sanitary facilities and drainage in the workers camps will help to avoid this possibility. Construction activity in this project will not contain any harmful ingredients.
▪ 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 taken into account to locate air polluting facility like stone crushing unit etc. use of environment friendly equipment's/machineries will help to reduce air pollution.
▪ 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
▪ Noise and vibration due to blasting and other civil works?	x		Blasting is involved. 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.
▪ dislocation or involuntary resettlement of people		x	Project will cause significant number of economically and physically displaced persons involving some vulnerable groups. Most of them are squatters and encroachers. Indigenous population is negligible. For exact figure, pls refer resettle plans which is under preparations. All displaced persons will be adequately compensated in line with GOI and ADB policy on involuntary resettlement.
▪ Dislocation and compulsory resettlement of people living in right-of-way?		x	
▪ Disproportionate impacts on the poor, women and children, indigenous peoples or other vulnerable groups?		x	
▪ 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 largely located in open areas. Extensive plantation along the highway and improved road conditions will improve the air quality of the area.
▪ 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.
▪ 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
▪ Creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents?		x	No such condition is anticipated. Most of borrow areas are likely to be converted into ponds. Fish culture will be promoted in these ponds which will naturally restrict mosquito breeding.
▪ 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.
▪ 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.
▪ 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.
▪ 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.
▪ 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.
▪ 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.
▪ 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 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,**	**GoI Ecologically Sensitive Area (notified by Central**
Sulfur dioxide (SO2) (ug/m3)	24-hr	125	(Interim target 1)		
		50	(Interim target 2)		
		20	(guideline)	80	80
	10 min	500	(guideline)		
	Annual	None		50	20
Nitrogen dioxide (NO2) (ug/m3)	1 Year	40	(guideline)	40	30
	24 Hour	None		80	80
	1 Hour	200	(guideline)		
PM10 (ug/m3)	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)		
		75	(Interim target 3)		
		50	(guideline)	**100**	**100**
PM2.5 (ug/m3)	1 year	35	(Interim target 1)		
		25	(Interim target 2)		
		15	(Interim target 3)		
		10	(guideline)	40	40
	24-Hour	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) µg/m3)	Annual			0.5	0.5
	24 hours			1.0	1.0

Carbon Monoxide (CO) µg/m3	8 hours			2000	2000
	1 hour			4000	4000
Ammonia (NH3) µ/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.

Table: B

Receptor	WB EHS in dB(A)		GOI NAAQS in dB(A)	
	Daytime	Nighttime	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_6H_5OH)	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}μc/mL)	nil	0.0001
37.	Beta Emitters (10^{-6}μc/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

APPENDIX 6: BASELINE AIR QUALITY STATUS IN THE PROJECT AREA

Goha Khellani Road

S. No	Location	Station Code	SPM (µg/m3)	SOx (µg/m3)	NOx (µg/m3)	CO (µg/m3)
1	Bari Village	AQ-1	32	5	15	ND

ND: Not Detectable

APPENDIX 7: NOISE LEVEL IN PROJECT AREA

Goha Khellani					
S. No.	**Station**	**Location**	**Leq dB (A) Day**	**Leq dB (A) Night**	**Remark**
1	NQ-1	Bari Village	50.5	33.8	Residential

APPENDIX 8: GROUND WATER QUALITY IN PROJECT AREA

S.N.	Parameters	Method of Test	Borewell not in Project Area
1	Colour	IS 3025 (Part-4)	NA
2	Odour	IS 3025 (Part-5)	NA
3	Taste	IS 3025 (Part-7))	NA
4	pH	IS 3025 (Part-11)	NA
5	Turbidity on NTU	IS 3025 (Part-10)	NA
6	Total Dissolved Solids	IS 3025 (Part-16)	NA
7	Total Hardness as $CaCO_3$	IS 3025 (Part-21)	NA
8	Calcium Hardness as Ca	IS 3025 (Part-40)	NA
9	Magnesium as Mg	IS 3025 (Part-46)	NA
10	Iron as Fe	APHA 3500 (Fe-B)	NA
11	Residual Free Chlorine	APHA 4500 (Cl C)	NA
12	Total Alkalinity as $CaCO_3$	IS 3025 (Part-23)	NA
13	Chloride as Cl	APHA 4500 (Cl B)	NA
14	Sulphate as SO_4	IS 3025 (Part-24)	NA
15	Fluoride as F	APHA 4500 (F D)	NA
16	Nitrate as NO_3	IS 3025 (Part-45)	NA
17	Coliform (MPN Value)	IS 1622	NIL

**in mg/l. except colour, Odour, Taste, Turbidity, & pH*

APPENDIX 9: SURFACE WATER QUALITY IN PROJECT AREA

Sl. No	Parameter	Test Method	Kaiser Nala	Units
1.	pH	IS:3025(Part-11)	7.34	-
2.	Color	IS:3025(Part-4)	<5.0	Hazen
3.	Dissolved Oxygen (as O_2) Min.	IS:3025(Part-38)	7.7	mg/l
4.	Biological Oxygen Demand (Max.) (at 27^0C for 3 days)	IS:3025(Part-44)	0.80	mg/l
5.	Chloride (as Cl), Max.	IS:3025(Part-32)	58.90	mg/l
6.	Sulphate (as SO_4), Max.	IS: 3025 (Part-24)	25.82	mg/l
7.	Nitrate (as NO_3), Max.	IS: 3025 (Part-34)	9.02	mg/l
8.	Iron (as Fe), Max.	IS:3025(Part-53)	0.28	mg/l
9.	Fluoride (as F), Max.	APHA-4500 F	0.26	mg/l
10.	Total Dissolved Solid	IS:3025(Part-16)	562.0	mg/l
11.	Total Hardness (as $CaCO_3$)	IS:3025(Part-21)	156.0	mg/l
12.	Calcium(as Ca)	IS:3025(Part-40)	43.20	mg/l
13.	Magnesium(as Mg)	IS:3025(Part-46)	11.66	mg/l

Appendix 1: Environmental Management Plan for Goha- Khellani Road

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	▪ Heavily built-up and geometrically deficit sections have been avoided ▪ Provision 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 guidelines ▪ Overloading to be checked at weigh station ▪ Increase in vent size/waterway of cross drains ▪ Provision of additional balancing culverts ▪ Provision of adequate side drains with suitable outfalls.	Design requirement IRC: SP: 19. IRC: 37-2012 IRC: SP:73-2015 IRC-SP:50-1999.	Realignment//geometric improvements of curves	MI: Design and number of cross and side drains, PT: 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	▪ Geometric Improvements of curves ▪ Provision of crash barriers at accident prone areas and bridges ▪ Speed limitations near educational institutes, hospitals and other CPR. ▪ Provision of retro- reflective warning signboards near curves, school, hospital, religious places and other sensitive location ▪ 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.	Design requirement IRC: SP:84-2014 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 ". IRC: SP: 67-2012	Entire Stretch	MI: number and location of crash barriers, informatory and cautionary sign boards and street lighting as per design PT: 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
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	▪ 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 2012 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	▪ 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	MI: CD Structure PT: 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	▪ CD structures designed for 50year return period ▪ Waterways of bridges and culverts have been increased. ▪ Roadside drains to be provided	IRC:34 Recommendations for road construction in waterlogged area and IRC: 75 and MORT&H guidelines for	Proposed Bridge	MI: Design and numbers of cross & side drains, design and number of bridges PT: Design and numbers are in accordance with site needs	Review of design documents and drawings and comparison with site conditions	Covered under costs for DPR consultant	Contractor	NHIDCL
3. Loss of Land and Assets								
3.1 livelihood loss to affected persons	▪ 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	The Right to Fair Compensation and Transparency in J&K State Land Acquisition act1990(1934AD) Contract Clause for preference to local people during employment.	Throughout the corridor (Pls Refer RP)	MI: compensation and assistance to DPs as per entitlement matrix of RP No. of grievance related to RP implementation PT: Minimal number of Complaints/ grievances. Cases if any are resolved at GRC level No case of	Check LA records; design drawings vs. land plans; Interview with affected persons Check status of employment given to local people during construction	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
	contracts during construction to APs ▪ Constitute GRC as per approved RP			grievance referred to arbitrator/court.				
4. Diversion of Forest Land and Cutting of Trees								
4.1 Deterioration in climatic condition. Increase in Green House effect/climate change impact	▪ Geometric adjustments made to minimize tree cutting. ▪ Obtain tree cutting permission from forest/Revenue department as the case may be. ▪ Provision for additional plantation on 1: 7 bases to be implemented through contractors of forest department.	Forest Conservation Act, 1980	Total number of affected trees= under scrutiny Forest Area: under Scrutiny	MI: location of geometric adjustments to minimize tree cutting, budget allocated for compensatory and additional plantation PT: Unnecessary tree felling avoided. Budget allocation for compensatory plantation is adequate,	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	▪ 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 construction ▪ Necessary permission and payments should be made to relevant utility service agencies to allow quick shifting and restoration of utility services ▪ Local people must be informed through appropriate means about the time of shifting of utility structures and potential disruption of services if any ▪ Relocation of. wells, hand pumps at suitable locations with consent from local community.	Project requirement	Throughout the corridor	MI: Number of complaints from local people, number, timing and type of notifications issued to local people, time taken to shift utilities PT: No. of complaints should be 0. Effective and timely notification. Minimal time for utility shifting	Interaction with concerned utility authorities and local public	Included under NHIDCL's costs	Contractor/ NHIDCL/utility company	NHIDCL /CSC

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
B. Construction Stage								
1. Air Quality								
1.1 Dust Generation due to construction activities and transport, storage and handling of construction materials	▪ Contractor to submit location and layout plan for storage areas of construction materials approved by CSC ▪ 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.	MORT&H Specifications for Road and Bridge works Air (P and CP) Act 1974 and Central Motor and Vehicle Act 1988 General Conditions of Bid Document	Throughout project corridor	MI: PM10 level measurements Complaints from locals due to dust PT: PM10 level< 100 g/m^{3}Number of complaints should be 0.	Standards CPCB methods Observations Public consultation Review of monitoring data maintained by contractor	Included in civil works cost	Contractor	NHIDCL /CSC
1.2 Emission of air pollutants(HC,SO_2,NO_X,CO etc.) from vehicles due to traffic congestion an use of equipment and machinery	▪ 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 construction camps instead of wood ▪ Ambient air quality monitoring ▪ Contractor to prepare traffic management and dust suppression plan duly approved by NHIDCL	The Air (Prevention and Control of Pollution) Act, 1981(Amended 1987) and Rules 1982	Asphalt mixing plants, crushers, DG sets locations	MI: Levels of HC, SO2, NO2, and CO. Status of PUC certificates PT: SO2 and NO2 levels are both less than 80ug/m^3. PUC certificate of equipment and machinery is up to date	Standards CPCB methods Review of monitoring data maintained by contractor	Included in civil works cost	Contractor	NHIDCL /CSC
2. Noise								
2.1 Disturbance to local residents and sensitive receptors due to excessive noise from construction activities and operation of equipment and machinery	▪ 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	Legal requirement Noise Pollution (Regulation and Control) Rules, 2000 and amendments thereof Clause No 501.8.6. MORT&H Specifications for Road and Bridge works	Throughout project section especially at construction sites, Residential and identified sensitive locations. Refer supplementary tables to EMP for information on sensitive receptors.	MI: day and Noise levels. Number of complaints from local people PT: Zero complaints or no repeated complaints by local people. Average day and night time	As per Noise rule, 2000 Consultation with local people Review of noise level monitoring data maintained by contractor	Included in civil works costs	Contractor	NHIDCL /CSC

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
	▪ 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. ▪ Honking restrictions near sensitive areas ▪ PPEs to workers ▪ Noise monitoring as per EMoP.			noise levels are within permissible limits for work zone areas	Observation of construction site			
3. Land and Soil								
3.1 Land use Change and Loss of productive/topsoil	▪ Non-agricultural areas to be used as borrow areas to the extent possible. ▪ If using agricultural land, top soil to be preserved and laid over 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	Throughout the project section and borrow areas Land to be identified for camp, storage areas etc.	MI: Borrow pit locations/Top soil storage area PT: Zero complaints or disputes registered against contractor by land owner	Review borrow area plan, site visits	Included in civil works cost	Contractor	NHIDCL /CSC
3.2 Slope failure and Soil erosion due to Construction activities, earthwork, and cut and fill, stockpiles etc.	▪ 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 than2:1. ▪ The earth stockpiles to be provided with gentle slopes to avoid soil erosion.	IRC: 56 -1974 recommended practice for treatment of embankment slopes for erosion control Clause No. 306 and 305.2.2 MORT&H Specifications for Road and Bridge works Guidelines IX for Soil erosion	Throughout the entire project road	MI: Occurrence of slope failure or erosion issues PT: No slope failures. Minimal erosion issues	Review of design documents and site observation	Included in civil works cost	Design consultant and Contractor,	NHIDCL /CSC
3.3 Borrow area management	▪ Obtain EC from DEIAA or State Authority as applicable prior to opening any new borrow area. ▪ Comply to EC conditions of DEIAA 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.	IRC Guidelines on borrow areas and for quarries(Environmental protection Act and Rules,1986; Water Act ,Air Act) Clause 305.2.2 MORTH Specifications for	Borrow site locations as identified in DPR However, contractor is free to select any other borrow area after consent from EA and securing all permits.	MI: Existence of borrow areas in inappropriate unauthorized locations. Poor borrow area management practices. Number of	Review of design documents and site observations Compare site conditions with EC conditions by	Included in civil works cost	Contractor	NHIDCL /CSC

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
	▪ 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 soil. Else, it shall be converted into fishpond.	Road and Bridgeworks Guidelines for Borrow Areas management		accidents. Complaints from local people. PT: No case of non-compliance to conditions stipulated by DEIAA in clearance letter. Zero accidents. Zero complaints.	DEIAA			
3.4 Quarry Operations	▪ Aggregates will be sourced from existing licensed quarries. ▪ Copies of consent/ approval / rehabilitation plan for a new quarry or use of existing source will be submitted to 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	MI: Existence of licenses quarry areas from which materials to be sourced and Existence of a quarry redevelopment plan PT: Quarry license is valid.: No case of non-compliance to consent conditions and air quality meets the prescribed limit	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 /CSC
3.5 Compaction of soil and impact on quarry haul roads due to movement of vehicles and equipment	▪ Construction vehicles, machinery, and equipment to be stationed in the designated 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.	MI: Location of approach and haulage roads Presence of destroyed/compacted agricultural land or land which has not be restored to its original condition PT: Zero	Site observation	Included in civil works cost	Contractor	NHIDCL /CSC

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
	▪ Land taken for construction camp and other temporary facility shall be restore to its original conditions			occurrence of destroyed/compacted land 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	▪ 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.	MI: Quality of soil near storage area Presence of spilled oil or bitumen in project area PT: Soil test conforming to no – contamination. No sighting of spilled oil or bitumen in construction site or camp site	Site observation	Included in civil work cost.	Contractor	NHIDCL /CSC
4. Water Resources								
4.1 Sourcing of water during Construction	▪ Requisite permission shall be obtained for abstraction of river/Nala/Stream water from State Water Commissioned or Irrigation Department in view of National Green Tribunal ▪ Arrangements 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 /CSC
4.2 Disposal of water during construction	▪ Provisions shall be made to connect to side drains with existing nearby natural Drain	Clause No.1010 EP Act 1986 MORT&H.	Throughout the Project section	MI: Drainage system in	Standards methods	Included in civil works	Contractor	NHIDCL /CSC

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
		Specifications for Road and Bridge works		construction site. Presence/absence of water logging in project area. PT: Existence of proper drainage system. No water logging in project area	Site observation and review of documents	cost		
4.3 Alteration in surface water hydrology	▪ Existing drainage system to be maintained and further enhanced. ▪ Provision shall be made for adequate size and number of cross drainage structures esp. in the areas where land is sloping towards road alignment. ▪ Road level shall be raised above HFL level as per IRC/MORTH guidelines. ▪ 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.	Design requirement, Clause No 501.8.6. MORT&H Specifications for Road and Bridge	Kaiser Nallah Seasonal streams & 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 /CSC
4.4 Siltation in water bodies due to construction activities/earthwork	▪ Embankment slopes to be modified suitably to restrict the soil debris entering water bodies. ▪ Provision of Silt fencing shall be made at water bodies. ▪ Silt/sediment should be collected and stockpiled for possible reuse as surfacing of slopes where they have to be re-vegetated. ▪ Earthworks and stone works to be prevented from impeding natural flow of rivers, streams and water canals or existing drainage system. ▪ Retaining walls at water bodies /Stream/nala to avoid siltation near Stream/Nala.	Design requirement, Clause No 501.8. 6.MORT&H Specifications for Road and Bridgeworks World-wide best practices	Kaiser Nallah Seasonal streams & Nallah crossing the project road	MI: Presence /absence of siltation in rivers, streams, ponds and other water bodies in project area. Turbidity test levels PT: No records of siltation due to project activities. Surface water quality tests confirm to turbidity and TSS limit	Field observation	Included in civil works cost	Contractor	NHIDCL /CSC

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
4.5 Deterioration in Surface water quality due to leakage from vehicles and equipment's and waste from construction camps.	▪ Parking and refueling away from water bodies/waterways ▪ Oil/ grease trap and fueling platforms to be provided at re-fueling locations. ▪ Chemicals and oil shall be stored away from water on concrete platform with catchment pit for spills collection. ▪ All equipment operators, drivers, and warehouse personnel will be trained in immediate response for spill containment and eventual clean-up. Readily available, simple to understand, written in the local language emergency response procedure, including reporting, will be provided by the contractors. ▪ Construction camp to be sited away from water bodies. ▪ Wastes must be collected, stored and taken to approve disposal site only. ▪ Water quality shall be monitored	The Water (Prevention and Control of Pollution) Act, 1974 and amendments thereof.	Kaiser Nallah Seasonal streams & Nallah crossing the project road	MI: Water quality of ponds, streams, rivers and other water bodies in project Presence of oil floating in water bodies in project area PT: Surface water quality meets freshwater quality standards prescribed by CPCB	Conduction of water quality tests as per the monitoring plan Field observation	Included in civil works cost	Contractor	NHIDCL /CSC
5. Flora and Fauna								
5.1 Vegetation loss due to site preparation and construction activities	▪ Restrict tree cutting up to toe line considering safety to road users. ▪ Roadside trees to be removed with prior approval of competent authority. ▪ Mandatory compensatory plantation at 1:3 basis by Forestry Department ▪ 1:7Additional 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, river banks to minimize noise & air pollution, check erosion. ▪ Controlled use of pesticides/fertilizers.	Forest Conservation on Act1980 IRC:SP:21 and IRC:SP:66 NHAI green Highway policy	Throughout project corridor Estimated No. of affected tree=Under Scrutiny Additional Plantation near Sensitive receptors, river banks, borrow areas	MI: ROW width Number of trees for felling Compensatory plantation plan Number of trees replanted. PT: Survival of Compensatory Plantation @ 70% and Additional plantation @ 80% survival	Review of relevant documents – tree cutting permit, compensatory plantation plan Field observations	Additional plantation and compensate plantation cost is included in project costs under NHIDCL.	Mandatory Compensatory plantation by forest Department and Additional plantation by contractor of forest department	NHIDCL /CSC
6. Construction Camps/sites Management and Occupational Health and Safety								
6.1 Impact associated with location	▪ All camps should be established with prior permission from SPCB. ▪ Layout plant shall be recommended	Design Requirement the Water	All construction camps	MI: Location of campsites and distance from	On site observation	Included in civil works cost	Contractor and EO	NHIDCL /CSC

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
	by CSC and approved by EA ▪ Camps to maintain minimum distance from following: # 500 m from habitation # 500 m from forest areas where possible # 500 m from water bodies where possible # 500 m from through traffic route	(Prevention and Control of Pollution)Act,1974and its amendments thereof		habitation, forest areas, water bodies, through traffic route and construction camps PT: Distance of campsite is less than 500m from listed locations	Interaction with workers and local community			
6.2 Worker's Health in construction camp/ construction sites	▪ The location, layout and basic facility provision of each labor camp will be submitted to CSC and approved by EA. ▪ 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 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	The Building and Other Construction workers (Regulating of Employment and Conditions of service) Act 1996 and The Water (Prevention and Control of Pollution) Act, 1974 And amendments thereof	All construction camps	MI: Camp health records Existence of proper first aid kit in camp site Complaints from workers. PT: No record of illness due to unhygienic conditions or vectors. Zero cases of STD. Clean and tidy camp site conditions.	Camp records Site observation Consultation with contractor workers and local people living nearby	Part of the civil works costs	Contractor	NHIDCL /CSC

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
	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	▪ Contractor to submit a waste/spoil disposal plan and get it approved by CSC 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 has to be obtained before finalizing the location.	Design Requirement, MORTH guidelines and General Conditions of Contract Document	At all Dumping/Disposal Sites	MI: Location of dumping sites Number of public complaints. PT: 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 /CSC
7.2 Muck Disposal Site and Plan	▪ Contractor to submit a Muck disposal plan and get it approved by CSC and EA and Concerned Authority. ▪ 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 Muck/debris generate Public perception and consent from the village Panchayats has to be obtained before finalizing the location.	Design Requirement, MORTH Guidelines and General Conditions of Contract Document	At all Muck Disposal Site .	MI: Location of dumping sites Number of public complaints. PT: 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		

7.3 Reuse and disposal of construction and dismantled waste	▪ The existing bitumen surface shall be utilized for paving of cross roads, access roads, and paving works in construction sites and camps, temporary traffic diversions, and haulage routes. ▪ All excavated materials from roadway, shoulders, verges, drains, cross drainage will be used for backfilling embankments, filling pits, and landscaping. ▪ Unusable and non-bituminous debris materials should be suitably disposed 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, MORT&H 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 CSC	Contractor records Field observation Interaction with local people	Included in civil works cost.		

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
8. Traffic Management and Safety								
8.1 Management of existing traffic and safety	▪ Traffic Management Plan shall be submitted by the contractor and approved by the CSC. ▪ The traffic control plans shall contain details of diversions; traffic safety arrangements during construction; safety measures for night time traffic and precautions for transportation of hazardous materials. 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 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.	Design requirement and IRC: SP: 27 - 1984,Report Containing Recommendation of IRC Regional Workshops on Highway Safety IRC:SP: 32 -1988 Road Safety for Children(5-12 Years Old) in Construction Zones IRC:SP:55-2014 The Building and other Construction workers Act 1996 and Cess Act of 1996 Factories Act 1948	Throughout the project corridor especially at Existing Road.	MI: Traffic management plan. Presence/ absence of safety signs, traffic demarcations, flag men etc. on site. Complaints from road users. No of accidents PT: No complaints. No accidents due to poor traffic management. Traffic signs, demarcation lines etc. present in appropriate locations on site	Review traffic management plan Field observation of traffic management and safety system Interaction with people in vehicles using the road	Included in civil works cost.	Contractor	NHIDCL /CSC
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.	MI: Presence/ absence of access routes for pedestrians. Road signage Number of complaints from local people PT: Easy access to schools, temples and public places. Zero complaints	Field observation Interaction with local people	Included in civil works cost.	Contractor	NHIDCL /CSC

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
8.3 Safety of Workers and accident risk from construction activities	▪ Contractors to adopt and maintain safe working practices. ▪ Usage of fluorescent and retro refectory 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 scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches and safe means of entry and egress hall be complied with. ▪ Provision of PPEs to workers. ▪ Provision of a readily available first aid unit including an adequate supply of dressing materials. ▪ The contractor will not employ any person below the age of 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.	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 /CSC
8.4 Accident risk to local community	▪ 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 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. ▪ Alternate access facility to common properties near construction zones ▪ Fencing and speed limitation wherever cattle movement is anticipated.	Same as above	Construction sites and Accident-Prone Areas	MI: Safety signs and their location Incidents of accidents Complaints from local people PT: Zero incident of accidents. Zero Complaint	Site inspection Consultation with local people	Included in civil works cost	Contractor	NHIDCL /CSC

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
9. Site Restoration and Rehabilitation								
9.1 Clean-up Operations, Restoration and Rehabilitation	▪ Contractor will prepare site restoration plans, which will be approved by the 'Engineer'. ▪ The clean-up and restoration operations are to be implemented by the contractor prior to demobilization. ▪ All construction zones including river-beds, 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	MI: camp, Condition borrows areas and construction sites, Presence/absence of construction debris after construction works is over PT: 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 /CSC
Operation and Maintenance stage								
1. Air Quality								
2.1 Air pollution due to due to vehicular movement	▪ Compensatory tree plantations shall be maintained as prescribed by forest department.80% survival rate for additional plantation shall be maintained ▪ Regular maintenance of the road will be done to ensure good surface condition ▪ Ambient 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	MI: Ambient air quality (PM10, CO,SO2 NO2) PT: Levels are equal to or below baseline levels (Air Quality Standard, CPCB)	As per CPCB requirements Site inspection	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
2. Noise								
2.1 Noise due to movement of traffic	▪ Effective traffic management and good riding conditions shall be maintained ▪ Speed limitation and honking restrictions near sensitive receptors locations. ▪ Construction of noise barriers near sensitive receptors with consent of local community ▪ 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.	Noise Pollution (Regulation and Control)Rules,2000 and amendments thereof	Sensitive receptors as given in supplementary table to EMP	MI: Noise levels PT: 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 sites	Included in Operation/ Maintenance cost	NHIDCL	
3. Land and Soil								
3.1 Soil erosion at embankment during heavy rainfall.	▪ Periodic checking to be carried to assess the effectiveness of the stabilization measures viz. turfing, stone pitching, river training structures etc. ▪ Necessary measures to be followed wherever there are failures	Project requirement	At bridge locations and embankment slopes and other probable soil erosion areas.	MI: Existence of soil erosion sites Number of soil erosion sites PT: Zero or minimal occurrences of soil erosion	On site observation	Included in Operation/ Maintenance cost	NHIDCL	
4. Siltation/Water-logging								
4.1 Siltation/ Contamination	▪ 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 Water bodies	MI: Water quality PT: No turbidity of surface water bodies due to the road	Site observation	Included in Operation/ Maintenance cost	NHIDCL	
4.2 Water logging due to blockage of drains, culverts or streams	▪ Regular visual checks 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	Project requirement IRC: SP:21-2009	Near surface Water bodies/cross drains/side drains	MI: Presence/ absence of water logging along the road PT: No record of overtopping/ Water logging	Site observation	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
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	J&K forest Act 1987(1930,AD) J&K forest (Conservation) act 1997, Felling of Trees J&K Forest(Conservation & afforestation) Rules,2000.	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/State Forest Deptt	
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 been forced strictly. ▪ Further encroachment of squatters within the ROW will be prevented. ▪ No school or hospital will be allowed to be established beyond the stipulated planning line as per relevant local law ▪ Monitor/ensure that all safety provisions including in design and construction phase are properly maintained ▪ Highway patrol unit(s) for round the clock patrolling. Help lines for accident reporting and ambulance services with minimum response time for rescue of any accident victims, if possible. ▪ Tow-way facility for the break down vehicles if possible.	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 PT: Fatal and non fatal accident rate is reduced after improvement	Review accident records Site observations	Included in Operation/ Maintenance cost	NHIDCL	
6.3.Transport of Dangerous Goods	▪ Existence of spill prevention and control and emergency responsive system ▪ Emergency plan for vehicles carrying hazardous material	-	Throughout the project stretch	MI: Status of emergency system – whether operational or not PT: Fully functional emergency system	Review of spill prevention and emergency response plan Spill accident records	Included in Operation/ Maintenance cost	NHIDCL	

WB: World Bank ,ADB: Asian Development Bank, NHIDCL: National Highway Infrastructure Development Corporation Limited., EA: Executing Agency, CSC: 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 (CSC) 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 CSC that takes the responsibility of signing approval documents on behalf of the CSC team. The “environmental officer” is the environmental specialist under the CSC who is responsible for providing recommendations to the CSC team leader for approving activities specific to environment safeguards on behalf of “the engineer”.

Annexure Environmental Monitoring Cost

ENVIRONMENTAL MONITORING PLAN

Env. Indicators	Project Stage	Parameters	Method/ Guidelines	Location	Frequency and Duration	Standards	Approximate cost (₹)	Implementation	Supervision
Air Quality	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 3 years	Air quality standard by CPCB	4x9000x4x3 = ₹432,000.00	Contractor through approved monitoring agency	NHIDCL /CSC
	Operation stage			Representative sample 1 each for residential, commercial/Industrial and Sensitive Locations (Total 3 Locations)-	24 hr continuous, 3/year for 1 year	Air quality standard by CPCB	3X9000x3X1 = ₹ 81,000	NHIDCL through approved monitoring agency	NHIDCL
Water Quality	Construction stage	Ground water: (IS: 10500:1991) and Surface water criteria for freshwater classification	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 3 years	Water quality standard by CPCB	4x 6000x4X3 = ₹ 288,000.00	Contractor through approved monitoring agency	NHIDCL /SC
	Operation stage			Groundwater at 2 locations and surface water at 1 locations and pond developed due to Borrows areas (Total 4 Samples)	2/year for 1 year	Water quality standard by CPCB	4X2x6000X1 = ₹ 48000.00	NHIDCL through approved monitoring agency	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:4954-1968Using Noise level meter	Construction sites, Construction Camp and 1 each at residential, commercial and sensitive locations along the alignment. (5 Locations) -	24 hr continuous, 4/year for 3years	National Ambient Noise Standard specified in Environment Protection Act, 1986	5x3000x4x3 = ₹180000.00	Contractor through approved monitoring agency	NHIDCL/C S C
	Operation stage			1 each at Sensitive and residential Commercial areas(3 Locations)	3 / year for 1 year		3x3000x3X1 = ₹ 27, 000	NHIDCL through approved monitoring	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 3 years	ICAR standard	3x1x5000 = ₹ 15,000.00	Contractor through approved monitoring agency	NHIDCL CSC
	Operation stage	Oil and grease		At oil spillage locations and other probable soil contamination location (2 Locations)	Twice for the first year of operation	CPCB standard	2*2*5000X1 = ₹ 20000	NHIDCL through approved agency	NHIDCL
Soil Erosion	Construction Stage			Throughout the Project Corridor especially at	After first rain	Visual Checks	Included in Engineering Cost	Contractor	NHIDCL CSC

Annexure Environmental Monitoring Cost

Env. Indicators	Project Stage	Parameters	Method/ Guidelines	Location	Frequency and Duration	Standards	Approximate cost (₹)	Implementation	Supervision
	Operation Stage	Visual check for Soil erosion and siltation		River banks, bridge locations and river training structures	Once during operation of 1st year	Visual Checks	Routine Engineering Work	Engineering Team of NHIDCL	
Drainage Congestion	Construction stage	Visual Checks		Throughout the Project Corridor especially Probable drainage congestion areas	Once in a year before rainy season	None Specific	Included in Engineering Cost	Contractor'	NHIDCL/CS C
	Operation Stage				Once in a year before rainy season	None Specific	Routine Engineering Work	NHIDCL	
Borrow Areas	Construction Stage	Visual Checks	IRC guidelines	Borrow areas to be operated	Once in a month	IRC guidelines + Compliance conditions of DEIAA	Part of the Contractor's quote	Contractor with approval from NHIDCL	NHIDCL/CS C
	Operation Stage	Visual Checks	Rehabilitation as per IRC guidelines	Closed Borrow Areas	Quarterly for 1 year			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/CS C
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 Additional Plantation: NHIDCL Cost	Compensatory: NHIDCL/Local Forest Departments Additional Plantation: NHIDCL through contractor of forest dept.	
	Operation stage	Audit for survival rate of trees plantation		Throughout the Project Section	IRC: SP:2009			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	
Record of Accident	Construction Stage	Type, nature and cause of accidents. Methodology as suggested by CSC and approved by NHIDCL		Throughout the stretch including construction sites, crusher, diversions, HMP, earthwork, demolition site etc.	occurrence of accidents	As suggested by PMC/SC	Part of the regular monitoring	Contractor	NHIDCL/CS C
	Operation stage			Throughout the stretch	occurrence of accidents	-	-	Road Safety unit of NHIDCL with support from	
Monitoring Costs: INR 1,091,000.00									

NHIDCL: National Highway Infrastructure Development Corporation Limited, NPK: Nitrogen, Phosphorous and Potassium, CSC: Construction Supervision Consultant, EIA: Environmental Impact Assessment, IRC: Indian Road Congress, SPCB: State Pollution Control Board, CPCB: Central Pollution Control Board, IS: Indian Standard

RESETTLEMENT ACTION PLAN (RAP)

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1. EXECUTIVE SUMMARY

1.1 Description of the Project

Introduction

National Highways & Infrastructure Development Corporation Limited (NHIDCL), (Ministry of Road Transport & Highways, Govt. of India) has been assigned the work of preparation of DPR and providing Pre-Construction activities on NH-244 (Old NH-1B) in the state of J&K

In pursuance of the above TPF Getinsa Euroestudios as S.L. In Association with Rodic Consultants Pvt. Ltd., New Delhi have been appointed as Consultants to carry out the Consultancy Services for Preparation of Detailed Project Report and providing Pre-Construction activities in respect of the following stretches on NH-244 (old NH-1B) in the State of Jammu & Kashmir. (i) Sudhmahadev – Dranga Tunnel of approx. length 4.5 Km and its approach roads on Chenani – Sudhmahadev – Goha road portion. (ii) Vailoo Tunnel of approx. length 10.00 Km under Sinthan Pass and its approach roads on Goha – Khellani – Khanabal road portion & the extended road section from Goha side approach road of Sudmahadav Saranga tunnel upto Khellani town.in the State of Jammu and Kashmir. The Agreement was signed on the 20th day in the month of February 2018.

The proposed length of project road is 16.490 Km including a tunnel (bi-directional) named as Khellani tunnel to bypass the Khellani town in the State of Jammu & Kashmir.

1.2 Objective of the Project

Developing the Project in the following primary objectives:

The plan is based on Resettlement Framework (RF) which is consistent with ADB's Safeguard Policy Statement-2009, National Resettlement and Rehabilitation Policy (NRRP 2007) and State Land Acquisition Act (LAA) 1990. The primary objective of RP is to restore the income and living standards of the Displaced Persons (DPs) within a shortest possible time without any disruptions in their own economic and social environment.

- Enhanced safety and level of service for the road users.

- Superior operation and maintenance enabling enhanced operational efficiency of the Project.
- Minimal adverse impact on the local population and road users due to tunnel construction.
- Minimal adverse impact on environment.
- Minimal additional acquisition of land.
- Phased development of the Project for improving its financial viability consistent with the need to minimize frequent inconvenience to traffic that may be caused if additional works are undertaken within the commencement of construction of the Project tunnel & its approaches.

1.3 Need for resettlement in the project

The aim of this Resettlement is to mitigate all such unavoidable negative impacts caused due to the project and resettle the displaced persons and restore their livelihoods. Plan complies with ADB Safeguard Policy Statement-2009 designed by ADB to protect the rights of the displaced persons and communities. The issues identified and addressed in this document are as follows:

- Type and extent of loss of land/ non-land assets, loss of livelihood, loss of common property resources and social infrastructure
- Impacts on indigenous people, vulnerable groups like poor, women and other disadvantaged sections of society
- Public consultation and people's participation in the project
- Existing legal and administrative framework and formulation of resettlement policy for the project
- Preparation of entitlement matrix, formulation of relocation strategy and restoration of businesses/income
- R&R cost estimate including provision for fund
- Institutional framework for the implementation of the plan, including grievance redress mechanism and monitoring & reporting.

2. DESCRIPTION OF PUBLIC CONSULTATION

Public consultation and participation have been viewed as a continuous two-way process, involving, promoting of public understanding of the processes and mechanisms through which developmental problems and needs are investigated and solved. The public consultation, as an integral part of environmental and social assessment process throughout the project preparation stage not only minimizes the risks and unwanted political propaganda against the project but also abridges the gap between the community and the project formulators, which leads to timely completion of the project and making the project people friendly

Therefore, keeping in mind the above objective public consultation with the people of different section of the society along the road, social agencies, shop keepers, community representatives, village heads and respectable and influential persons of the project area were made. Moreover, potential vulnerable people like, squatters, encroachers, schedule caste of society were also consulted with the aim to make people aware and minimize adverse impacts of the project.

2.1 Definition of PAP'S & the Eligibility Criteria

The involuntary taking of land results in relocation or loss of shelter; and loss of assets or access to assets or loss of income sources or means of livelihood, whether the PAPs must move to another location or not.

Persons who encroach on the area after the cut-off date are not entitled to compensation or any other form of resettlement assistance.

Therefore, all project affected persons irrespective of their status or whether they have formal titles, legal rights or not are eligible for assistance if they occupied the land or had use of it, before the entitlement cut-off date.

Sr. No.	Project impact	PAP category	Asset affected	Compensation guide
1.	Temporary acquisition of land	Land owner	Land	Rental value of land based on market rates including rates for current period and restoration of land and all assets thereon to

Sr. No.	Project impact	PAP category	Asset affected	Compensation guide
				former status, including compensation for relocation and transfer a) movable assets, domestic materials; b) state and municipal assets; c) recovery of source of income for period used.
2.	Permanent acquisition of land for works, construction, or as part of first sanitary protection area.	Land owner	Land	Replacement land of equivalent market value as priority option, to be acceptable to PAP and should be of the same size and productive capacity as affected one. Failing availability of land, cash compensation at replacement cost as well as cost and fees for documentation and re-registration of rights and expenses for reinstatement of land up to the condition similar to the condition of the land impacted by the project will be paid (and 10% if over 20% of land acquisition) as a severe impact subsidy. If the remainder of the plot is not viable the entire plot will be acquired.
3.	Permanent acquisition of legal structure.	Owner of structure/building	Any structure including fence, sanitation structure etc.	Replacement structure or cash compensation at replacement cost as well as a right to salvage materials.
4.	Permanent acquisition of	Owner of structure	Any structure including	Replacement of structure or cash compensation at

Sr. No.	Project impact	PAP category	Asset affected	Compensation guide
	illegal structure		house, fence, sanitation structure etc.	replacement cost as well as a right to salvage materials.
5.	Restriction of access to homes.	Tenant or house owner	Section of residential compound temporarily affected or access to house affected by works	Restoration of land to original condition after works. In kind compensation for temporarily affected need such as alternative car parking facility. Disturbance allowance set on the basis of minimum wage for each week (7 days) of disturbance calculated on a pro rata basis of minimum wage (a specific calculation of the allowance would be established in each RAP).
6.	Vendors or business entrepreneur	Owner of business	Temporary loss of business due to works	Cash compensation of estimated business loss assessed from records of preceding 3 months or equivalent business (if no records). Disturbance allowance equivalent to 7 days of business profit.
7.	Farmer with land title	Owner	Crops	In addition to land compensation, it will be allowed to take standing crop and cash compensation for agricultural season at highest market value or according to rates of the MORTH/RCD Jammu & Kashmir, whichever is higher
8.	Tenant farmer	Tenant	Crops	It will be allowed to take standing crop and cash

Sr. No.	Project impact	PAP category	Asset affected	Compensation guide
				compensation for agricultural season at highest market value or according to rates of the MORTH/RCD Jammu & Kashmir, whichever is higher. For temporary use of land where a growing season will be lost, compensation will be provided for the lost growing season based on the market value of the last crop grown.
9.	Fruit tree owner	Owner	Fruit tree	Price of a sapling and cash compensation for the value of the harvest multiplied by number of years it will take for the sapling to reach maturity.
10.	Vulnerable people	Identified both based on social payments (disability payments, pensioners, widows/women headed households and impoverished households) and consultations.	Residential and commercial assets	1. In addition to compensation for assets lost, a social allowance for the period of one year will be paid. 2. Assistance during moving and in transportation of materials will be provided as required. 3. Special attention will be paid to reinstatement of income.

2.2 Socio-Economic profile of Jammu and Kashmir

As per details from Census 2011, Jammu and Kashmir has population of 1.25 Crores, an increase from figure of 1.01 Crore in 2001 census. Total population of Jammu and Kashmir as per 2011 census is 12,541,302 of which male and female are 6,640,662 and 5,900,640 respectively. In 2001, total population was 10,143,700 in which males were

5,360,926 while females were 4,782,774. The total population growth in this decade was 23.64 percent while in previous decade it was 29.04 percent. The population of Jammu and Kashmir forms 1.04 percent of India in 2011. In 2001, the figure was 0.99 percent.

Recently as per Jammu and Kashmir census data, 96.73% houses are owned while 2.19% were rented. In all, 73.51% couples in Jammu and Kashmir lived in single family

Jammu and Kashmir Population 2018

As per projection, population of Jammu and Kashmir in 2018 is 1.44 Crore.

Jammu and Kashmir Table Data Table No-1

DESCRIPTION	2001	2011
Approximate Population	1.01 Crore	1.25 Crores
Actual Population	10,143,700	12,541,302
Male	5,360,926	6,640,662
Female	4,782,774	5,900,640
Population Growth	29.04%	23.64%
Percentage of total Population	0.99%	1.04%
Sex Ratio	892	889
Child Sex Ratio	941	862
Density/km2	46	56
Density/mi2	118	146
Area (Km2)	222,236	222,236
Area mi2	85,806	85,806
Total Child Population (0-6 Age)	1,485,803	2,018,905
Male Population (0-6 Age)	765,394	1,084,355
Female Population (0-6 Age)	720,409	934,550
Literacy	55.52 %	67.16 %
Male Literacy	66.60 %	76.75 %
Female Literacy	43.00 %	56.43 %
Total Literate	4,807,286	7,067,233
Male Literate	3,060,628	4,264,671

Jammu and Kashmir Religious Data

Jammu & Kashmir is Muslim majority state in India with approximately 68.31 % of state population following Islam as their religion. Hinduism is second most popular religion in state of Jammu and Kashmir with approximately 28.44 % following it. In Jammu and Kashmir state, Christianity is followed by 0.28 %, Jainism by 0.02 %, Buddhism by 0.90 % and Sikhism by 1.87 %. Around 0.01 % stated 'Other Religion',

approximately 0.16 % stated 'No Particular Religion'.

Table No-2

DESCRIPTION	POPULATION	PERCENTAGE
Muslim	8,567,485	68.31 %
Hindu	3,566,674	28.44 %
Sikh	234,848	1.87 %
Buddhist	112,584	0.90 %
Christian	35,631	0.28 %
Jain	2,490	0.02 %
Other Religion	1,508	0.01 %

Sudhmahadev Population- Udhampur, Jammu and Kashmir

Sudhmahadev is a medium size village located in Chenani Tehsil of Udhampur district, Jammu and Kashmir with total 348 families residing. The Sudhmahadev village has population of 1901 of which 971 are males while 930 are females as per Population Census 2011.

In Sudhmahadev village population of children with age 0-6 is 344 which makes up 18.10 % of total population of village. Average Sex Ratio of Sudhmahadev village is 958 which is higher than Jammu and Kashmir state average of 889. Child Sex Ratio for the Sudhmahadev as per census is 1036, higher than Jammu and Kashmir average of 862.

Sudhmahadev village has lower literacy rate compared to Jammu and Kashmir. In 2011, literacy rate of Sudhmahadev village was 61.14 % compared to 67.16 % of Jammu and Kashmir. In Sudhmahadev Male literacy stands at 70.95 % while female literacy rate was 50.73 %.

As per constitution of India and Panchyati Raj Act, Sudhmahadev village is administrated by Sarpanch (Head of Village) who is elected representative of village

Sudhmahadev Data Table No-3

PARTICULARS	TOTAL	MALE	FEMALE
Total No. of Houses	348	-	-
Population	1,901	971	930
Child (0-6)	344	169	175
Schedule Caste	659	342	317
Schedule Tribe	270	145	125
Literacy	61.14 %	70.95 %	50.73 %
Total Workers	815	494	321

PARTICULARS	TOTAL	MALE	FEMALE
Main Worker	539	-	-
Marginal Worker	276	22	254

2.3 Socio Economic Profile of the Project Area

A. General Socioeconomic Profile of Project Area

Some of the socio-economic information of DPs was collected through the census survey and its findings are presented in the following sections. The analysis of sample baseline socio-economic information of APs is discussed in length in the Poverty and Social Analysis Report prepared for the project.

B. Number of DPs

There are 84 DPs in total being affected by the project which includes 51 (60.71%) males and 33 (39.29%) females. The details of DPs being affected in the project are presented in the Table-5

Table no-5 No. of DPs

Sr. No.	Categories of DPs	No. of DPs	%
1.	Male	51	60.71
2.	Female	33	39.29
	Total	**84**	**100.00**

C. SOCIAL IMPACT ON COMMUNITY

Improved roads will bring great benefits to women and girls. Direct benefits include a decrease in travel time and an increase in reliable and convenient transport services. Indirect benefits include improved access to products and services, including social services such as health, education, as well as other government services. During construction, women will also benefit from the increased employment opportunities. However, road construction and improvements may also lead to potential negative impacts such as the spread of STI (sexually transmitted infections), trafficking, and road safety issues. Potential negative impacts will be addressed through community awareness raising sessions that will be implemented by the NGO. The NGO will coordinate with relevant organization or mobilize its own short-term experts in carrying out the activities. In addition, the contractor will also carry out HIV/AIDS awareness program among worker camps and nearby community as mandated in their

contract.

Carry out meaningful consultations with displaced persons, host communities, and concerned nongovernment organizations. Inform all displaced persons of their entitlements and resettlement options. Ensure their participation in planning, implementation, and monitoring and evaluation of resettlement programs. Pay attention to the needs of vulnerable groups, especially those below the poverty line, the landless, the elderly, women and children, and indigenous peoples, and those without legal title to land, and ensure their participation in consultations. Establish a grievance redress mechanism to receive and facilitate resolution of the concerns of displaced persons. Support the social and cultural institutions of displaced persons and their host population. Where involuntary resettlement impacts and risks are highly complex and sensitive, compensation and resettlement decisions should be preceded by a social preparation phase.

Improve, or at least restore, the livelihoods of all displaced persons through;

I. land-based resettlement strategies when affected livelihoods are land based where possible or cash compensation at replacement cost for land when the loss of land does not undermine livelihoods,

II. prompt replacement of assets with access to assets of equal or higher value,

III. prompt compensation at full replacement cost for assets that cannot be restored, and

IV. Additional revenues and services through benefit sharing schemes where possible.

Provide physically and economically displaced persons with needed assistance, including the following:

(i) if there is relocation, secured tenure to relocation land, better housing at resettlement sites with comparable access to employment and production opportunities, integration of resettled persons economically and socially into their host communities, and extension of project benefits to host communities;

(ii) transitional support and development assistance, such as land development,

credit facilities, training, or employment opportunities; and

(iii) Civic infrastructure and community services, as required.

Improve the standards of living of the displaced poor and other vulnerable groups, including women, to at least national minimum standards. In rural areas provide them with legal and affordable access to land and resources, and in urban areas provide them with appropriate income sources and legal and affordable access to adequate housing.

Develop procedures in a transparent, consistent, and equitable manner if land acquisition is through negotiated settlement to ensure that those people who enter into negotiated settlements will maintain the same or better income and livelihood status.

Ensure that displaced persons without titles to land or any recognizable legal rights to land are eligible for all compensation, relocation and rehabilitation measures, except land.

Prepare a resettlement plan elaborating on the entitlements of displaced persons, the income and livelihood restoration strategy, institutional arrangements, monitoring and reporting framework, budget, and time-bound implementation schedule. This resettlement plan will be approved by ADB prior to contract award.

Disclose a draft resettlement plan, including documentation of the consultation process in a timely manner, before project appraisal, in an accessible place and a form and language(s) understandable to displaced persons and other stakeholders. Disclose the final resettlement plan and its updates to displaced persons and other stakeholders.

Conceive and execute involuntary resettlement as part of a development project or program. Include the full costs of resettlement in the presentation of project's costs and benefits. For a project with significant involuntary resettlement impacts, consider implementing the involuntary resettlement component of the project as a stand-alone operation.

Pay compensation and provide other resettlement entitlements before physical or economic displacement. Implement the resettlement plan under close supervision throughout project implementation.

Monitor and assess resettlement outcomes, their impacts on the standard of living of

displaced persons, and whether the objectives of the resettlement plan have been achieved by taking into account the baseline conditions and the results of resettlement monitoring. Disclose monitoring reports.

3. LEGAL & ENTITLEMENT POLICY FRAMEWORK

A. Introduction

The legal framework and principles adopted for addressing resettlement issues in the project have been guided by the existing legislation and policies of the Government of India (GOI), the Government of Jammu & Kashmir and Asian Development Bank.

3.1 Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act (RFCT in LARR), 2013

The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (RFCT in LARR Act - 2013) has been effective from January 1, 2014 after receiving the assent of the President of Republic of India. This Act extends to the whole of India except the state of Jammu and Kashmir. The Act replaced the Land Acquisition Act, 1894.

The aims and objectives of the Act include: (i) to ensure, in consultation with institutions of local self-government and Gram Sabha's established under the constitution of India, a humane, participative, informed and transparent process for land acquisition for industrialization, development of essential infrastructural facilities and urbanization with the least disturbance to the owners of the land and other affected families; (ii) provide just and fair compensation to the affected families whose land has been acquired or proposed to be acquired or are affected by such acquisition; (iii) make adequate provisions for such affected persons for their rehabilitation and resettlement; (iv) ensure that the cumulative outcome of compulsory acquisition should be that affected persons become partners in development leading to an improvement in their post-acquisition social and economic status and for matters connected therewith or incidental thereto.

Section 27 of the Act defines the method by which market value of the land shall be computed under the proposed law. Schedule I outlines the proposed minimum compensation based on a multiple of market value. Schedule II through VI outline the

resettlement and rehabilitation entitlements to land owners and livelihood losers, which shall be in addition to the minimum compensation per Schedule I.

The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (Amendment) Second Ordinance, 2015: With an intention to overcome the procedural difficulties in land acquisition for important national projects, President of India has issued an amendment ordinance on 30th May 2015. Three main features of the ordinance among others are as following:

(i) The Chapter II and III of the RFCT in LARR Act - 2013 regarding determination of social impact assessment and public purpose and special provision to safeguard food security shall not apply to the project such as

  (a) vital to national security or defence of India and every part thereof, including preparation for defence or defence production;

  (b) rural infrastructure including electrification;

  (c) affordable housing and housing for the poor people;

  (d) industrial corridors; and

  (e) 24 infrastructure and social infrastructure projects including projects under public private partnership where the ownership of land continues to vest with the Government.

(ii) The five-year period set by the principal Act in Section 24 under sub-section (2), for lapse of 1894 Act shall exclude the cases where acquisition process is held up on account of any stay or injunction issued by any court or the period specified in the award of a Tribunal for taking possession.

(iii) The five-year period set by the principal Act for any land acquired and unused is now will be a period specified for the setting up of any project or five years, whichever is later.

3.2 ADB's Safeguard Policy Statement (SPS), 2009

The objectives of ADB's SPS (2009) with regard to involuntary resettlement are: (i) to avoid involuntary resettlement wherever possible; (ii) to minimize involuntary resettlement by exploring project and design alternatives; (iii) to enhance, or at least

restore, the livelihoods of all displaced persons in real terms relative to pre-project levels; and (iv) to improve the standards of living of the displaced poor and other vulnerable groups.

ADB's SPS (2009) covers physical displacement (relocation, loss of residential land, or loss of shelter) and economic displacement (loss of land, assets, access to assets, income sources, or means of livelihoods) as a result of; (i) involuntary acquisition of land, or (ii) involuntary restrictions on land use or on access to legally designated parks and protected areas. It covers displaced persons whether such losses and involuntary restrictions are full or partial, permanent or temporary.

The three important elements of ADB's SPS (2009) are: (i) compensation at replacement cost for lost assets, livelihood, and income prior to displacement; (ii) assistance for relocation, including provision of relocation sites with appropriate facilities and services; and (iii) assistance for rehabilitation to enhance, or at least restore, the livelihoods of all displaced persons relative to national minimum standard of living.

3.3 Jammu & Kashmir State Land Acquisition Act 1990 (1934 AD)

The Land Acquisition Act (LAA) 1894, as amended in 1984 which is in force in rest of India is not applicable to the State of Jammu and Kashmir. The Sate Land Acquisition Act 1990 (1934 AD) is in force in state of Jammu and Kashmir. The Act provides the legal framework for land acquisition for a public purpose in J&K. It enables the State Government to acquire private lands for a public purpose and seeks to ensure that no person is deprived of land except under the Act. The general process for land acquisition under L.A Act is:

(i) As per the rules of the State Land Acquisition Act 1990(1934 AD) land for the public purpose could be acquired through two processes:

a. Private Negotiation

b. Compulsory Land Acquisition under the provisions of the Land Acquisition Act.

(ii) Steps that are to be followed under Jammu and Kashmir State Land Acquisition Act. 1990 (1934AD) are as follows:

Placing of Indent by Indenting Department. The department entrusted with execution and supervision of the work shall prepare information as to the situation and general character of the land acquired, after the information has been compiled same is send to Collector concerned with the request to acquire the land.

Preparation of the Revenue Documents (Shajra & Khasra) – Once the collector receives the indent from the concerned department; the Revenue Documents (Shajra & Khasra) are prepared to know the ownership status and quantum of land to be acquired.

Issuance of Land Acquisition Notification: Once the revenue documents are prepared, the collector issues notification under section 4 (i) that land is required for the public purposes and inviting of objection from the land owners within fifteen days of issuance of notification.

Conducting of the Private Negotiation: After the lapse of fifteen days, concerned Deputy Commissioner is requested by the Collector to call the meeting of the Private Negotiation Committee of which concerned DC is the Chairman. Other members are i) Collector Land Acquisition to whom intend is placed ii) Engineer from Intending Department iii) Collector Land Acquisition of the concerned district. iv) District Superintending Engineer v) Concerned Tehsildar vi) Concerned Naib Tehsildar vii) Land owners.

Before initiating the negotiations, the committee ascertains the maximum price which is offered for land owners if acquired by private negotiation. The District Collector takes following things into consideration

(i) Directs Tehsildar to communicate the rates.

(ii) Refers to the Master rates approved by the Divisional Commissioner concerned.

(iii) Refers to the rate at which the land has been earlier acquired in the nearby area.

(iv) Utility, Location of the Land.

After taking in to consideration all the above listed facts the appreciated rates are offered and negotiated with the land owners.

The valuation of structures is done by PW (R&B) Dept, for Fruit Trees from horticulture and non-fruit trees from Forest or Social Forestry Department.

Compulsory Acquisition: Wherein the private negotiations with the title holders fail, the Deputy Commissioner shall communicate the result of the negotiation to Intending Department who may initiate proceeding for compulsory acquisition of land under the provisions of the Act.

Shajra or Village Map is a detailed map of the village that is used for legal (land ownership) and administrative purposes in India and Pakistan. Shajra maps out the village lands into land parcels and gives each parcel a unique number.

A Khasra or index register to the map. It is the list showing, by number, all the fields and their area, measurement, who owns what cultivators he employs, what crops, what sort of soil, what trees, are on the land.

3.4 National Rehabilitation and Resettlement Policy (NRRP-2007)

The National Rehabilitation & Resettlement Policy, 2007 for the Project affected Families (PAFs) have been prepared by the Department of Land Resources, Ministry of Rural Development and Government of India. The policy stipulates the minimum benefits to be ensured foe persons displaced due to acquisition of land for public purposes.

The objectives of the Policy are:

- To minimize displacement and to identify the non-displacing or least displacing alternatives;
- To plan the Resettlement and Rehabilitation of project affected families (PAFs), or Project

Affected Households (PAHs), including tribal and vulnerable households;

- To provide improved standard of living to PAFs or PAHs; and
- To facilitate a harmonious relationship between DFCCIL/CA and PAFs

The Policy is applicable to projects displacing 400 or more family's masse in plain areas, or 200 or more family's masse in tribal or hilly areas, Desert Development Programme (DDP) blocks, and areas mentioned in Schedule V and Schedule VI of the Constitution of India. However, the basic principles of policy can be applied to rehabilitation and resettlement of PAFs regardless of the number of PAFs. The policy

provides specific measures for vulnerable and poor groups. The salient feature and the statements of the

NRPP policy are as follows:

- (SIA shall be mandatory for all projects involving displacement of four hundred or more family's masses in plain areas, or two hundred or more families' masses in tribal or hilly areas etc. Co-ordination with EIA in the context of the public hearing done in the project affected are for EIA shall also cover issues related to SIA.
- Consultations with project affected people and disclosure of relevant information to them at various stages of resettlement planning;
- Affected people without legal rights also need to be assisted (affected people categorized
- landless agricultural workers, forest dwellers, tenants and artisans who are critically dependent on the acquired assets for their subsistence/ livelihoods);
- Prepare resettlement plans that are disclosed to the project affected people in draft form, and reviewed and approved by competent authorities;
- Collection of socio-economic base line data for project affected households;
- Vulnerable project affected people will get extra cash/kind assistance;
- A monitoring cell should be constituted under the project.
- Each project affected family comprising of rural artisan/small trader and self-employed person shall be granted one-time financial assistance for construction of working shed/shop for livelihood support.

3.5 The National Highways Act, 1956 (As Amended in 1997)

This Act governs the acquisition of land for building, maintenance, management or operation of the national highways in India. The land acquisition provisions of NH Act are basically like that of LAA, 1894 except that the land acquisition can now be initiated and completed directly by 'competent authority' appointed by the Govt. of India without going through the administrative apparatus of the concerned State Government. NH Act is silent on the quantum of solatium to be paid. 'Competent Authority', under Section 3 of NH Act, is also vested with the power of a civil court

under the Code of Civil Procedure, 1908 (5 of 1908) in matters pertaining to Land Acquisition under the Act. However, if the compensation amount determined by the competent authority is not acceptable to any affected party, there is a provision for appointment of the arbitrator (to be appointed by the Central Government) as per the provisions of the Arbitration and Conciliation Act, 1996 (26 of 1996).Through the NH Act, Govt. of India have assumed wide-ranging powers, trying to keep land acquisition for national highways beyond the purview of the State Govt. administrative procedures as well as judicial processes that may tend to delay land acquisition processes. The following procedure is adopted in general to acquire the land under this Act:

a) Section 3(a) - By notification in the Official Gazette, a person or authority who is authorised by the Central Government, is appointed to perform the functions of the competent authority for such area as may be specified in the notification.

b) Section 3A- Where the Government is satisfied that for a public purpose any land is required for the building, maintenance, management or operation of a national highway or part thereof, it may, by notification in the Official Gazette, declare its intention to acquire such land. The notification includes the name of the district, village name, and survey number, area of the land and status of land.

c) Section 3 B- On the issue of a notification under Section 3A and publication of notification in local newspaper, the person, authorised by the Government in this behalf, to enter the intended land for the actual measurement of the land.

d) Section 3 C- Any person interested in the land may, within twenty-one days from the date of publication of the notification under Section 3A, object to the use of the land for the purpose or purposes mentioned in that sub-section.

e) Section 3 D- Where no objection under section 3C has been made to the competent authority within the period specified therein or where the competent authority has disallowed the objection under

f) Section 3C, the competent authority submits, as soon as may be, a report accordingly to the Government and on receipt of such report, the Government declares, by notification in the Official Gazette, that the land should be acquired for the purpose or purposes mentioned in Section 3A. On the publication of the

declaration, the land is vested absolutely in the Government free from all encumbrances.

g) Subsequently, the Government may take the possession of the land under Section 3 E. Competent authority is empowered to determine the amount of the compensation to the title holder under Section 3 G and payment is made under Section 3 H.

The basic principles of Resettlement Plan include the following elements:

a) As a matter of policy, land acquisition, and other involuntary resettlement impacts would be minimized as much as possible;

b) Any land acquisition and/or resettlement will be carried out and compensation provided in order to improve or at least restore the pre-Project income and living standards of the affected people;

c) Screen the project early on to identify past, present and future resettlement impacts and risks;

d) Carry out meaningful consultations with affected people, host communities and concerned key stakeholders on compensation options and prepare Resettlement Plan (RP) in accordance with this Framework;

e) Payment of compensation for acquired assets at market/replacement rates;

f) Ensure that DPs without title to land or any recognizable legal rights to land are eligible for resettlement assistance and compensation for loss of non-land assets;

g) Payment of compensation for lost land, housing, assets and resettlement allowances in full prior to the contractor taking physical acquisition of the land and prior to the commencement of any construction activities;

h) All compensation and other assistances will be paid to all DPs prior to commencement of civil works

i) Income restoration and rehabilitation.

j) An Entitlement Matrix for different categories of people affected by the project has been prepared and provisions will be kept in the budget for those who were not present at the time of census survey. However, people moving in the project area

after the cut-off date will not be entitled to any assistance. In case of land acquisition, the date of notification for acquisition will be treated as cut-off date. For non-titleholders such as squatters and encroachers, the date of project census survey or a similar designated date declared by the executing agency will be considered as cut-off date;

k) Special attention to vulnerable groups; and,

l) Establish a grievance redress mechanism to receive and facilitate resolution of DPs concerns.

The DPs identified in the subproject areas on the cut-off date will be entitled to compensation for their displaced assets, and rehabilitation measures as outlined in the entitlement matrix. Compensation eligibility is limited by a cut-off date as set for this subproject. They however will be given enough advance notice (30 days) and will be requested to vacate premises and dismantle affected structures prior to project implementation. In case of the temporary impacts, advance notice will be given.

3.6 Entitlement Matrix

A detailed Entitlement Matrix which lists various types of subproject losses, identification/eligibility and entitlements and provides for basic parameters for preparation of compensation and resettlement benefits is provided below.

ENTITLEMENT MATRIX

(Resettlement Framework for Jammu & Kashmir)

Type of Loss	Identification of Affected Households	Entitlement	Entitlement Details
1. Loss of Agricultural Land	DPs with legal titles / rights, recognizable legal rights, usufruct and traditional titles / rights for affected land	Land-for-land or compensation in cash at Replacement value.	a. In case of partial impact on land with the remaining land is economically viable for continued use, compensation in cash at replacement cost8. b. In case of loss of entire land holding, the DPs will be entitled to: i) Replacement land of equivalent productive potential if available to EA and acceptable to the DPs; OR ii) Where the location is not acceptable to the DPs, compensation in cash for the entire land- holding. c. In case of entire loss of productive land DPs will be entitled to Transition Allowance equivalent to the total income derived from the affected land in the last 2 years. d. In case of replacement land, the cost of registration, stamps etc. will be borne by the project.
	Sharecroppers and leaseholders	Compensation in cash	a. Sharecroppers will receive compensation for their share of the loss of crops. b. Leaseholders will receive compensation equivalent to the remaining part of the lease amount; c. Additionally, affected sharecroppers and leaseholders will receive cash assistance

Type of Loss	Identification of Affected Households	Entitlement	Entitlement Details
			equivalent to 6 months of incomes derived from the affected land
2. Loss of residential or commercial land	DPs with legal rights/ titles, recognizable rights or traditional rights to the affected land	Land-for-Land or Compensation at replacement cost	For entire loss of residential, commercial, industrial or institutional land, or where only a part of the land affected but the remaining land is rendered too small according to the local zoning laws: a. where available and feasible DPs will be provided replacement land of similar attributes to that is lost or compensation in cash at replacement cost. b. In case of replacement land, the cost of registration, stamps etc. will be borne by the project.
			For loss of residential, commercial, industrial or institutional land with remaining land sufficient in accordance with the zoning law and for remaining affected structure, DPs will be entitled to compensation in cash at replacement cost.

	Tenants and leaseholders	Compensation at replacement cost	a. For entire loss of land the Leaseholders will get an equivalent area of leased land or reimbursement for un-expired lease period. b. In case of partial loss of land Leaseholders will get reimbursement for un-expired lease period for the portion of land lost. -In case of replacement land, the cost of registration, stamps etc. will be borne by the project. c. Tenants will receive rental allowance equivalent to three months rental value. -Compensation for any improvements done by tenants and leaseholders
B: LOSS OF STRUCTURES			
3. Loss of structures	Owners of affected structures	Compensation in cash at replacement cost	For partial loss of structure and the remaining structure viable for continued use, DPs will be entitled to compensation for the affected part of the structures calculated as per the latest prevailing Basic Schedule of Rates (BSR) without depreciation or deductions for salvaged material; and Repair allowance for improvement of the remaining structure where applicable @ 10% of compensation calculated for the affected part of structure.

			For entire loss of structures or where only partial impact, but the remaining structure is rendered unviable for continued use: -DPs will be entitled to compensation for the entire structure calculated as per the latest prevailing Basic Schedule of Rates (BSR) without depreciation or deductions for salvaged material; -Right to salvage material from demolished structure; and -A lump sum transfer grant at the rate of INR 3,000 for temporary, INR 4,000 for semi-permanent, and INR 10,000 for permanent structure for shifting household assets and other belongings to the new area.
	Tenants and leaseholders of affected structures	Rental Assistance	a) Tenants would only be given rental assistance on a case-by-case basis in the form of grant for a period of three months. b) Additional structures erected by tenants will also be compensated and deducted from owner‘s compensation amount. c) Any advance deposited by the tenants or leaseholders will be deducted from owner’s total compensation package.

4. Impact on market place / shops/businesses / commercial enterprises	Titleholder (Owner Operator) & non-titleholder (tenants Operator,) losing/shops/ commercial enterprise.	Relocation Assistance	Affected enterprise whose commercial structure can no longer be used for commercial purpose as a result of the Project impact will be provided with the following options: a) All operators will be provided cash compensation as decided by the DLC on case to case basis depending upon their income, size and location of the shop Or Project assisted relocation option where available will be based on i) Owner Operator: Will be given a shop in lieu of compensation. with same ownership status. No additional compensation will be paid to him/her. ii) Tenant Operator: Will be provided shop on rent. For first 3 months, no rent will be charged and after three months tenants will have to pay the agreed rent. Or If a tenant wishes to own the same, he/she has to pay the cost of the shop. Those opting for this option will not be paid cash compensation for their structure loss. b) A lump sum transfer grant at the rate of INR 3000 for temporary, INR 4,000 for Semi-temporary and INR 10,000 for permanent structures for shifting of assets and other belonging to new area; and c) Right to salvage material from demolished structure.

C: LOSS OF CROPS & TREES			
5. Loss of crops and trees	Owner / operators /Tenants affected	Compensation at ‗market value'	a) Advance notice to DPs to harvest their crops. b) In case of standing crops, cash compensation for loss of agricultural crops at current market value of mature crops based on average production. c) Compensation for loss of timber trees at current market value of wood/timber or firewood depending on the kind of tree to be computed by concerned department. d) In case of fruit trees, compensation at average fruit production to be computed by concerned department.
D: LOSS OF LIVELIHOOD SOURCE			
6. Loss of primary source of income	Titleholders losing income through business	Transitional assistance	DPs losing their business establishment due to displacement will be assisted in the form of a grant for the days of closure up to a maximum of three months of their income from affected business.
	Titleholders losing income from loss of agricultural land	Assistance for income restoration	DPs will be entitled to income restoration assistance / vocational training/ skill up gradation options as per DPs choice equivalent to a maximum of INR 10,000 per affected household. Specific income restoration measure will be decided in consultation with the people based on their needs and priorities.
	Non-titleholders namely squatters and encroachers losing primary source of income	Assistance for income restoration	DPs losing their business establishment due to displacement will be assisted in the form of a grant equivalent to three months of their income from affected business. DPs will be entitled to income restoration

			assistance / vocational training/ skill up gradation options as per DPs choice equivalent to a maximum of INR 10,000 per affected household. Specific income restoration measure will be decided in consultation with the people based on their needs and priorities.
	Wage earning employees affected in terms of loss of employment	Transitional Assistance	Employees affected in terms of loss of employment due to displacement of commercial structure will be given lump sum transitional assistance equivalent to INR 3,000/month for three months.
E: LOSSES OF NON-TITLEHOLDERS			
7. Encroachers	Households	No compensation for land	a) Encroachers will be given a one month notice to remove their assets that will be affected. b) Right to salvage material from demolished structure. c) Compensation for affected structures at replacement
8. Squatters and informal settlers	Households	No compensation for land but compensation for structure at replacement cost and other assistance	a) Squatters will be notified with one-month notice in which to remove their assets that will be affected. b) Compensation for loss of structure at replacement value. c) A lump sum shifting allowance of INR 3000 for temporary, INR 4000 for semi-permanent and INR 10,000 for permanent structures. d) Right to salvage material from demolished structure.

F: TEMPORARY IMPACTS			
9. Temporary impacts on land and other assets during construction	Owner / Operator of affected assets	Cash compensation for affected assets and for loss of income potential	1. Compensation for affected standing crops and trees as per the market rates. 2. In case of impacts on land: -Restoration of land to its previous or better quality. -Contractor to negotiate a rental rate with the owner for temporary possession of land. -Compensation for crop losses for the duration of temporary occupation plus one more year necessary for the soil to be adequately prepared to its original productive potential. - Project and contractor to ensure that persons other than the owner affected as a result of the temporary acquisition are compensated for the temporary period. 3. Compensation in cash for the loss of income due to temporary loss of access for the duration of the impact. 4. In case of any impact on the properties (structure) during construction. -The contractor will restore the impacted structure to its previous condition before handing over to the owners. 5. Any temporary acquisition of land for the project will be done in accordance with the prevalent local laws.

G: LOSS OF COMMON PROPERTY RESOURCES			
10. Loss of Common Property Resources	Affected community/Institution responsible	Cash compensation /Reconstruction	Cash compensation at replacement value or reconstruction of the community structure in consultation with the community/institution.
H: REHABILITATION MEASURES			
11. Additional assistance to vulnerable groups	Households categorized as vulnerable10	Lump sum assistance	Additional lump sum assistance of Rs 5,000 per household to vulnerable groups
I: UNIDENTIFIED IMPACTS			
12. Any unanticipated adverse impacts due to project intervention	Any unanticipated consequence of the project will be documented and mitigated based on the spirit of the principles agreed upon in this policy framework.		

4. ORGANIZATIONAL RESPONSIBILITIES FOR IR IMPLEMENTATION

Based on the above analysis of government provisions and ADB policy, the following resettlement principles are adopted for this Project:

(i) Screen the project early on to identify past, present, and future involuntary resettlement impacts and risks. Determine the scope of resettlement planning through a survey and/or census of displaced persons, including a gender analysis, specifically related to resettlement impacts and risks. Measures to avoid and minimize involuntary resettlement impacts include the following:

a. explore alternative alignments or locations which are less impacting,

b. ensure the appropriate technology is used to reduce land requirements,

c. Modify the designs, cross sections, and geometrics of components to minimize the ROW and ensure involuntary resettlement is avoided or minimized.

(ii) Carry out meaningful consultations with displaced persons, host communities, and concerned nongovernment organizations. Inform all displaced persons of their entitlements and resettlement options. Ensure their participation in planning, implementation, and monitoring and evaluation of resettlement programs. Pay particular attention to the needs of vulnerable groups, especially those below the poverty line, the landless, the elderly, women and children, and indigenous peoples, and those without legal title to land, and ensure their participation in consultations. Establish a grievance redress mechanism to receive and facilitate resolution of the concerns of displaced persons. Support the social and cultural institutions of displaced persons and their host population. Where involuntary resettlement impacts and risks are highly complex and sensitive, compensation and resettlement decisions should be preceded by a social preparation phase.

(iii) Improve, or at least restore, the livelihoods of all displaced persons through;

a. land-based resettlement strategies when affected livelihoods are land based where possible or cash compensation at replacement cost for land

when the loss of land does not undermine livelihoods,

b. prompt replacement of assets with access to assets of equal or higher value,

c. prompt compensation at full replacement cost for assets that cannot be restored, and

d. additional revenues and services through benefit sharing schemes where possible.

(iv) Provide physically and economically displaced persons with needed assistance, including the following:

a. If there is relocation, secured tenure to relocation land, better housing at resettlement sites with comparable access to employment and production opportunities, integration of resettled persons economically and socially into their host communities, and extension of project benefits to host communities;

b. transitional support and development assistance, such as land development, credit facilities, training, or employment opportunities; and

c. Civic infrastructure and community services, as required.

d. Improve the standards of living of the displaced poor and other vulnerable groups, including women, to at least national minimum standards. In rural areas provide them with legal and affordable access to land and resources, and in urban areas provide them with appropriate income sources and legal and affordable access to adequate housing.

e. Develop procedures in a transparent, consistent, and equitable manner if land acquisition is through negotiated settlement4 to ensure that those people who enter into negotiated settlements will maintain the same or better income and livelihood status.

f. Ensure that displaced persons without titles to land or any recognizable legal rights to land are eligible for all compensation, relocation and

rehabilitation measures, except land.

g. Prepare a resettlement plan elaborating on the entitlements of displaced persons, the income and livelihood restoration strategy, institutional arrangements, monitoring and reporting framework, budget, and time-bound implementation schedule. This resettlement plan will be approved by ADB prior to contract award.

h. Disclose a draft resettlement plan, including documentation of the consultation process in a timely manner, before project appraisal, in an accessible place and a form and language(s) understandable to displaced persons and other stakeholders. Disclose the final resettlement plan and its updates to displaced persons and other stakeholders.

i. Conceive and execute involuntary resettlement as part of a development project or program. Include the full costs of resettlement in the presentation of project's costs and benefits. For a project with significant involuntary resettlement impacts, consider implementing the involuntary resettlement component of the project as a stand-alone operation.

j. Pay compensation and provide other resettlement entitlements before physical or economic displacement. Implement the resettlement plan under close supervision throughout project implementation.

k. Monitor and assess resettlement outcomes, their impacts on the standard of living of displaced persons, and whether the objectives of the resettlement plan have been achieved by considering the baseline conditions and the results of resettlement monitoring. Disclose monitoring reports.

4.1 Valuation of Assets

The valuation of affected land and structures will be governed by the following process:

Land surveys for determining the payment of compensation would be conducted on the basis of updated official records and ground facts. The land records containing information like legal title, and classification of land will be updated expeditiously for

ensuring adequate cost compensation and allotment of land to the entitled displaced persons. Records as they are on the cut-off date will be taken into consideration while determining the current use of land. The uneconomic residual land remaining after land acquisition will be acquired as per the provisions of Jammu & Kashmir State Land Acquisition Act, 1990 (1934 AD). The owner of such land/property will have the right to seek acquisition of his entire contiguous holding/ property provided the residual land is less than the average land holding of the district.

The methodology for verifying the replacement cost for each type of loss will calculated as per the provision made in the Jammu & Kashmir State Land Acquisition Act, 1990 (1934 AD):

4.2 Valuation of Building and Structure:

The District Collector/Deputy Commissioner in determining the market value of the building and other immovable property or assets attached to the land or building which are to be acquired shall use the services of a competent engineer or any other specialist in the relevant field, as may be considered necessary by him. The cost of buildings will be estimated based on updated Basic Schedule of Rates (BSR) as on date without depreciation. Solatium of 100% will be added to the estimated market value of the structure as per the provision of Jammu & Kashmir State Land Acquisition Act, 1990 (1934 AD). During valuation of structure/building following parameters should be taken in to account:

- From where they use to buy materials
- Type of shops (private or state-owned)
- Distance to be travelled
- Sources (local or foreign) and the cost of various materials
- Who will build the structures (owner or contractor) and whether they will use the hired labour or their own labour;
- Obtaining cost estimates by meeting at least three contractors/suppliers to identify cost of materials and labour
- Identifying the cost of different types of houses of different categories and compare the same with district level prices.

4.3 Valuation of Trees:

Compensation for trees will be based on their full replacement cost. The District Collector/Deputy Commissioner for the purpose of determining the market value of trees and plants attached to the land acquired, use the services of experienced persons in the field of agriculture, forestry, Horticulture, Sericulture, or any other field, as may be considered necessary by him.

Even after payment of compensation, DPs would be allowed to take away the materials salvaged from their dismantled houses and shops and no charges will be levied upon them for the same. In case of any structures not removed by the DPs in stipulated 60 days period, a notice to that effect will be issued intimating that DPs can take away the materials so salvaged within 48 hours of their demolition; otherwise, the same will be disposed by the project authority without giving any further notice.

Trees standing on the land owned by the government will be disposed of through open auction by the concerned Revenue Department/ Forest Department. DPs will be provided with an advance notice of three months prior to relocation. Further, all compensation and assistance will be paid to DPs at least 60 days prior to displacement or dispossession of assets.

For temporary impact on land and common resources, any land required by the project on a temporary basis will be compensated in consultation with landowners and will be restored to previous or better quality. Implementation issues can be found in the Entitlement Matrix.

4.4 Grievance Redressal Committee

4.5 Grievance Redress Mechanism

Project-specific grievance redress mechanism (GRM) will be established to receive, evaluate and facilitate the resolution of displaced people's concerns, complaints and grievances about the social and environmental performance at the level of the Project. The GRM will aim to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns linked to the project. The project-specific GRM is not intended to bypass the government's own redress process, rather it is

intended to address displaced people's concerns and complaints promptly, making it readily accessible to all segments of the displaced people and is scaled to the risks and impacts of the project.

During project preparation, information regarding GRCs will be disclosed as part of the public consultation process. Grievances related to the implementation of the project will be acknowledged, evaluated, and responded to the complainant with corrective action proposed. The outcome shall also form part of the semi-annual monitoring report that will be submitted to ADB. The decision of the GRCs is binding, unless vacated by the court of law. The GRC will continue to function, for the benefit of the DPs, during the entire life of the project including the maintenance period.

4.6 Constitution and Function of the GRC

The GRC will be headed by the District Collector (DC) or his designated representative. The GRC will have representative from the PIU office, representatives of DPs, particularly of vulnerable DPs, local government representatives, representative of local NGOs and other interest groups. The GRC will meet at least once in each 15 days. Other than disputes relating to ownership rights under the court of law, GRC will review grievances involving all resettlement benefits, compensation, relocation, and other assistance. At least one member from each Panchayat will be a woman. The Committee will co-opt a member from each of the affected Panchayat institution when dealing with matters coming from a particular panchayat. Some of the specific functions of the GRC will be as following:

- To provide support for the DPs on problems arising out of land/property acquisition like award of compensation and value of assets;
- To record the grievances of the DPs, categorize and prioritize the grievances that needs to be resolved by the Committee and solve them within a month;
- To inform PIU of serious cases within an appropriate time frame; and
- To report to the aggrieved parties about the development regarding their grievance and decision of PIU.

It is proposed that GRC will meet regularly (at least twice in a month) on a pre-fixed

date. The committee will look into the grievances of the people and will assign the responsibilities to implement the decisions of the committee. The claims will be reviewed and resolved within 15 days from the date of submission to the committee. All Grievances will be routed through the NGO to the GRC. Through public consultations, the DPs will be informed that they have a right to grievance redress. The DPs can call upon the support of the NGO to assist them in presenting their grievances or queries to the GRC. The NGO will act as an in-built grievance redress body. The DPs, who would not be satisfied with the decision of the GRC, will have the right to take the grievance to the BSRDC Head Office for its redress. Failing the redressal of grievance at BSRDC, the DPs may take the case to Judiciary. Taking grievances to Judiciary will be avoided as far possible and the NGO will make utmost efforts at reconciliation at the level of GRC. All grievances received (written or oral) and their redress will be recorded and documented properly. The EA will ensure that, such records will be made available to the external monitor on request.

4.7 Proposed Income Restoration Programme for PAP's

Livelihood and Income Restoration

- Number of displaced persons under the rehabilitation programs (women, men, and vulnerable groups).
- Number of displaced persons who received vocational training (women, men, and vulnerable groups).
- Types of training and number of participants in each.
- Number and percentage of displaced persons covered under livelihood programs (women, men, and vulnerable groups).
- Number of displaced persons who have restored their income and livelihood patterns (women, men, and vulnerable groups).
- Number of new employment activities.
- Extent of participation in rehabilitation programs.
- Extent of participation in vocational training programs.

- Degree of satisfaction with support received for livelihood programs.
- Percentage of successful enterprises breaking even (women, men, and vulnerable groups).
- Percentage of displaced persons who improved their income (women, men, and vulnerable groups)
- Percentage of displaced persons who improved their standard of living (women, men, and vulnerable groups)
- Number of displaced persons with replacement agriculture land (women, men, and vulnerable groups)
- Quantity of land owned/contracted by displaced persons (women, men and vulnerable groups)
- Number. of households with agricultural equipment
- Number of households with livestock

5. MONITORING & EVALUATION

5.1 Need for Monitoring and Reporting

Monitoring and reporting are critical activities in involuntary resettlement management in order to ameliorate problems faced by the DPs and develop solutions immediately. Monitoring is a periodic assessment of planned activities providing midway inputs. It facilitates change and gives necessary feedback of activities and the directions on which they are going. In other words, monitoring apparatus is crucial mechanism for measuring project performance and fulfilment of the project objectives.

5.2 Monitoring in the Project

RP implementation for the project by the NGO will be closely monitored by the Executing Agency. Keeping in view the significance of resettlement impacts of the project and being categorised overall as 'A', the monitoring mechanism for this project will have both internal monitoring by PIU and external monitoring by an external expert.

5.3 Monitoring by PIU

One of the main roles of PIU will be to see proper and timely implementation of all activities in RP. Monitoring will be a regular activity for PIU and Resettlement Officer at this level will see the timely implementation of R&R activities. Monitoring will be carried out by the PIU and its agents, such as NGOs and will prepare monthly reports on the progress of RP Implementation. PIU will collect information from the project site and assimilate in the form of monthly report to assess the progress and results of RP implementation and adjust work program where necessary, in case of delays or any implementation problems as identified. This monitoring will form parts of regular activity and reporting on this will be extremely important in order to undertake mid-way corrective steps.