

# Himachal Pradesh State Roads Transformation Program

(Funded by World Bank)

Dadhol-Ladrour (Km 0.00 to KM 13.500)  
Environment and Social Impact Assessment  
(Draft)



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## TABLE OF CONTENTS

ABBREVIATIONS AND ACRONYMS .....	3
EXECUTIVE SUMMARY.....	5
Chapter 1 ó Introduction.....	12
1.1 Project Description.....	12
1.2 Sub-Project Road ó Dadhol to Ladroun.....	13
1.3 Proposed Improvement .....	16
1.3 Purpose of ESIA .....	25
1.5 Scope of the ESIA.....	26
1.6 Approach and Methodology .....	26
Chapter 2 ó Legal and Institutional Framework .....	30
2.1 Applicable Regulations of GOI/GoHP.....	30
2.2 World Bank ESF Policy, Directives and Standards ó Extent of Relevance.....	36
2.3 Comparison of GoI/GoHP legislations and ESF, 2016.....	44
2.4 Clearances/Permissions required for the Project Road.....	48
2.5 Institutional Framework.....	49
Chapter 3 ó Baseline Data .....	51
3.1 Land Environment .....	52
3.2 Physical Environment .....	62
3.3 Biological Environment .....	71
3.4 Social Environment.....	77
3.5 Cultural Environment.....	89
3.6 Hazard and Vulnerability Profile.....	89
Chapter 4 ó Stakeholder consultations & information disclosure .....	97
Chapter 5 ó Analysis of Alternatives .....	101
Chapter 6 Environment and Social Risks and Impacts and Mitigation Measures.....	107
6.2 í relating to Labour and working conditions (ESS 2).....	108
6.3 í relating to Resource Efficiency & Pollution Prevention & Management (ESS 3)....	111
6.4 í relating to Community Health and Safety (ESS 4).....	131
6.5 í on land & assets (ESS 5) .....	139
6.6 í relating to Bio-diversity & Living Natural Resources (ESS 6) .....	141
6.7 í on Tribals/Indigenous Population (ESS 7).....	143
6.8 í on impacts on Cultural Heritage (ESS 8) .....	143
Chapter 7 ó Environment and Social Management Plan.....	145

## LIST OF APPENDICES

1	List of the individuals/organizations that prepared/ contributed to ESIA.
2	References
3	Summary table of Consultations and surveys with stakeholders (affected persons other interested parties)
4	Comparison of ESF, RFCTLARR Act 2013 and GoHP Financial Commissioner Standing Order No. 28 and Measures to address gaps
5	List of applicable Labour laws
6	Details Of Settlements, Cross Drainage Structures, Junctions Along the Project Road
7	Plan & Profile of Project Road
8	Strip Plan of Project Road Showing Existing Features
9	Transect Walk Survey Formats
10	Ecological Investigations along the Project Road Corridor
11	Photographs Of Sensitive Locations of the Project Road
12	Environmental Monitoring Test Results
13	GoHP's Strategy To Rehabilitate Areas Infested With Invasive Alien Plant Species (Exotic Weeds) In Himachal Pradesh
14	Village Wise - Census & Economic Details
15	Village Wise - Amenities
16	Census Questionnaires
17	Socio-Economic Questionnaires
18	Attendance Sheet of Stakeholder Consultations
19	Photographs of Stakeholder Consultations
20	Checklist for Community Consultations
21	Gender Based Focused Group Discussion Checklist
22	Material Quantities, Cut and Fill Areas and Volumes
23	Details of impacted structures

## ABBREVIATIONS AND ACRONYMS

AIDS	Acquired Immunodeficiency Syndrome
BDO	Block Development Officer
BMP	Biodiversity Management Plan
CD	Cross Drainage
CGWB	Central Ground Water Board
CHS Plan	Community Health and Safety Plan
COI	Corridor of Impact
CPR	Common Property Resources
CPCB	Central Pollution Control Board
CRRRI	Central Road Research Institute
Cu.m	Cubic Meter
DoE	Department of Environment
DC	District Commissioner
E&S	Environmental and Social
ESA	Environmental and Social Assessment
EHSGs	Environment Health and Safety Guidelines
ESIA	Environmental and Social Impact Assessment
ESF	Environment and Social Framework
ESS	Environment and Social Standard
ESMP	Environmental and Social Management Plan
ESCP	Environment and Social Commitment Plan
ESHS	Environmental Social Health and Safety
FPIC	Free Prior and Informed Consultation
FGDs	Focus Group Discussions
GDP	Gross Domestic Product
GHG	Green House Gas
GoI	Government of India
GoHP	Government of Himachal Pradesh
GRC	Grievances Redress Committee
GRM	Grievances Redress Management
GBV	Gender Based Violence
HIV	Human Immunodeficiency Virus
HP	Himachal Pradesh
HPDOT	Himachal Pradesh Department of Transport
HPMVA	Himachal Pradesh Motor Vehicle Administration
HPPWD	Himachal Pradesh Public Works Department
HPRIDP	Himachal Pradesh Road and Other Infrastructure Development Corporation
HPSRTP	Himachal Pradesh State Road Transformation Project
IT	Information and Technology
IRC	Indian Road Congress
LMP	Labor Management Procedure
MDRs	Major District Roads
MoEF&CC	Ministry of Environment, Forests and Climate Change
MSL	Mean Sea Level
MT	Metric Tonne
NGO	Non-Government Organization
NH	National Highway
NOx	Oxides of Nitrogen
NPV	Net Present Value
NSDP	Net State Domestic Product
OHS Plan	Occupational Health and Safety Plan
OSR	Other State Road
PAP	Project Affected Person
PIU	Project Implementation Unit
PMC	Project Management Consultant
RAP	Resettlement Action Plan
RFCTLARR	Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and

Act	Resettlement
RoW	Right of Way
SEP	Stakeholder Engagement Plan
SEIAA	State Environmental Impact Assessment Agency
SGWB	State Ground Water Board
SH	State Highway
SME	Small Medium Enterprises
SO <sub>2</sub>	Sulphur Dioxide
SC	Schedule Caste
ST	Schedule Tribe
SDO	Social Development Officer
VMS	Variable Messaging System
WB	The World Bank

## EXECUTIVE SUMMARY

### 1.0 Project Description

1. GoHPØ program for transforming state level transport institutions, improving mobility and logistics for horticulture and overall economic growth in HP, connecting HP to the Bharatmala network, and enhancing Road Safety, sets the goal for the institutional transformation envisaged to be implemented under the proposed project. The proposed Project Development Objective is to enhance the efficiency of the transportation, logistics and Road Safety institutions to stimulate horticulture and overall economic growth in Himachal Pradesh.
2. The proposed operation comprises the following: Component 1: Building HPØ Transport and Logistics Institutions, and Resilience; Component 2 - Improving fruit belts stimulating HPØ horticulture and overall economic growth. This component will finance upgrading priority target collector roads/MDRs. Component 3: Enhancing Road Safety. Under Component 2 upgrading of approximately 88.265 km of roads connecting small holding farmers production and primary processing clusters to wholesale markets/SME clusters. The implementation of the core initiatives of the project is expected to result in: i) Improved efficiency of transport and logistics institutions; ii) Reduction in maintenance expenditure; iii) Reduction in transport cost for transporting products from production clusters to SME/wholesale markets along the project roads; iv) Reduction in road accident fatalities per 100,000 population in pilot areas.

### 2.0 Sub-project road– Dadhol-Ladrour

3. The Dadhol-Ladrour is one of the four priority corridors proposed for upgradation. The project road traverses entirely within Bharari tehsil of Bilaspur district and connects to SH-32 at Ladrour end and also to National Highway (NH-103) at Dadhol. The road will improve the accessibility of the inhabitants of the rural areas to education, health, employment, and trading opportunities and will consequently alleviate poverty in the process. The altitude of project corridor ranges between 697-981 m above mean sea level. There are 15 settlements along the project road. Some of the big settlement areas along the project road are Padyalag, Gahar, Gatwar, Ladhyani, Bharari, Mihara and Ladrour. These locations do not have any Schedule-V areas or tribal households that display characteristics as outlined under ESS 7.
4. The lack of better road access in the sub-project areas constrains economic activities in these areas, and easier access to essential services such as education, health and employment. Thus, the road is expected to provide critical support to transportation and development links, including personal mobility, access to services, and growth of non-farm employment. The villagers would be able to transport their produce faster instead of depending solely on local markets and middlemen. Improved connectivity will facilitate travel to Block Development Office, tehsil headquarters and other local government/development agencies. Women will especially benefit, since their mobility will be augmented both in terms of access to social services including health care, as well as access to higher levels of schooling. Hence, the proposed road improvements will bring positive economic and social changes in the area.
5. The present condition of road, indicate severe cracking, raveling, patching & potholes, surface bad and undulations all along its length. The existing width of carriage way (bitumen paved width) of the project road varies between 3.0 m to 3.3m in rural areas and varies between 5.0 mtr to 7.1 mtr in settlement/built-up areas. The existing RoW varies from varies between 12m to 18m. The accident data with police recorded seven accident cases. These location were assessed during road safety audit carried out for the project road. The audit findings indicated that there are no black spots along the project corridor.

6. The proposed improvement/widening scheme for the project road comprises concentric widening, eccentric widening either on left or right side depending upon the availability of the land (within RoW). The proposed improvement design also consider geometric improvements at necessary locations and also areas prone to landslides. As a part of road upgradation, 32 CD structures are being reconstructed, and 1 are retained with minor repairs and without any extension. The project has 10 bus stops, also locally known as rain shelters and all of these are proposed to be remodeled. Provision for toilets (3 seater for men and 3 seater for women) with separate entrance) with septic tank and soak pit arrangement has been made at Ladrou Market.
7. In the overall project, there is likely to be one Associated facility in the form of a bridge that is under construction by National Highways Authority of India which lies adjacent to one of the upgradation corridors Raghunathpura-Mandi-Harpura- Bharari in Bilaspur district. There no other multi-lateral or bi-lateral financing institutions involved in the project for any of the upgradation or maintenance corridors, hence there is no requirement for a Common Approach.

### **3.0 Purpose and Scope of ESIA**

8. Initially, the overall project risk was categorized as High as per an internal Environment and Social Risk Classification of the World Bank and hence the ESIA's are prepared by an independent consultants. Currently based on the risks and impacts for the priority corridors, the risk rating of the overall project is revised to Substantial. The purpose was to: a) identify, evaluate and manage the environment and social risks and impacts of the project in a manner consistent with the ESSs; b) adopt a mitigation hierarchy approach to the project's E&S risks; c) help identify differentiated impacts on the disadvantaged or vulnerable and to identify differentiated measures to mitigate such impacts, wherever applicable; d) assess the relevance and applicability of environmental and social institutions, systems, laws, regulations and procedures in the assessment, development and implementation of projects, whenever appropriate; identify gaps, if any exist, and to assess borrower's existing capacity and identify areas for enhanced capacity towards management of E&S risks.
9. The scope of the ESIA is to: i) assess the existing baseline status of the environment within Corridor of Impact and Project Influence Area; ii) identify the probable adverse and positive E&S risk and impacts due to the planned project during its entire cycle i.e. from preconstruction to construction to operation & maintenance; iii) consider all ESHS likely in the project for further usage towards preparation of requisite mitigation plans, as may be required; iv) identify capacity constraint of HPRIDC in respect of E&S management and propose commensurate capacity enhancement measures, etc.

### **4.0 Legal and Institutional Framework**

10. Key GoI and GOHP provisions applicable to the sub-project are summarized here and these include: Environmental Protection Act, 1986; The Forest (Conservation) Act. 1980; Biological Diversity Act, 2002; Construction & Demolition, Waste Management Rules, 2016; Air (Prevention and Control of Pollution) Act, 1981; Water (Prevention and Control of Pollution) Act, 1974; Noise Pollution (Regulation and Control Act) 1990; Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (RFCTLARR); Acquisition of Land by Private Negotiation and Upkeep of Land Record/General Guidelines and Instruction, 2018; The Right to Information Act, 2005. Further WB's Environment and Social Policy and Standards 1, 2-6, 8 and 10 are relevant to this sub-project, besides the World Bank's Guidance note on Management of Labor Influx, 2016. Hence provisions and measures through action plans would need to be prepared to meet the requirements of the ESS. In addition, various construction stage environment and social laws shall apply to this project.

## **5.0 Environment and Social Baseline**

11. The baseline environmental & social profile assessment of the project influence area covers 15 km radius of the project as well as Bilaspur district as a whole. The baseline environmental assessment included key attributes like physiography, drainage, geology, soil, hydrogeology, land use, flora, fauna, forest/vegetation cover, climate, ambient air quality, water quality, ambient noise levels, hazards and vulnerability of the project region among others.
12. The project road lies in the range of 248-1141 m. The maximum and minimum elevation of the project road is 981m at km 13+300 and 697 m at Km 0+900. The project road traverses majorly along agricultural lands. Millets are the most dominant agricultural crop, which can also be seen in cultivable lands along the project road. The climate of the district is temperate to sub-tropical. The project road falls within the jurisdiction of Bilaspur division, but there are no forest areas along the 13.5km long Dadhol-Ladrour road, though 3614 trees exist within existing right-of-way. The terrain of project area is hilly and there are no perennial surface water sources/bodies other than three seasonal streams and springs
13. There are no National Parks, Wildlife Sanctuaries, Biosphere Reserve and any other notified sensitive area within 15km on either side of the project road. Further, no wildlife crossing corridors are reported along the project corridor. No notified/protected Archaeological or Historical monuments exist within corridor of impact.
14. The total population of Bilaspur district is 381,956 comprising 192,764 (50.46%) males and 189,192 (49.53%) females. Out of the total population of the district 93.42 per cent are in rural areas while mere 6.58 per cent are in urban areas. As per census 2011, the average sex ratio of India was 940 females per 1000 male. The sex ratio of Bilaspur district is 981 females per every 1000 males, which is higher than the national average. Among the total population of district, 2.8% (10,693) are Scheduled Tribes, 25.92% (98,989) are Scheduled caste population and 71.28% (2,72,274) people belong General Category. Among the total population, 84.59% of the people are literate and 15.41% of the people are illiterate excluding the 0-6 age group population. This shows that most of the population is literate. The literacy rate is 91.16% for males and 77.97% for females. This shows that the male literates are more than the female literates. The project influence area/district had an average family size of 4.7 persons per household on 2011. This is moderate family size and comparable with the other part of the district. The density of population of the project influence area/district works out to about 327 persons per km<sup>2</sup> in the district.
15. In terms of literacy level of the 136 affected household surveyed, only 12.12 percent are illiterates. The average household size for the project affected population is 3.6. Occupation wise, most of them are engaged into commercial activity of trade/business, petty shop, services (44.69 %) followed by agriculture, non-agriculture labour (24.24%), household industries consists 0.76 percent. The incidence of Govt. Employees, Private Employees and Others is around 16.67 percent, 13.64 percent respectively. The income levels of majority of the households fall under higher middle-income category earning more than Rs. 4,00,000 per annum (81.77%). The incidence of lower-income families is about 3.32 percent who earn below 1,80,000 per annum. The expenditure pattern of the affected household shows that majority of them have an average monthly expenditure above Rs.30,000 per month.

## **6.0 Stakeholder Consultations**

16. Consultations were also held with communities at various locations en-route and also specifically at locations where common property resources were getting affected. Key queries and concerns were relating to: what compensation will be paid to title holder and non-title holders; avoidance of impacts on CPRs such as temples used for various religious and



community purposes; project authorities to consider available open land wherever it was available instead of impacting their house and land; safety measures in hospital and school zones; construction works should lead to jobs. They suggested that project should have provisions for parking are must in the city area; should take up the structural works (bridges and culverts) in priority during the early phase of the project cycle or otherwise these works mostly gets delayed; provide for noise barriers to minimize the noise pollution; additional assistance for employment/ income restoration for locals; and necessary measures to be taken during the construction stage to reduce and/avoid pollution and health risks at the time of construction.

17. Women opined that majority of the people living along the project corridor depends on water tank/ hand pump for drinking water and disposal of these will especially affect women folk; Lack of public toilets, in particular ladies toilets at market places as well as near bus stops. Water shortage is one of the major problems facing all women. They also indicated concerns over construction workers from outside the area might lead to possible harm for women, girls in their habitations.
18. Interested parties indicated the need for: Rain Shelters, Storm water drainage; Nallahs to be channelized; water pond facility for forest and local animals, Street light and crash barrier provision on road, Crop bazar development. Bus stops including bus bays must be provided at appropriate places. Improved road should have proper provisions of retaining walls to avoid landslides.
19. Based on the socio-economic and environmental base line impact data, outcome of stakeholders consultations and analysis of alternatives, the engineering, social and environment team has consider the project design, where needs and concerns of the local people including the disadvantaged group like physically challenged people are considered through different mitigation measures to make a project a successful venture. Different issues which are arising out of the exercise broadly included but not limited to road safety, disable friendly bus stop design, providing public amenities like toilets, drinking water, involving local women group for maintaining the nature based solutions (bio-engineering), provision of street light in settlement areas, road safety during construction, adequate compensation measures and payment of the same before civil construction starts, disseminate project related information in timely manner, satisfactory redressal of project related complaints and grievances etc.

## **7.0 Analysis of Alternatives**

20. Lane configuration is being done in keeping in view safety considerations, geometric improvements and vehicular population. At built up/ village sections where the road width is insufficient for expansion, design alternatives include options for realignments and for modifying the proposed road designs, such as reduction of the shoulder widths, have been used. Reducing design speed in built up areas; providing suitable safety measures, such as speed reductions near schools and hospitals have been incorporated in the design. Hence in light of the ESIA, impacts were minimized at least three locations. These included: i) dense Built up area- 5+700 - 6+860 (Ladhyani & Bharari); ii) Lehri sarel, Kothi (Chainage 7+300 ó 9+300) and iii) Bharari (6+700) Government Secondary School. At these locations analysis of alternatives such as keeping the lane configuration as intermediate lane; concentric widening in the built-up sections (9 ó 10m); curve improvements within the available RoW and realignments to reduce impacts, have been considered. Hence, vide this approach that was considered as part of the Mitigation Hierarchy, the preliminary/draft designs are being further revised again to reduce impacts on land, assets and forest area including trees.

## **8.0 E&S Risks and Impacts**

21. The project's environmental and social risks and impacts likely due to the project road by each relevant standard (ESS 2-6 & 8) have been assessed based on the current designs and also measures to mitigate the same have been proposed.
22. Project shall define the following as vulnerable groups/persons: Scheduled Caste, ST, family/household headed by women/female, physically challenged, Below Poverty Line (BPL) families; widows; and persons above the age of 65 years irrespective of their status of title (ownership). Vulnerable groups would also include those farmers who (after acquisition of land) become small/marginal farmers. As per Census and socio-economic survey there are 5 Schedule Caste and 1 Schedule Tribe family who shall be affected by the project.
23. E&S risks on labor and working conditions (ESS 2): HPRIDC shall contract agencies to undertake civil works, agencies/firms to support core-functions; primary suppliers of material/equipment and other implementation support partners. All categories of project workers: Direct workers, Contracted workers (including Migrant Workers) Primary supplier workers (those providing goods and materials e.g. IT services, security services outsourced through by the contractor); and Community Workers would be involved. At this stage, it is estimated that the project will require to engage 560 labor (including project managers, supervisors, labor, etc.) Risks include: employment of child labour, non-payment of wages by employer; Non-payment of benefits (compensation, bonus, maternity benefits etc.) by employer; discrimination in employment (e.g. abrupt termination of the employment, working conditions, wages or benefits etc.); possibility of gender based violence as the road shall traverse through sensitive locations such as hospitals, schools, etc. that are near to habitations; Health risks of labour relating to HIV/AIDS and other sexually transmitted diseases.
24. E&S risks and impacts relating to Resource efficiency and Pollution Prevention: The assessment of impacts and risks due to road constructions has considered sensitive receptors like settlement, drainage pattern of the area, water bodies, springs/streams/river crossing, forest, protected areas, animal crossing within and outside protected area, roadside trees/plantation, erosion prone locations, receptors vulnerable to air, water, noise and soil quality etc. In addition, natural calamity like landslide, earthquake and flooding were also considered during assessment due to location of road in such sensitive geography. The project's impacts and risk would be of significance on sensitive receptors due to muck disposal; slope stability and erosion (2 locations); blocking or filling of springs and seasonal streams (3 number); construction water demand (26.7 million Liters); stressing water sources used by community (absence of perennial water sources); emission from construction vehicles, equipment and plants; dust from earth works, hill cutting, stack yard, transportation of materials; noise pollution (2 schools) and settlements along road; damage to structure vibration from movement of machine and equipment (structure on embankment); handling of hazardous and non-hazardous wastes, quarry and borrow area. Due to improvement of road, the GHG emission net reduction of 30003.89 CO<sub>2</sub> e tons is estimated over project road life cycle till 2038.
25. E&S risks and impacts relating to Community Health and Safety (ESS 4): The road will act as haul road for transporting construction materials will cause nuisance to local road users (road users and pedestrians). Additionally: i) hill cutting, landslides, road excavation, use of vibratory equipment, construction debris handling and disposal etc. during construction; ii) high likelihood of direct exposure to increased construction related traffic related accident due to traffic and equipment especially at road sections traversing settlement area with limited carriageway/roadway width, and sensitive receptors such as schools, religious place, health centre/hospitals; iii) high dust levels from earthworks/hill cutting, high noise and emission level from traffic congestion and idling of vehicles; iv) influx of migrant workers could potentially cause local discomfort or potential conflicts with local people v) possibility of involving child labour.

26. E&S risks and impacts on land & assets (ESS 5): As per the available right of way information provided by PWD units and revenue officials and superimposing of the final design, it is confirmed that there is no need to acquire private land. The total numbers of families affected are 1366 all of which are non-titleholder encroachers. These structures of these affected families are mainly residential, commercial and mix of *residential* and commercial, besides others such as cattle sheds, etc. From the total affected structures of 136, 123 are pucca 6 semi pucca and 7 kutcha structures. All the structures are partially affected. In addition, there are 4 CPRs that comprise Schools (1), Religious structures (1) and Hand Pump (2). Cut-off date established for this corridor is 08.09.2019.
27. E&S risks and impacts relating to Bio-diversity & Living Natural Resources (ESS 6): There are no presence of rare, endangered and threatened flora species along project road. However, invasive species like *Ageratum conyzoides*, *Eupatorium adenophorum*, *Lantana camara*, *Parthanium hysterophoros* are observed, which are being managed through Forest Department, GoHP. The construction of road is likely to affect 75 of 3614 trees existing within right of way. No rare, endangered and threatened floral species are identified within the corridor. Monitor lizard (*Varanus bengalensis*) was observed along the road, which is listed under Schedule-I (part III) of Wildlife Protection Act-1972. The biodiversity investigation along the project corridor has not indicted the presence of any scheduled fauna. Hence, the project road construction is not likely to cause any impacts on the fauna.
28. E&S risks and impacts relating to Cultural Heritage (ESS 8): The alignment of the project road does not have any ancient monuments and/or archaeological site(s). However, The project road has 1 religious structures/shrines that shall experience partial impact by proposed road improvement activities.

## **9.0 Environment and Social Management Plan**

29. An ESMP has been prepared to mitigate Project's environmental and social risks and impacts. It includes mitigation measures, monitoring plan, capacity building, responsibilities and reporting system and budget. In addition, the ESMP provide measures to address GBV issue at project level. A separate Resettlement Action Plan has been prepared to address pre-construction social impacts. The ESMP obligates the contractor, upon mobilization, to prepare the C-ESMP, which shall be approved prior to the commencement of construction activities. The Contractor's C-ESMP shall include OHS plan, Water and Waste Management Plan, Influx management Plan, Workers camp management plan, CHS Plan, Traffic management and road safety management Plan, Quarry/borrow area management plan, and Site restoration Plan among others in accordance with the GoI and IFC&WB workers accommodation guidelines. All such plans will be reviewed and approved by the PMC and HPRIDC prior to commencement of construction works. The approved C-ESMP shall be reviewed periodically (but not less than every six (6) months), and updated in a timely manner.

## **10.0 Key issues/findings and inputs to ESCP**

30. Few gaps exist in the provisions in policies between government acts/policies and World Bank's ESS requirements that need to be filled. Institutional arrangement to address E&S aspects are currently relatively weak and need significant strengthening. GRM is decentralized and ad-hoc and requires systematic recording of grievances and redressal
31. Further action needs to be taken to: i) to verify existing RoW and obtain clearances, licenses/approvals and permits under existing legal framework that are applicable to the Project

from relevant national and/or local authorities; ii) describe the policy, institutional and implementation framework to guide the compensation for loss of land and assets and ensure that no affected persons are displaced without proper consultation and compensation; iii) develop mechanisms to foster greater participation of more passive members of the community, including disadvantaged persons, women and vulnerable groups; iv) develop clear procedures for disseminating information about the project to all affected communities and provide a feedback mechanism for these communities to voice their concerns and address these concerns during project implementation. Trainings on Environment and Social aspects including reporting requirements need to be prepared and administered to build capacity of the project staff.

32. Key measures and time frames required for the project to meet the requirements of the ESSs will include the following:

**Before appraisal completion, preparation and disclosure of**

- i. Environmental and Social Impact Assessment Report of this corridor
  - ii. Environmental and Social Management Plan including GBV Plan
  - iii. Stakeholder Engagement Plan for the overall project
  - iv. Resettlement Policy Framework for the overall project to guide the preparation of corridor specific RAPs prior to Invitation of bid
  - v. Resettlement Action Plan for this corridor
33. HPRIDC will establish and maintain an E&S organizational structure in HPRIDC with qualified staffs to support management of E&S risks including at least one Environmental Expert and one Social Expert

## CHAPTER 1 – INTRODUCTION

### 1.1 Project Description

1. GoHP's program for transforming state level transport institutions, improving mobility and logistics for horticulture and overall economic growth in HP, connecting HP to the Bharatmala network, and enhancing Road Safety, sets the goal for the institutional transformation envisaged to be implemented under the proposed project. As such, this project will support the launching of GoHP's program focusing on strengthening the institutional base for transportation infrastructure and logistics services administration.
2. The proposed Project Development Objective is to enhance the efficiency of the transportation, logistics and Road Safety institutions to stimulate horticulture and overall economic growth in Himachal Pradesh.
3. The proposed operation comprises the following Components and sub-components:

#### **Component 1. Building HP's Transport and Logistics Institutions, and Resilience, including:**

- Sub component 1.1: Reestablishing the Himachal Pradesh Road and Infrastructure Development Corporation (HPRIDC) and building resilience. The objective is to support GoHP's initiative to create a corporate entity responsible for the administration of HP roads and delivering safe, resilient and well performing roads supporting the horticulture and overall economic development of the State. This involves, reestablishing HPRIDC as the road asset and other public infrastructure manager, responsible for the development and maintenance of all roads and other infrastructure under the jurisdiction of the HPPWD.
- Sub component 1.2: Supporting the commercialization process of the direct labor operations and promoting competitive performance-based maintenance contracting. The objective is to support GoHP's initiative to improve the efficiency of maintenance execution and reduce maintenance cost, by laying the ground for the full commercialization of HPPWD's direct labor operations.
- Sub component 1.3: Establishing HP Motor Vehicle Administration (HPMVA), Strengthening the Directorate of Transportation of HPDOT and developing logistics system and strategy. The objective is to deliver efficient customer services, as well as competitive, safe and clean/less pollutant transportation in HP.

#### **Component 2. Improving fruit belts stimulating HP's horticulture and overall economic growth.**

This component will finance upgrading priority target collector roads/MDRs. The upgrading of approximately 88.65 Km of roads connecting small holding farmers production and primary processing clusters to wholesale markets/SME clusters.

#### **Component 3: Enhancing Road Safety, including:**

- Sub component 3.1: Promoting the 'Safe System' This support focuses on strengthening enforcement on state roads and critical accident spots along rural roads, by enhancing patrolling and establishing emergency response system.
- Sub component 3.2: Promoting the 'Safe Corridor initiative' The Safe Corridor initiative will support the state highway patrol by providing surveillance equipment (CCTV cameras for speed control, accident recording, etc.), variable messaging system (VMS), training the police, and establishing emergency response posts.

4. The implementation of the core initiatives of the project is expected to result in: i) Improved efficiency of transport and logistics institutions; ii) Reduction in maintenance expenditure; iii) Reduction in transport cost for transporting products from production clusters to SME/wholesale markets along the project roads; iv) Reduction in road accident fatalities per 100,000 population in pilot areas.

## 1.2 Sub-Project Road – Dadhol to Ladroun

5. Under the project the following four corridors are being taken up for upgradation. Details are provided in Table 1.1

**Table 1.1 – Roads proposed for upgradation under HPSRTP II**

S.No	Name of the Road	District	Length (in Km)
1	Baddi ó Sai ó Ramshahr	Solan	34.00
2	Dadhol ó Ladroun	Bilaspur	13.50
3	Mandi ó Rewalsar ó Kalkhar	Mandi	28.00
4	Raghnathpura-Mandi-Harpura- Bharari	Bilaspur	2.70

6. The Dadhol-Ladroun road with a total length of 13.5km is proposed for upgradation. As per road classification the sub-project road is Other State Road -9 (OSR). The project road traverses entirely within Bharari tehsil of Bilaspur district and connects to SH-32 at Ladroun end and also to National Highway (NH-103) at Dadhol. The latitude of the project road at Dadhol and Ladroun are 31.29ø52ö N to 31.34ø22ö N respectively and Longitude is 76.29ø52ö E to 76.40ø07ö E respectively. The altitude of project corridor ranges between 697-981 m above mean sea level.
7. There are 15 settlements along the project road, including big settlements such as Padyalag, Gahar, Gatwar, Ladhyani, Bharari, Mihara and Ladroun. The project road traverses through plain terrain (3 km) and rolling (10 km) with an average longitudinal gradient of 9.5% between the start and end point and the cross slope exceeding 25% at many stretches along the sections. The built-up area along road account for 30% of road length (4 km) and at remaining length is majorly agriculture land. These locations do not have any Schedule - V areas or tribal households that meet the characteristics outlined in ESS 7<sup>1</sup>.



**Start Point**



**End Point**

**Figure 1.1: Start Point and End Point of Project Road**

<sup>1</sup> characteristics as outlined in ESS 7 ó Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities

8. The existing road surface, for a length of 10km, is in bad condition with undulation, severe cracking, patching & potholes. The chainage wise existing pavement condition is summarized in Table 1-2.

**Table 1-2: Pavement Condition of the Project Road**

S. No	Existing Chainage (km)		Length (Km)	Rutting (mm)	Pavement Distress				Other Distresses	Overall Condition
	From	To			Cracking (%)	Potholes (Nos)	Patching (%)	Ravelling (%)		
1	0	3	3	4	5.5	<2	<5	-	Edge Breaks at few locations	Good
2	3	13.3	10.3	Severe Cracking, Patching & Potholes. Pavement condition surface is Bad and Undulations are predominant					Poor	



**Figure 1.2: Existing Condition of Project Road**

9. The existing width of carriageway varies between 3.0m to 3.3m in rural areas and from between 5.0m to 7.1m in settlement/built-up areas. The chainage wise details of the bitumen paved carriage way are given in Table 1-1.

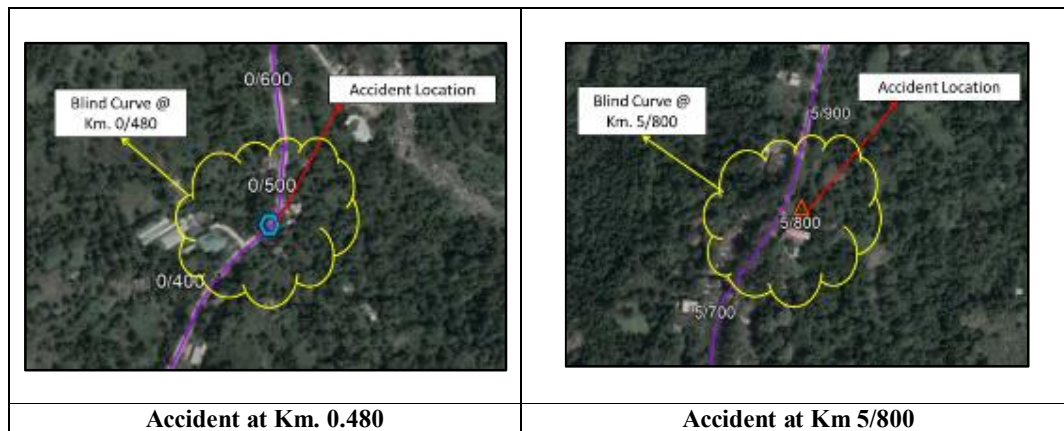
**Table 1-1: Existing Carriageway width of the Project Road**

From Km	To Km	Carriage Way Width (m)
0/000	0/150	6.5m
0/130	0/800	3.0m
0/800	1/100	7.1m
1/100	1/300	6.4m
1/300	6/000	3.2m
6/000	7/100	3.1m
7/100	9/000	3.3m
9/000	10/700	3.2m
10/700	12/000	3.1m
12/000	12/900	3.0m
12/900	13/380	5.0m

10. The existing right of way for the project road varies between 12m to 18m. Mostly at built-up areas, the encroachment of existing RoW has reduced the available width and this needs consideration during design of road without compromise with design standards.
11. During project preparation, a road safety audit was carried out for the project road, which indicated that there are no black spots along the project corridor. Further, accident data available from Police Department for years 2016-2018 (Table 1.4) recorded seven accidents, of which two were fatal accident and remaining with grievous injuries. The reasons of accidents were dangerous driving, turning without care, over speeding and in one isolate case the accident was reported due to defect in vehicle.

**Table 1.4: Details of Accidents along the Project Road**

S. No.	Accident Year	Chainage	Accident Class	Accident Cause	Collision Type
1	2018	0.48	Fatal	Dangerous driving	Fell down from vehicle
2	2018	2.69	Grievous injury	Turning without care	Hit in side
3	2016	5.75	Grievous injury	Suspected vehicle defect	Ran off road
4	2016	5.82	Fatal	Speed	Head on
5	2018	9.35	Grievous injury	Speed	Hit pedestrian
6	2017	10.9	Injury needing hospitalisation	Dangerous driving	Head on
7	2018	11.9	Grievous injury	Speed	Overtuned



**Figure 1.3: Accident Locations**

12. There are 12 junctions along the project road out of which 4 are major junctions and the rest 8 are minor junctions. The majority of cross drainage structure are pipe and slab culverts totaling to 32 and 2 are minor bridges (Table 1-5).

**Table 1-5: Details of Cross Drainage Structures**

S.No	Chainage	Culverts		Minor Bridge
		Pipe	Slab	
1	0 to 10 Km	27	4	2
2	11 to 13 Km	1	0	0
<b>Total</b>		28	4	2



### 1.3 Proposed Improvement

13. Based on the traffic demand forecast and considering a Level of Service (LoS), as recommended by IRC, the intermediate lane with sealed shoulder and side drain (Table 1-9) configuration is considered for entire project road length.

**Table 1-9: Proposed Lane Configuration for Project road**

S.No	Lane	From (Km)	To (Km)
1	Intermediate lane	0	13+500

14. Proposed improvement/widening scheme of project comprises concentric and eccentric widenings. The geometric improvements at necessary locations, blind/reverse curves and areas prone to landslides has been propose wherever necessitated by site condition to eliminate existing substandard geometry. Proposed design improvement for the project road is done taking into consideration of lane configuration, available right-of-way, speed, embankment height and terrain i.e. mountainous setting of the road.
15. According to IRC guidelines for the Hill Roads, the speed criteria for mountainous terrain are 40 km/h to 30 km/h for MDRs and for OSR 30 km/h to 25 km/h. However, considering the site conditions, topography economy, and environmental & social impacts and also other parameters, the speed limit for the project road which is a OSR is considered as mentioned in Table 1-10.

**Table 1-10: Design Speed criteria for Project road**

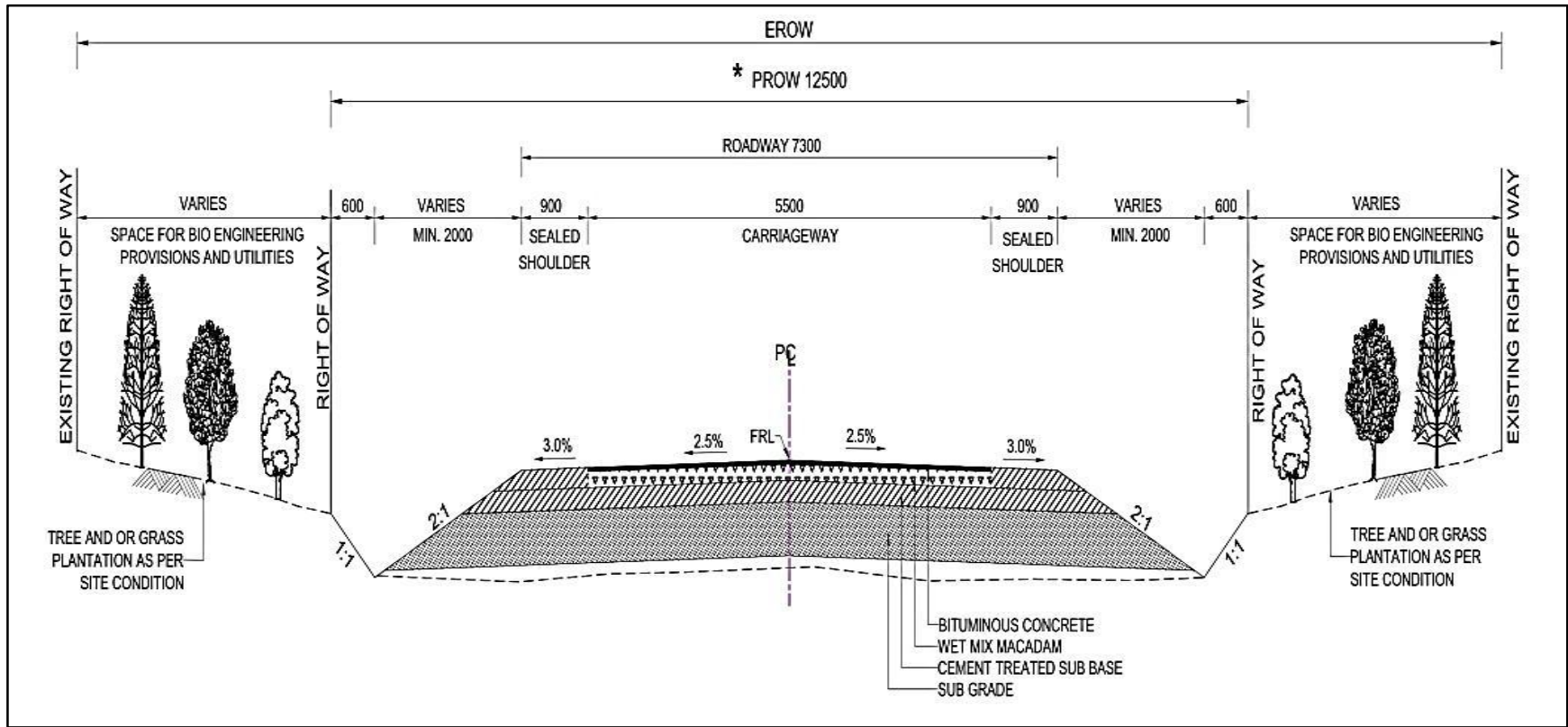
Type	Rural Area	Built-up Area
Ruling	40	30
Minimum	30	20

### Typical Cross-sections

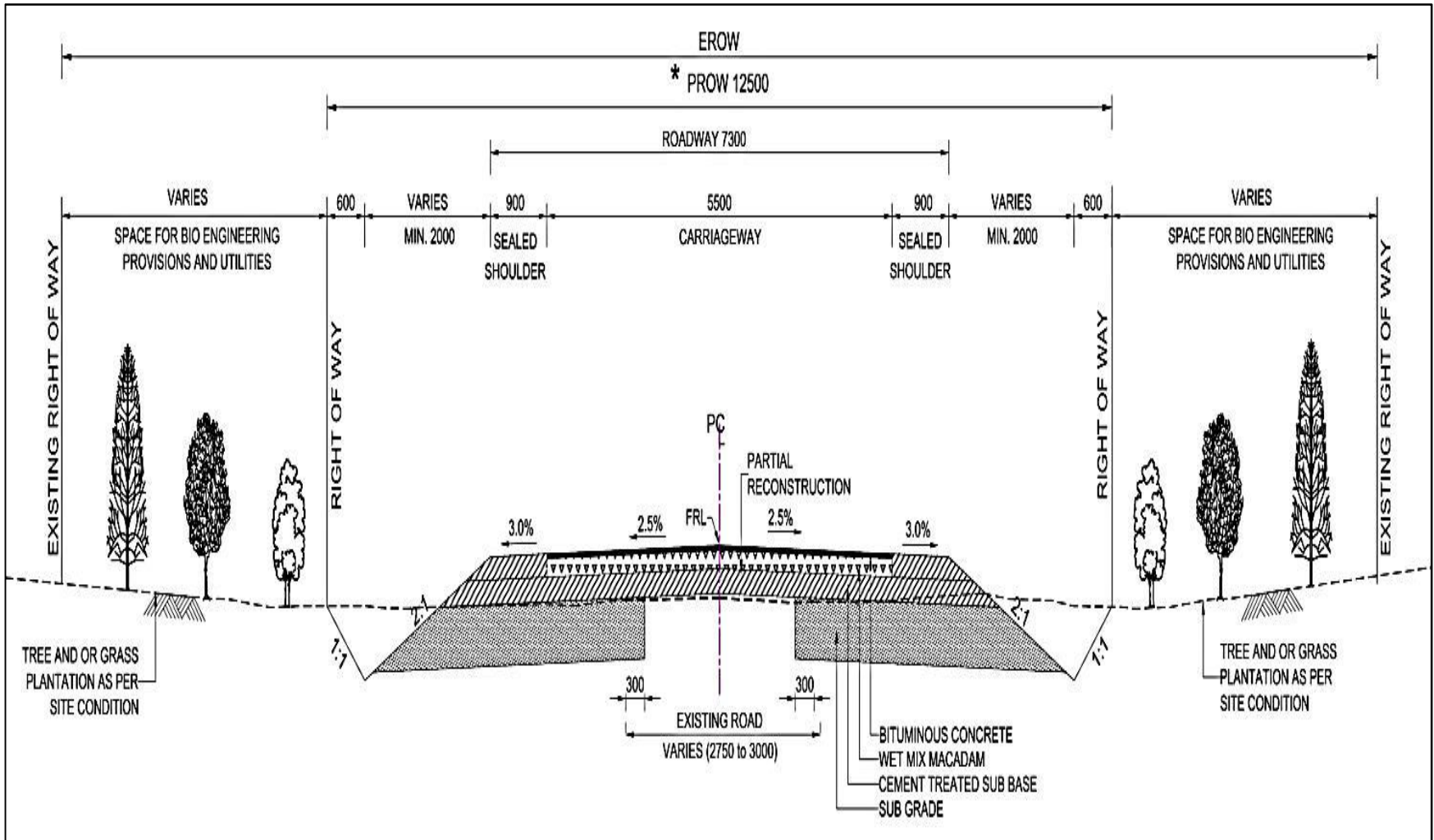
16. The proposed improvement/widening scheme of project road comprises of six type of configurations as below. The alignment Plan & Profile of the project road is given in Annexure - 2.
- TCS-1A: Intermediate lane Carriageway in New Construction/Curve Improvement
  - TCS- 1 B: Intermediate Lane carriageway in Rural Sections
  - TCS-2A: Intermediate Lane Carriageway in Built Up Sections with Foot path Cum Drain
  - TCS-2B: Intermediate Lane Carriageway in Built Up Sections with Foot path Cum Drain on Both sides, Retaining wall on LHS
  - TCS-3: Intermediate lane Carriage way Reconstruction in built-Up Sections with Breast Wall on One Side
  - TCS-4: Intermediate Lane Carriage way in Rural Sections Breast wall on One Side.

**Table 1-10: Typical Cross sections along Project Road**

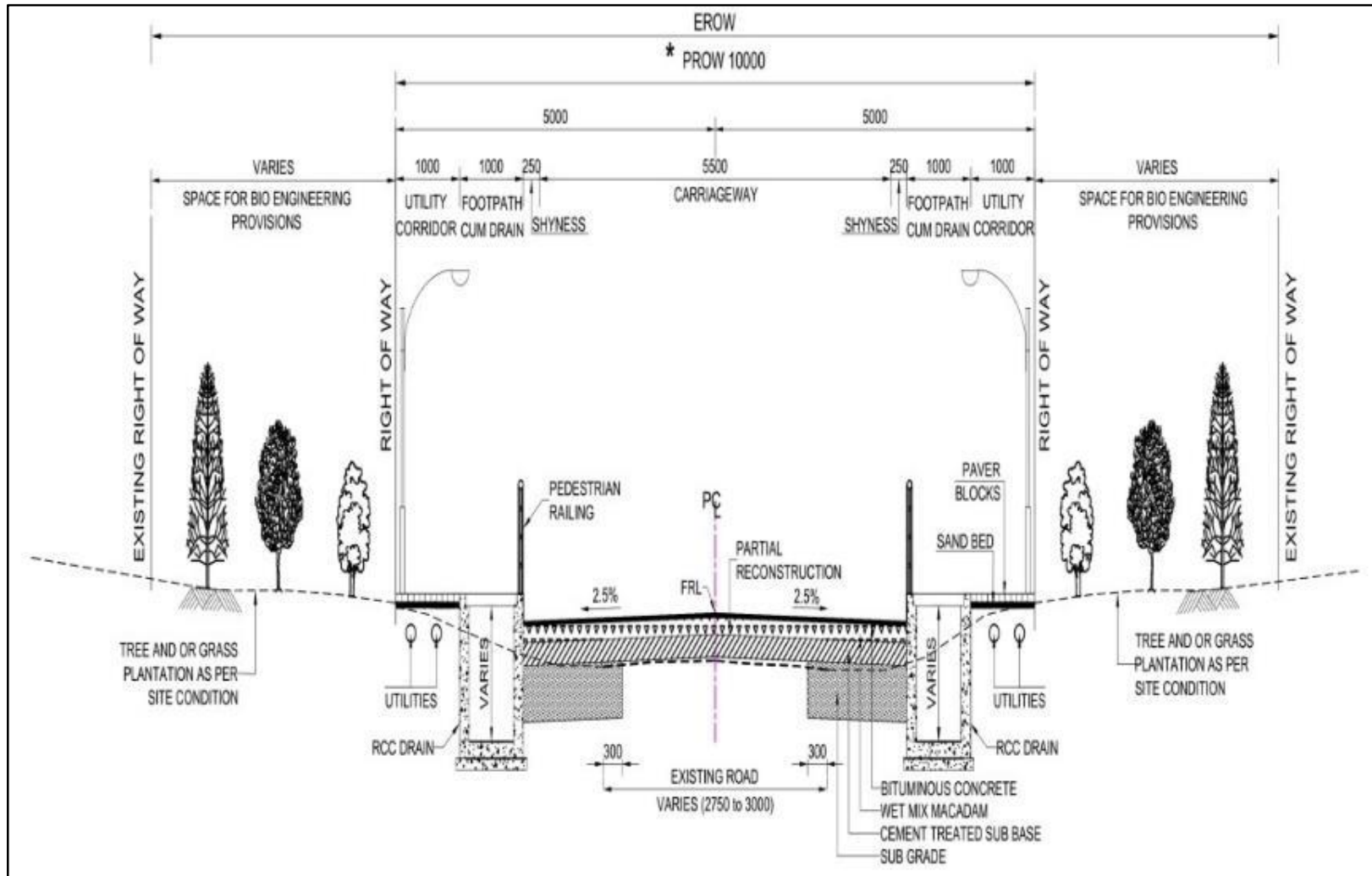
Typical cross section	Length of road (in km)
TCS-1A	0.38
TCS-1B	4.96
TCS-2A	4.31
TCS-2B	0.55
TCS-3	0.07
TCS-4	3.05



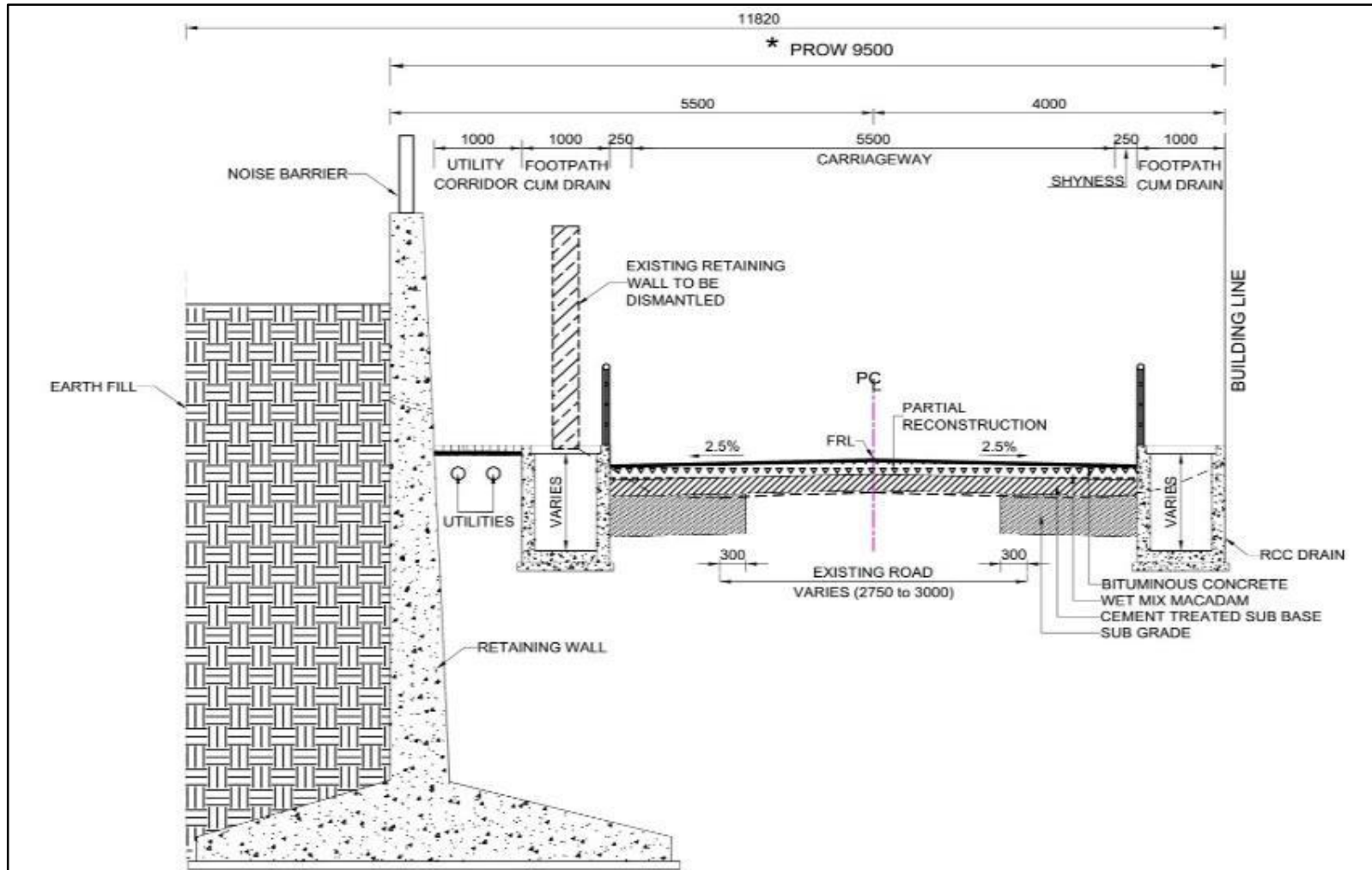
TCS-1A: Intermediate lane Carriageway in New Construction/Curve Improvement



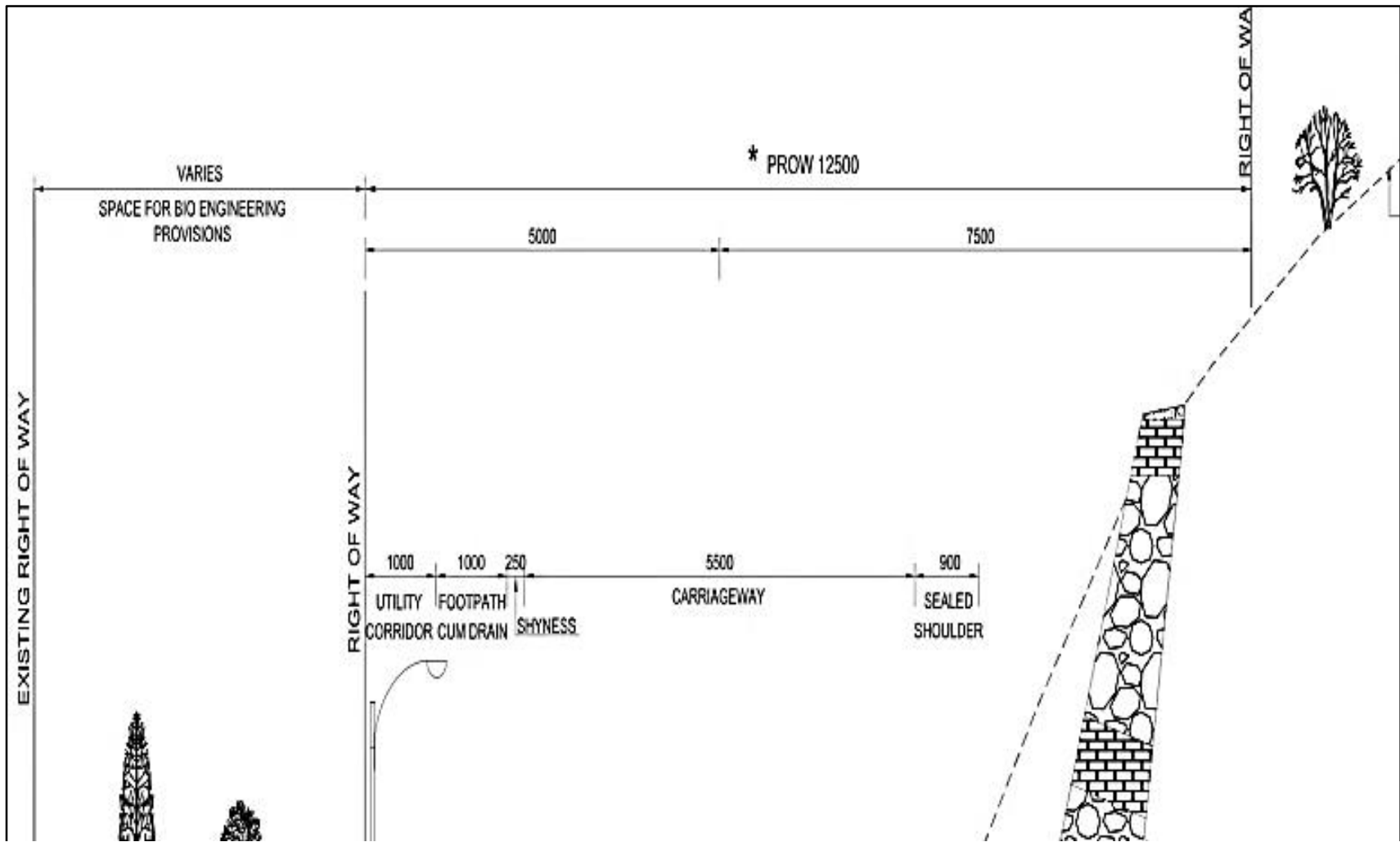
TCS- 1 B: Intermediate Lane carriageway in Rural Sections



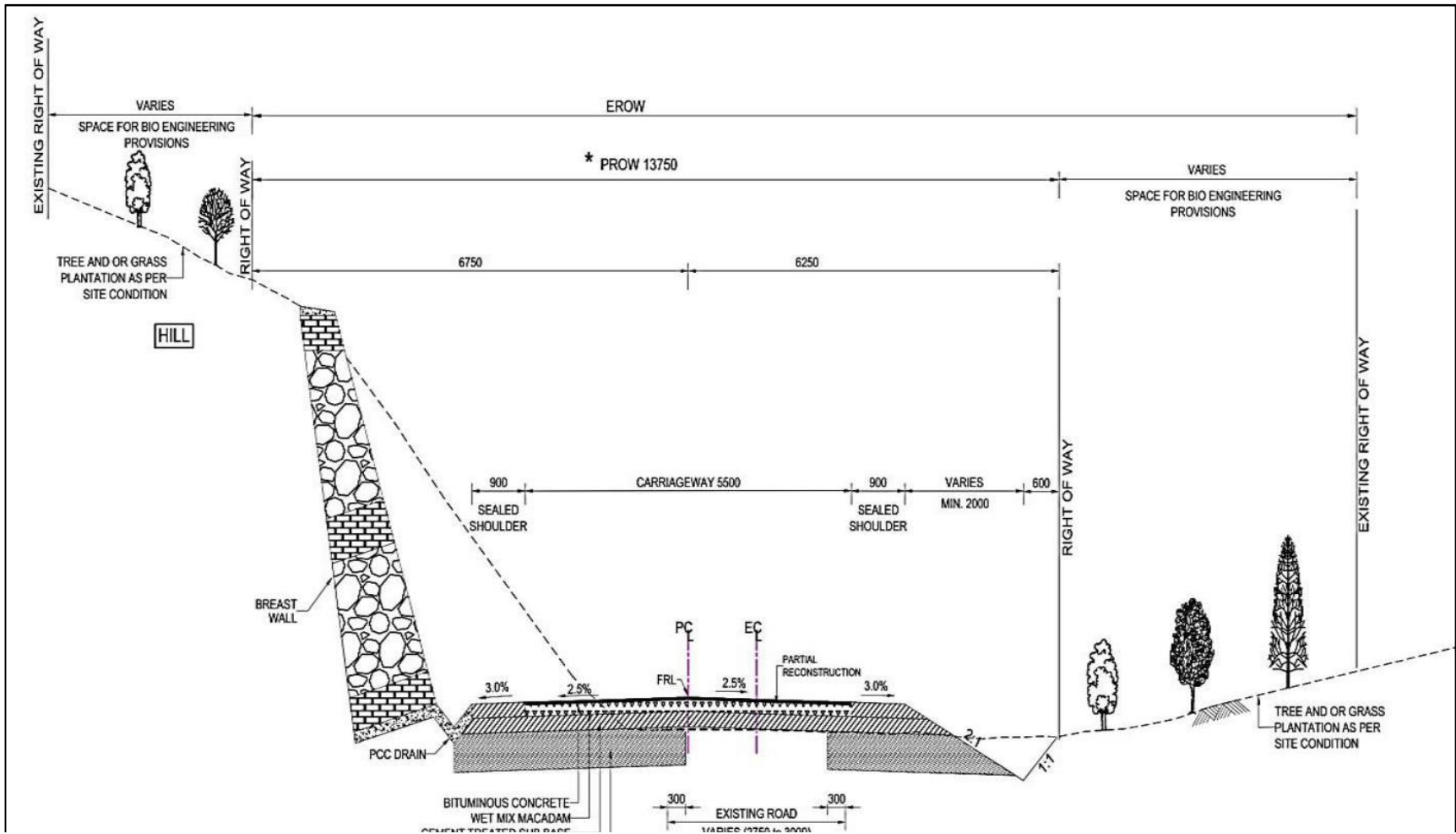
**TCS-2A: Intermediate Lane Carriageway in Built Up Sections with Foot path Cum Drain**



TCS-2B: Intermediate Lane Carriageway in Built Up Sections with Foot path Cum Drain on Both sides, Retaining wall on LHS



TCS-3: Intermediate lane Carriage way Reconstruction in built-Up Sections with Breast Wall on One Side



TCS-4: Intermediate Lane Carriage way in Rural Sections Breast wall on One Side

Figure 1.5: Typical Cross Sections for OSR-9

17. As a part of road upgradation, 32 CD structures are being reconstructed and 1 is retained with minor repairs and without any extension. The list of the proposed cross drainage Works are given in below Table 1-21. The chainage wise details of cross drainage structures are provided in Annexure-1.

**Table 1-21: Proposed Cross Drainage Works**

Type of Construction	Minor Bridges	Pipe Culverts	Slab Culverts	Box Culverts
Reconstruction	1	27	4	0
Retained with minor repairs and extension	0	0	0	0
Retained with minor repairs	1	0	0	0

18. There are 10 bus stops between Km 0 to Km 13.5 and all of these are proposed to be remodeled as given in Table 1-12. All remodeled bus stops shall have universal access (ramp) with railing for physically challenged persons (in accordance with rights of persons with disabilities act, 2016).
19. Provision for toilets (3 seater for men and 3 seater for women with separate entrance) with septic tank and soak pit arrangement has been made at Ladrou Market. The toilet provision has been made as per the outcome of stakeholder consultations and these will be maintained by local shopkeeper's association with co-operation from local *panchayats*. Although, toilets were sought at other bus stops as well during stakeholder consultations, provision could not be made mainly due to operation and maintenance issues and less number of passengers at such bus stops. The list of bus stops/rain shelters is given in **Error! Reference source not found.2**.

**Table 1-32: Details of Remodelled Bus stops/Rain Shelters**

S.No	Chainage	Side/ (LHS/RHS)
1	0/010	LHS
2	2/090	LHS
3	3/380	RHS
4	4/650	RHS
5	7/670	RHS
6	8/340	RHS
7	9/420	LHS
8	10/130	RHS
9	10/680	RHS
10	12/250	LHS

20. The project road has 92 electric poles, 21 street lights/lamp poles, 76 telephone poles and 5 transformers within the right of way (**Error! Reference source not found.3**). These utilities presently along the edge of the carriage way / shoulder will required to be shifted to the adjacent locations within the available RoW.

**Table 1-43: Utilities within Right of Way of the Project Road**

S.No	Utility	LHS	RHS	Total
1	Electric Poles	55	37	92
2	Street light poles	13	8	21
3	Telephone Poles	39	37	76
4	Transformers	1	4	5
<b>Total</b>		<b>108</b>	<b>86</b>	<b>194</b>



21. It is estimated that 560 numbers of manpower (510 - skilled and unskilled labors and the balance - supervisor and managerial staff) will be engaged during 24 months construction period.
22. Pre-construction stage of the project are likely to involve adverse impacts on land ó private/government, structures, trees/crops, CPRs including religious structures that fall within the Corridor of Impact. Additionally, in hilly areas, there is a need to consider landslide depending on the type of soil in the slope and hence at such locations land & structures beyond COI may need to be taken as well. Further during construction stage, the project is expected to set up labor camps with separate but temporary facilities for housing, water & power supply and construction material storage facilities.



**Figure 1.6: Map indicating Dadhol - Ladroul Road**

23. Besides, the project will also have labor camps and identified spots/locations needed for disposal of material, etc. which are adjacent to the project road and does not require separate/new access road. It is anticipated that materials required i.e. primary suppliers for construction works will be sourced from government approved facilities from adjoining districts/within the state.
24. The Himachal Pradesh Road and Other Infrastructure Development Corporation (HPRIDC) is the designated nodal agency under GoHP for implementation of HPSRTP in Himachal Pradesh. HPRIDC besides having its direct own workers i.e. employees shall contract agencies<sup>2</sup>: for civil works, agencies/firms to support core-functions; primary suppliers of material/equipment and other implementation support partners, and these could be from anywhere in the country or outside. Influx of migrant labor from other states for construction works has been a norm in the state and is likely to continue in this project as well resulting in potential gender-based violence (GBV). Therefore, the project will involve a wide variety of stakeholders during its project cycle

<sup>2</sup> e.g. Civil works contractors, Road Safety Consultants, Project Management Consultants/Construction Supervision Consultant, NGO for RAP implementation

including Police Department that are associated with activities under other components of the project such as Road Safety.

25. In the overall project, there is likely to be one Associated facility in the form of a bridge that is under construction by National Highways Authority of India which lies adjacent to one of the upgradation corridors Raghunathpura-Mandi-Harpura- Bharari in Bilaspur district. There is no other multi-lateral or bi-lateral financing institutions involved in the project for any of the upgradation or maintenance corridors, hence there is no requirement for a Common Approach.
26. Based on a thorough consideration of the afore-mentioned details, the following plans need to be prepared to meet the requirements of ESS.

**Table 1.15 – Plan documents to meet relevant ESS requirements**

ESS 1	ESIA and ESMP (including GBV Mitigation Plan <sup>3</sup> )
ESS 2	Labour Management Procedure for HPRIDC <sup>4</sup>
ESS 3	Waste Management Plan & Pollution Prevention Management Plan
ESS 4	Emergency Response
ESS 5	Resettlement Action Plan
ESS 6	Bio-diversity Management Plan (Not applicable )
ESS 7	Indigenous-Peoples (Not applicable)
ESS 8	Cultural Heritage Plan (will be included as part of the ESMP)
ESS 9	No Plan needed as no financial intermediaries are involved
ESS 10	Stakeholder Engagement Plan

### 1.3 Purpose of ESIA

27. Initially, the overall project risk was categorized as High as per an internal Environment and Social Risk Classification of the World Bank and hence the ESIA's are prepared by an independent consultant. Currently based on the risks and impacts for the priority corridors, the risk rating of the overall project is revised to Substantial. The purpose of the ESIA is to use it as tool for decision-making on the sub-project so that there is sustainable development of the road construction. Specifically, the objective of the ESIA is:

- i. To identify, evaluate and manage the environment and social risks and impacts of the project in a manner consistent with the ESSs;
- ii. To adopt a mitigation hierarchy approach to the project's E&S risks i.e. a) anticipate and avoid risks and impacts; b) minimize or reduce risks and impacts to acceptable levels, if not avoidable; c) once risks and impacts have been minimized or reduced, mitigate; and (d) where significant residual impacts remain, compensate for or offset them, where technically<sup>2</sup> and financially<sup>3</sup> feasible;
- iii. To help identify differentiated impacts on the disadvantaged or vulnerable and to identify differentiated measures to mitigate such impacts, wherever applicable;
- iv. To assess the relevance and applicability of environmental and social institutions, systems, laws, regulations and procedures in the assessment, development and implementation of projects, whenever appropriate; identify gaps, if any exist, and
- v. To assess borrower's existing capacity and identify areas for enhanced capacity towards management of E&S risks

<sup>3</sup>GBV risk mitigation plan will be prepared for the overall project

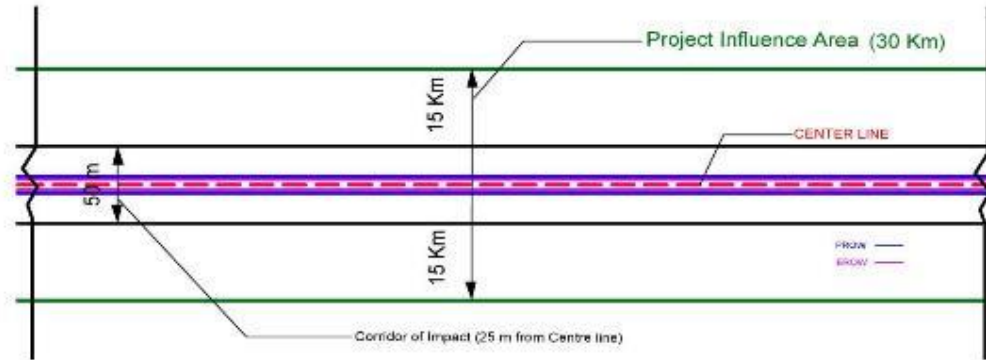
<sup>4</sup> Labor Management Procedure shall be applied by HPRIDC for all upgradation and maintenance roads

## **1.5 Scope of the ESIA**

28. The ESIA requires conforming to the applicable environment and social legal and regulatory framework of Government of India and Himachal Pradesh as well as World Bank's Environmental and Social Framework Policy and relevant Standards. The scope of the ESIA is to:
- i. assess the existing baseline status of the environment within Corridor of Impact and Project Influence Area;
  - ii. identify the probable adverse and positive E&S risk and impacts due to the planned project during its entire cycle i.e. from preconstruction to construction to operation & maintenance;
  - iii. identify stakeholders and various groups/institutions who are either affected or have an interest or a stake in the project, with additional emphasis on disadvantaged and vulnerable groups and to carry out consultations with stakeholders to help elicit their concerns, suggestions and support;
  - iv. consider all ESHS likely in the project for further usage towards preparation of requisite mitigation plans, as may be required.
  - v. conduct additional studies, if any, for the enhancement of the benefit to the local community and the road users.
  - vi. identify capacity constraint of HPRIDC in respect of E&S management and propose commensurate capacity enhancement measures; and
  - vii. finally use inputs from the above to prepare appropriate mitigation measures and plans and their inclusion in cost estimates (including rate analysis), Drawings, Bill of Quantities, Technical specifications and other inputs that would be integrated with the bid documents.

## **1.6 Approach and Methodology**

29. Study Areas: The study area is defined consideration physical space to be occupied, whether permanently or temporarily, during construction of the entire road infrastructure, associated infrastructure, as well as adjacent spaces, performance of planned activities in the various stages according to project needs, requirements on use and exploitation of natural resources, abiotic, biotic and socioeconomic components, and the area where significant environmental impacts are evident, with a view to define limit on which components involved are analyzed.
- a. Corridor of Impact: The land width that would be needed during construction taking into account full construction width, vehicle parking/movement plus safety zone on either side of centerline during construction stage is considered as Corridor of Impact. The environmental baseline inventory has been collected 25 metre on each side of the centre line of the road.
  - b. Project Influence Area: As required under EIA notification, 2006 for conducting environmental assessment, 15km radius on each side of project road is considered as the Project Influence area (PIA) for collecting baseline data from secondary data sources.



**Figure 1.7: Corridor of Impact and Project Influence Area**

30. Socio-economic profile: The influence area of 15 km is considered for the study to analysis the regional developments at the macro level and is represented with the secondary and primary data, Stakeholder consultations and during the social surveys. A socio-economic profile for the project areas was prepared based on the information collected from secondary and primary sources to provide an overview, levels of socio-economic development etc. of the project road. Secondary information from different government sources like Census of India, Economic and Statistics department, Agriculture department, Social Welfare & Women Development Department of Government of Himachal Pradesh. The secondary information helped to understand macro level socio-economic profile of the population by gender, ethnicity, vulnerability, poverty, working population and available infrastructure facilities for services in the project influence area.
31. Verification of Existing Right of Way: A team comprising E&S specialists with the field social surveyor and investigators conducted preliminary reconnaissance of the project road for project appreciation including type and nature of impacts en-route. The Existing Right of Way (RoW) status of the project was ascertained by verification of land details from the revenue and forest departments/divisions and ground-truthing was done by checking on boundary pillars that demarcate EROW, wherever available. Also, information relating to legacy issues on compensation payments, pending litigations, if any were collected. Super-imposing the current design on the available EROW helped to ascertain the additional land that would be required, besides the quantum and type of assets that are likely to be impacted. As currently the designs are not final, the social surveys have been carried out considering the buffer area of more than existing & required RoW along corridor to determine the social changes and maximum impacts.
32. Census-socio-economic survey included the collection of information from primary and secondary sources. Information included: general identification including aspects relating to sexual orientation; household identification; social status; type of family; income by sources; type of losses due to the project; vulnerable category of the household; type of inventory losses; impact category; use of structure/property; loss of structure; Other losses. Survey also collected details on ownership of the structure /land; options for R&R/Opinion on the proposed project; access to Health, Electricity, Fuel, Water Supply, and Sanitation; Income, Debt levels, Expenditure pattern, loss of land, Assets Owned and Productivity; health status; gender aspects; migration; and perception about the project. The impact on private land and structures (residential, commercial) government, encroachers and squatters in addition, detailed information on impact on community assets has also been collected (religious structure, educational institutions, community properties etc.). Subsequently collation and analysis of primary and secondary information collected from different sources has been carried out. On the basis of primary data, analysis has been done on potential social and economic impacts, categorization of impacts, risks, potentials impacts, and alternatives etc. Local level consultations and focus group discussions and key informant

interviews were deployed to elicit views and opinions of different stakeholders regarding the proposed road improvements.

33. Environmental baseline and assessment: The primary baseline information on different environmental components were collected through field survey. The input to field survey i.e. identification of environmental factors to be considered for assessment is backed by a thorough desk review of literature, existing rules/regulations/acts and reconnaissance survey. Field survey were carried out to collect information on the major environmental features such as settlement facilities, drainage pattern of the area, forest, trees within RoW of the alignment, water bodies, river crossing, sensitive receptors, air, water, noise and soil quality etc. and were studied in detail, which helped in identifying areas of concern along the stretch and critical issues. After the full documentation of the baseline environmental situation, each of the environmental aspects was examined against the road upgrading component and activities. Environmental issues have been assessed to describe the potential impacts and risks that may result from road upgrading and construction. Quantification has been difficult in light of the limited availability of data.
34. Based on an identification of stakeholder towards the preparation of a Stakeholder Engagement Plan, stakeholders were identified through systematic consultation with project beneficiaries, project affected people, women, vulnerable and poor members of the community, and other stakeholders who may have an influence over the project. Hence consultations were undertaken with primary stakeholders: beneficiaries, disadvantaged, poor and vulnerable groups, people who may potentially be impacted adversely by the project. Consultations were also carried out with secondary stakeholders: local community-based organizations (CBOs) and community representatives as well as government departments etc.

**Table 1.16 – Tools of Consultations**

<b>Tools of Consultation</b>	<b>Stakeholders</b>	<b>Purpose</b>
Public meeting, Focus Group Discussion	Community, civil society organizations, NGOs, local leaders, Government officials	Discuss the objective of the project; Social impact (Land including EROW, Structure, CPR)
Public meeting, Focus Group Discussion	Women groups, Truckers, vulnerable road users etc.	Social Concerns (Road Safety, Critical Junctions, Rural Roads, Slow moving vehicles, Fair/Festival Traffic; Environmental improvement/enhancement)
Key informant interviews	Government Officials (Managers, Engineers, Supervisors etc.);	Social impact (Land/EROW, Structure, CPR)
	Neighbouring communities; Disadvantaged and vulnerable Groups (women, children, person with disability, old age); Employees and Managers (Project Managers, Site Engineers, technicians, supervisors, safety staff, multipurpose staff);	Social Concern (Road Safety, accident spots, critical Junctions)
	Village panchayat members/ local NGOs and Community Organization	Rural Roads (Slow moving vehicles, importance of the road, Fair/Festival Traffic; Environmental improvement Social Concern (Road Safety, accident spots, critical Junctions; role in the area)
	Community workers, Sarpanch, ANMs etc.	Social Concern (Road Safety, accident spots, critical Junctions)

35. Focus group discussions were conducted with a cross-section of men and women in the community. The objective of these discussions was to gain in-depth understanding of project issues and concerns from a broad group of discussants, including people who may be affected from loss of land. The consultations focused on: inclusiveness in participation of community members, perceptions and concerns about the positive and negative social impacts of the project, including impacts on land and structures.
36. Separate individual interviews were held with disadvantaged and vulnerable members of the community to disseminate information about the project and to understand their views about the project. Women at select locations were also consulted on their interest in road related livelihood activities such as providing off-carriage maintenance works and supporting the much-needed nature-based solutions/measures (bio-engineering) towards slope stabilization efforts. A separate questionnaire was administered to females on questions relating to Gender Based Violence (GBV) particularly at locations where labor camps and socially sensitive receptors such as Schools and hospitals are located.
37. Individual interviews were conducted during one on one interview during the social & environment related surveys. Such a technique helped solicit views and opinions at the individual level. It enabled stakeholders to speak freely and confidentially about controversial and sensitive issues. Build personal relations with stakeholders and record the interviews. The purpose is to understand the social concerns of the directly or indirectly impacts persons. A team comprising social development professionals carried out these consultations. The outcomes of the public consultations were helpful towards providing key inputs to the DPR on adoption of the mitigation hierarchy and provide inputs for approach to management of E&S issues arising in the project road.
38. All formats used for collection of the above information, checklists used for consultations and photographs were used for collation and compilation, analysis towards preparation of the Draft ESIA report. These formats and checklists are appended to this draft ESIA.

## **CHAPTER 2 – LEGAL AND INSTITUTIONAL FRAMEWORK**

39. A review of the existing environmental and social legal and regulatory framework is discussed here in terms of their relevance and applicability to the sub-project road is presented in this chapter. Following which, the chapter presents the current institutional structure of HPRIDC ó the implementing agency.

### **2.1 Applicable Regulations of GOI/GoHP**

40. The Government of India has laid out various policy guidelines, acts and regulations pertaining to environment and social aspects. Table 2.1 lists all the applicable GOI regulations and their relevance to this sub-project.

**Table 2.1 Summary of Applicable E&S Regulations of GOI/GoHP**

S.No.	Act / Rules	Key provisions and purpose	Applicability to Project Road
1	Environmental protection Act, 1986 and subsequent amendments	The Act provides for mandatory public consultation for all listed projects and activities requiring prior Environmental Clearance (EC) and includes road and highways requiring further land acquisition. The Public Consultation shall ordinarily have two components comprising of:- (a) a public hearing at the site or in its close proximity- district wise, to be carried out in the manner prescribed, for ascertaining concerns of local affected persons; (b) obtain responses in writing from other concerned persons having a plausible stake in the environmental aspects of the project or activity.	Project road does not fall under the listed projects and activities, which requires prior environmental clearances from central or state levels and thus all provisions under the act are exempted/ not applicable.
2	Environmental Impact Assessment Notification-2006, 14th Sep-2006, as amended in 2009 and 2013	To provide environmental clearance to new development activities following environmental impact assessment	No (The project road is other district road and it does not fall under the category of state Highway (7f of the schedule, EIA notification) and thus is outside the preview of EIA, 2006 Notification). Therefore, no prior environmental clearances are required from central or state levels.
3	Notification for use of fly ash, 2003 and MoEF&CC notification dated 25 <sup>th</sup> March 2015	Reuse large quantity of fly ash discharged from thermal power plant to minimize land use for disposal	No (as there is no thermal plant within 300km of project road)
4	The Forest (Conservation) Act. 1980	To check deforestation by restricting diversion of forest areas into non- forest uses.	No.
5	MoEF&CC circular (1998) on linear Plantation on roadside, canals and railway lines modifying the applicability of provisions of forest (Conservation) Act, to linear Plantation	Protection / planting roadside strip as avenue/strip plantations as these are declared protected forest areas.	No.
6	The Wild Life Protection Act, 1972	To protect wildlife such as National Parks and Sanctuaries	No (No wild life Sanctuary or National park is within 10 km of project road)
7	Biological Diversity Act, 2002	Disclosure of species survey	No, As per act, there is no presence of any rare, endangered, threatened species reported along the corridor.
8	Air (Prevention and Control of Pollution) Act, 1981	To control air pollution Pollutants	Yes (During construction phase contractor to obtain CTO and CFO) to regulate air quality at



S.No.	Act / Rules	Key provisions and purpose	Applicability to Project Road
			construction
9	Water (Prevention and Control of Pollution) Act, 1974	To control water pollution by controlling discharge of pollutants as per the prescribed standards	Yes (During construction phase contractor to obtain CTO and CFO) to regulate water quality at construction
10	Noise Pollution (Regulation and Control Act) 1990	The standards for noise for day and night have been promulgated by the MoEF&CC for various land uses.	Yes, (During construction phase contractor to obtain CTO and CFO) to regulate noise level at construction
11	The Explosive Act 1984	Safe transportation, storage and use of explosive material	No (as explosive are prohibited to be used.)
12	The Mines and Minerals (Development and Regulation) Act 1957	For opening new quarry.	Yes (During construction only, if any new quarries are opened, contractor shall avail the permission/license from competent agencies)
13	The Ancient Monuments and Archaeological Sites and Remains Act 1958	Conservation of cultural and historical remains found in India	No
14	National Resource Efficiency Policy, 2019 (Draft)	To create a facilitative and regulatory environment to mainstream resource efficiency across all sectors by fostering cross-sectoral collaborations, development of policy instruments, action plans and efficient implementation and monitoring frameworks.	Yes (During construction Phase)
15	Municipal Solid Waste (Management & Handling) Rules, 2000 (MSW Rules)	Segregation, Handling & safe disposal of domestic solid waste	Yes (The work force camp and camp site shall have facility for collecting the waste, and access controlled to prevent the entry of stray animals including wildlife for scavenging of waste.)
16	Hazardous Wastes (Management, Handling and Trans-boundary Movement) Rules, 2008.	Safe handling, storage, transportation & disposal of hazardous wastes	Yes (Applicable during construction phase, the contractor shall obtain the requisite licenses for handling and disposal of hazardous waste generated during construction phase.)
17	Batteries (Management and Handling) Rules, 2001	Safe recycling of lead acid batteries	Yes (Applicable during construction phase, the contractor shall obtain the requisite licenses for handling and disposal of batteries during construction phase)

S.No.	Act / Rules	Key provisions and purpose	Applicability to Project Road
18	Central Motor Vehicle Act 1988 and Central Motor Vehicle Rules 1989	To check vehicular air and noise pollution	Yes (contractors responsibility to obtain Pollution Under Control certificates during construction stage for all vehicles deployed for construction activities)
19	National Labour Act, 1970.	An Act to regulate the employment of contract labour in certain establishments and to provide for its abolition in certain circumstances and for matters connected therewith	Yes (This shall be contractors responsibility for compliance)
20	Public Liability and Insurance Act 1991	To provide through insurance, immediate relief, by you who control or handle hazardous chemicals. Protection form hazardous materials and accidents.	Yes (The contractor shall obtain the required insurance policy prior to commencement of construction)
21	Building and Other Construction Workers act, 2006	To regulate the employment and conditions of service of building and other construction workers and to provide for their safety, health and welfare measures and for other matters connected therewith or incidental thereto.	Yes (This shall be contractors responsibility for compliance)
22	The Petroleum Rules, 2002	Safe use and storage of petroleum products and will need to be compiled by the contractors.	Yes (contractors responsibility to obtain PUC certificates during construction stage for all vehicles deployed for construction activities)
23	The E-Waste (Management) Rules, 2016,	This provides for management of E-wastes (but not covering lead acid batteries and radio-active wastes) aiming to enable the recovery and/or reuse of useful material from e-waste, thereby reducing the hazardous wastes destined for disposal and to ensure the environmentally sound management of all types of waste of electrical and electronic equipment.	Yes (contractor is responsibility during the construction period)
24	Plastic waste Management Rules, 2016	This provides for control and management of the plastic waste generated from any activity. Contractors will ensure compliance to this Rule.	Yes (contractor is responsibility during the construction period)
25	State Groundwater Acts and Rules	These provide for regulating extraction of ground water for construction/industrial and drinking and domestic purposes.	Contractors will need to obtain permission from Central/State Groundwater Boards prior to groundwater abstraction through either new/existing tube well or through any other means; and will to ensure full compliance to all applicable rules and any conditions imposed in the permit by competent authority.

S.No.	Act / Rules	Key provisions and purpose	Applicability to Project Road
26	Construction & Demolition, Waste Management Rules, 2016	This rule shall be applicable to construction waste/debris resulting from road construction including RCC bridge and other protection works	Yes. As, this Project is a rehabilitation/widening of road with demolition of old and damaged CD structures, the project road is likely to generate the demolition waste. The project considers balancing the cut and filling volumes and reusing the debris/muck generated in the construction of sub base and base layers of the road. Excess debris will be safely disposed in approved sites by the project authorities and district administration.
27	Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (RFCTLARR)	The act provides for a transparent process and fair compensation in land acquisition for public purpose and provides for rehabilitation and resettlement of land owners and those affected by land acquisition. It comprises four schedules that provide the minimum applicable norms for compensation based on market value, multiplier and solatium; resettlement and rehabilitation (R&R) entitlements to land owners and livelihood losers; and facilities at resettlement sites for displaced persons, besides providing flexibility to states and implementing agencies to provide higher norms for compensation and R&R.	Applicable to all sub-projects when land is required to be taken on involuntary basis i.e. if land is not taken on direct purchase from the owner
28	The Himachal Pradesh Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (Social Impact Assessment and Consent) Rules 2015,	Provides the rules for operationalizing the provisions of the above-mentioned act	Applicable to all sub-projects when land is required to be taken on involuntary basis i.e. if land is not taken on direct purchase from the owner
29	Acquisition of Land by Private Negotiation and Upkeep of Land Record/General Guidelines and Instruction (Standing Order No .28)(PBW(B)F(5)40/2017-PWD/ GoHP, January 2018	For speedier acquisition of land, the process of acquisition by private negotiations with the interested landowners have proved to be beneficial to both the parties i.e. landowners as well as acquiring department, Government of Himachal Pradesh in January 2018 publish the order to execute for infrastructure projects. If it is found that acquisition of land is imminent for a public purpose, following two options will be available with the concerned department i) Acquisition by private negotiation. ii) Compulsory acquisition under the provisions of the new Land Acquisition Act & Right to Fair Compensation and Transparency in Land Acquisition	Either of the options would be used for acquiring land under the project

S.No.	Act / Rules	Key provisions and purpose	Applicability to Project Road
		Rehabilitation and Resettlement Act, 2013.	
30	The Himachal Pradesh Road Infrastructure Protection Act, 2002 (and Rules 2004)	The Act defines road infrastructure that includes: roads, paths and streets for transport or communication and also shall include: - (i) acquired road land width; (ii) all types of road and their structure, such as road pavements, shoulders, retaining walls, breast walls, (iii) any structure ancillary to road transport and communication system; (iv) bridges including approaches, return walls, wing walls, protection works and allied structures;(v) expressways including interchanges, (vi) road furniture, such as parapets, railings, etc. No person shall: encroach upon the Government land under road infrastructure; (vii) raise any permanent, temporary or movable structure on or from road infrastructure;	Applicable to all roads in HP specifically to address the issue of encroachments
31	The Himachal Pradesh roadside land control act 1968	Act has provisions for restriction on buildings etc., in a controlled area no person shall erect or re-erect any building or make or extend any excavation or lay out means of access to a road in a controlled area.	Applicable to all roads in HP specifically to address the issue of encroachments
32	The Right to Information Act, 2005	The Act provides for setting out the practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, the constitution of a Central Information Commission and State Information Commissions and for matters connected therewith or incidental thereto.	Applicable to the project as a whole.
33	The Rights of Persons with Disabilities Act, 2016	The Act ensures that persons with disabilities enjoy the right to equality and non-discrimination in all aspects of life. Every entity has to comply with the accessibility standards relating to physical environment, transport and information and communication technology as per the standards prescribed in the RPD Act. These include barrier free built environment having elevators/ramps for the benefit of wheelchairs. In respect to Access to Transport- mentioned that the appropriate Government shall take suitable measures to provide, (a) facilities for persons with disabilities at bus stops, railway stations and airports conforming to the accessibility standards relating to parking spaces, toilets, ticketing counters and ticketing machines;(b) access to all modes of transport that conform the design standards, including retrofitting old modes of transport, wherever technically feasible	Applicable to the project road infrastructure in terms of making it more accessible

## **2.2 World Bank ESF Policy, Directives and Standards – Extent of Relevance**

41. Section below discusses the relevance of ESF Policy, each of the ten standards (ESS1 to 10) and associated Directive; their requirements. Additionally, it also discusses the relevance and requirements relating to other guidance notes of World Bank.

**Table 2.2 – World Bank ESF Policy, 2016 and World Bank Groups’ EHSGs, IFC, 2007**

<b>World Bank ESS Policy, Standards, Directive</b>	<b>Objectives</b>	<b>Requirements</b>	<b>Relevance &amp; Extent of Relevance to the sub-project/project</b>
World Bank Environment and Social Policy for Investment Project Financing	It sets out the mandatory requirements of the Bank in relation to the projects it supports through Investment Project Financing.	The types of E&S risk and impacts that should be considered in the environmental and social assessment. The use and strengthening of the Borrower’s environmental and social framework for the assessment, development and implementation of World Bank financed projects where appropriate.	Applicable to this project
<b>ESS-1</b> Assessment and Management of Environmental and Social Risks and Impacts	Identify, assess, evaluate, and manage environment and social risks and impacts in a manner consistent with the ESF. Adopt differentiated measures so that adverse impacts do not fall disproportionately on the disadvantaged or vulnerable, and they are not disadvantaged in sharing development benefits and opportunities	The types of E&S risk and impacts that should be considered in the environmental and social assessment. The use and strengthening of the Borrower’s environmental and social framework for the assessment, development and implementation of World Bank financed projects where appropriate.	E&S risks and Impacts have been identified based on surveys and consultations with primary stakeholders including communities and implementing agency
<b>ESS-2</b> Labor-and-Working-Conditions	Promote safety and health at work. Promote the fair treatment, non-discrimination, and equal opportunity of project workers. Protect project workers, with particular emphasis on vulnerable workers. Prevent the use of all forms of forced labor and child labor. Support the principles of freedom of association and collective bargaining of project workers in a manner consistent with national law. Provide project workers with accessible means to raise workplace concerns.	Requirements for the Borrower to prepare and adopt labor management procedures. Provisions on the treatment of direct, contracted, community, and primary supply workers, and government civil servants. Requirements on terms and conditions of work, non-discrimination and equal opportunity and workers organizations. Provisions on child labor and forced labor. Requirements on occupational health and safety, in keeping with the World Bank Group’s Environmental, Health, and Safety Guidelines (EHSG).	Project will following types of workers: i) Direct workers will include the project managers and supervisors, who are employees of HPRIDC, deployed for HPSRTP; ii) All the work force deployed by the Contractors and the Project Management Consultant (for all packages) under the HPSRTP will be deemed to be contracted workers. The Contractor(s) might further engage multiple subcontractors; iii) Influx of migrant labor from other states for construction works has been a norm in the state and is likely to continue in this project; iv) Community workers may be employed by the contractor in relation to

World Bank ESS Policy, Standards, Directive	Objectives	Requirements	Relevance & Extent of Relevance to the sub-project/project
			this Project from local sources particularly for supporting bio-engineering solutions towards slope stabilization workers.
<p><b>ESS-3</b> Resource-Efficiency-and-Pollution-Prevention-and-Management</p>	<p>Promote the sustainable use of resources, including energy, water, and raw materials. Avoid or minimize adverse impacts on human health and the environment caused by pollution from project activities. Avoid or minimize project-related emissions of short and long-lived climate pollutants. Avoid or minimize generation of hazardous and non-hazardous waste. Minimize and manage the risks and impacts associated with pesticide use. Requires technically and financially feasible measures to improve efficient consumption of energy, water, and raw materials, and introduces specific requirements for water efficiency where a project has high water demand.</p>	<p>Requires an estimate of gross greenhouse gas emissions resulting from project (unless minor), where technically and financially feasible. Requirements on management of wastes, chemical and hazardous materials, and contains provisions to address historical pollution. ESS-3 refers to national law and Good International Industry Practice, in the first instance the World Bank Groups' EHSGs.</p>	<p>With respect to Resource Efficiency, the project preparation and the ESA process will identify feasible measures for efficient (a) energy use; (b) water usage and management to minimize water usage during construction, conservation measures to offset total construction water demand and maintain balance for demand of water resources; and (c) raw materials use by exploring use of local materials, recycled aggregates, use of innovative technology so as to minimize project's foot prints on finite natural resources.</p> <p>With respect to Pollution Management, based on past road project experiences, the project will develop, as part of the ESA process, prevention and management measures to offset risks and impacts of pollution from potential sources such as dust and emission from operation of hot-mix and batching plants, crushers, construction and haulage vehicles, material and spoil stockpile; effluents and wastewater from labor camps, construction camp; spillage or leakage during handling of chemical admixtures, hazardous materials like bitumen, high strength diesel, used oil, battery wastes etc.; and disposal of non-hazardous wastes (municipal wastes)</p>

World Bank ESS Policy, Standards, Directive	Objectives	Requirements	Relevance & Extent of Relevance to the sub-project/project
			generated during project implementation period.
<b>ESS-4</b> Community-Health-and-Safety	Anticipate or avoid adverse impacts on the health and safety of project-affected communities during project life-cycle from routine and non-routine circumstances. Promote quality, safety, and climate change considerations in infrastructure design and construction, including dams. Avoid or minimize community exposure to project-related traffic and road safety risks, diseases and hazardous materials. Have in place effective measures to address emergency events. Ensure that safeguarding of personnel and property is carried out in a manner that avoids or minimizes risks to the project-affected communities.	Requirements on infrastructure, taking into account safety and climate change, and applying the concept of universal access, where technically and financially feasible. Requirements on traffic and road safety, including road safety assessments and monitoring. Addresses risks arising from impacts on provisioning and regulating ecosystem service. Measures to avoid or minimize the risk of water-related, communicable, and non-communicable diseases. Requirements to assess risks associated with security personnel, and review and report unlawful and abusive acts to relevant authorities.	In the project corridor there is likely to be i) hill cutting, landslides, road excavation, use of vibratory equipment, construction debris handling and disposal etc. during construction; ii) high likelihood of direct exposure to increased construction related traffic and equipment especially at road sections traversing settlement area with limited carriageway/roadway width, and sensitive receptors such as schools, religious place, health centre/hospitals; iii) high dust levels from earthworks/hill cutting, high noise and emission level from traffic congestion and idling of vehicles; and iv) influx of migrant workers could potentially cause local discomfort or potential conflicts with local people.
<b>ESS-5</b> Land-Acquisition-Restrictions-on-Land-Use-and-Involuntary-Resettlement	Avoid or minimize involuntary resettlement by exploring project design alternatives. Avoid forced eviction. Mitigate unavoidable adverse impacts from land acquisition or restrictions on land use by providing compensation at replacement cost and assisting displaced persons in their efforts to	Applies to permanent or temporary physical and economic displacement resulting from different types of land acquisition and restrictions on access. Does not apply to voluntary market transactions, except where these affect third parties. Provides criteria for voluntary land donations, sale of community land, and parties obtaining income from illegal rentals. Prohibits forced eviction (removal against the will of affected people, without legal and other protection	Land will be required for widening, upgradation works in identified corridors and possibly for rehabilitation corridor works, curve/geometric improvements, blind spots, etc. Hence impacts on land, private and community owned assets including structures, trees and crops within existing and proposed ROW is likely. Physical and economic



World Bank ESS Policy, Standards, Directive	Objectives	Requirements	Relevance & Extent of Relevance to the sub-project/project
	improve, or at least restore, livelihoods and living standards to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher. Improve living conditions of poor or vulnerable persons who are physically displaced, through provision of adequate housing, access to services and facilities, and security of tenure. Conceive and execute resettlement activities as sustainable development programs.	including all applicable procedures and principles in ESS5). Requires that acquisition of land and assets happens only after payment of compensation and resettlement has occurred. Requires community engagement and consultation, disclosure of information and a grievance mechanism.	displacement too is very likely.
<b>ESS-6</b> Biodiversity-Conservation	Protect and conserve biodiversity and habitats. Apply the mitigation hierarchy and the precautionary approach in the design and implementation of projects that could have an impact on biodiversity. To promote the sustainable management of living natural resources.	Requirements for projects affecting areas that are legally protected designated for protection or regionally/internationally recognized to be of high biodiversity value. Requirements on sustainable management of living natural resources, including primary production and harvesting, distinguishing between small-scale and commercial activities. Requirements relating to primary suppliers, where a project is purchasing natural resource commodities, including food, timber and fiber.	Site clearance activities for road construction will involve removal of road side vegetation and felling of trees. The biodiversity studies has indicated that entire corridor along the project road is rich in biodiversity, interspersed with invasive species. Other than the clearance of road side vegetation, road construction will also require felling of trees.
<b>ESS-7</b> Indigenous-Peoples	Ensure that the development process fosters full respect for affected parties, human rights, dignity, aspirations, identity, culture, and natural resource-based livelihoods. Promote sustainable development benefits and opportunities in a manner that is accessible, culturally appropriate and inclusive. Improve project design and promote local support by establishing and maintaining an ongoing relationship	Applies when the Indigenous Peoples are present or have a collective attachment to the land, whether they are affected positively or negatively and regardless of economic, political or social vulnerability. The option to use different terminologies for groups that meet the criteria set out in the Standard. The use of national screening processes, providing these meet World Bank criteria and requirements. Coverage of forest dwellers, hunter gatherers, and pastoralists and other nomadic groups. Requirements for meaningful consultation tailored to affected parties and a grievance mechanism. Requirements for a process of free, prior and informed	Not relevant to this sub-project road. Though it has 3 tribal households might be impacted across the 13.5 km corridor these households do not meet the characteristics outlined in this Standard. Hence no differential provisions will be required to address the impacts on these households.

World Bank ESS Policy, Standards, Directive	Objectives	Requirements	Relevance & Extent of Relevance to the sub-project/project
	based on meaningful consultation with affected parties. Obtain the Free, Prior, and Informed Consent (FPIC) of affected parties in three circumstances. Recognize, respect and preserve the culture, knowledge, and practices of Indigenous Peoples, and to provide them with an opportunity to adapt to changing conditions in a manner and in a timeframe acceptable to them.	consent in three circumstances.	
<b>ESS-8</b> Cultural-Heritage	Protect cultural heritage from the adverse impacts of project activities and support its preservation. Address cultural heritage as an integral aspect of sustainable development. Promote meaningful consultation with stakeholders regarding cultural heritage. Promote the equitable sharing of benefits from the use of cultural heritage.	Requires a chance finds procedure to be established. Recognition of the need to ensure peoples' continued access to culturally important sites, as well as the need for confidentiality when revealing information about cultural heritage assets that would compromise or jeopardize their safety or integrity. Requirement for fair and equitable sharing of benefits from commercial use of cultural resources. Provisions of archaeological sites and material, built heritage, natural features with cultural significance, and moveable cultural heritage.	The alignment of the project road does not have any ancient monuments and/or archaeological site(s), protected but it has 1 religious structures/shrines of local importance that is partially impacted by the proposed road improvement activities
<b>ESS-9</b> Financial-Intermediaries	Sets out how Financial Intermediaries (FI) will assess and manage environmental and social risks and impacts associated with the subprojects it finances. Promote good environmental and social management practices in the subprojects the FI finance. Promote good environmental and sound human resources management within the FI.	Financial Intermediaries (FIs) to have an Environmental and Social Management System (ESMS) - a system for identifying, assessing, managing, and monitoring the environmental and social risks and impacts of FI subprojects on an ongoing basis. FI to develop a categorization system for all subprojects; with special provisions for subprojects categorized as high or substantial risk. FI borrowers to conduct stakeholder engagement in a manner proportionate to the risks and impacts of the FI subprojects.	Not relevant as there is no financial intermediary involved.

<b>World Bank ESS Policy, Standards, Directive</b>	<b>Objectives</b>	<b>Requirements</b>	<b>Relevance &amp; Extent of Relevance to the sub-project/project</b>
<b>ESS-10</b> Stakeholder-Engagement-and-Information-Disclosure	Establish a systematic approach to stakeholder engagement that helps Borrowers identify stakeholders and maintain a constructive relationship with them. Assess stakeholder interest and support for the project and enable stakeholders' views to be taken into account in project design. Promote and provide means for effective and inclusive engagement with project-affected parties throughout the project life-cycle. Ensure that appropriate project information is disclosed to stakeholders in a timely, understandable, accessible and appropriate manner.	Requires stakeholder engagement throughout the project life cycle, and preparation and implementation of a Stakeholder Engagement Plan (SEP). Requires early identification of stakeholders, both project-affected parties and other interested parties, and clarification on how effective engagement takes place. Stakeholder engagement to be conducted in a manner proportionate to the nature, scale, risks and impacts of the project, and appropriate to stakeholders' interests. Specifies what is required for information disclosure and to achieve meaningful consultation.	Relevant as the project will involve a wide variety of stakeholders during its project cycle including Police Department that are associated with activities under other components of the project such as Road Safety
Environmental and Social Directive for Investment Project Financing	This Directive applies to the Bank and sets out the mandatory requirements for the implementation of the Environmental and Social Policy for Investment Project Financing (IPF).	It lays down the following responsibilities of the Bank to manage ES risks and impacts as below: a) undertake its own due diligence of the ES risks and impacts related to the Project; b) support the Borrower to engage in meaningful consultation with stakeholders, in particular affected communities, and in providing Project-based grievance mechanisms; c) assist the Borrower in identifying appropriate methods and tools to assess and manage the potential ES risks and impacts of the Project; d) agree with the Borrower on the conditions under which the Bank is prepared to provide support to the Project, as set out in the ESCP; and e) monitor the ES performance of a Project in accordance with the ESCP and the ESSs.	Applies to Bank in addressing E&S aspects of this project
Bank Directive Addressing Risks and Impacts on Disadvantaged or Vulnerable	This Directive establishes directions for Bank staff regarding due diligence obligations relating to the	It requires the Bank task team to support the borrower in establishing arrangements for the undertaking and preparation of the environmental and social assessment	Applies to Bank in addressing E&S risks and impacts on disadvantaged and vulnerable persons or groups that are

<b>World Bank ESS Policy, Standards, Directive</b>	<b>Objectives</b>	<b>Requirements</b>	<b>Relevance &amp; Extent of Relevance to the sub-project/project</b>
Individuals or Groups	identification of, and mitigation of risks and impacts on, individuals or groups who, because of their particular circumstances, may be disadvantaged or vulnerable	of the project as required by ESS1. It reviews the terms of reference for the environmental and social assessment to verify that (a) identifies (or requires the identification of) groups or individuals affected by the project that may be disadvantaged or vulnerable; and (b) requires an assessment of project risks and impacts, and identification of differentiated mitigation measures, as they pertain to the disadvantaged or vulnerable individuals or groups that are identified.	identified in this project corridor
World Bank's Guidance note on managing the risks of adverse impacts on communities from temporary project induced labor influx, 2016	The document provides guidelines to address issues and risks arising from influx of migrant labor leading to gender-based violence, forced labor etc.	Requires HPRIC to prepare a labor influx management and GBV risk mitigation plan	Applicable to all sub-projects, as influx of migrant labor in construction works is a norm in Himachal Pradesh
Good Practice Note on Road Safety	Road Safety - To identify, evaluate and monitor the potential traffic and road safety risks to workers, affected communities and road users throughout the project life-cycle and, where appropriate, will develop measures and plans to address them. The Borrower will incorporate technically and financially feasible road safety measures into the project design to prevent and mitigate potential road safety risks to road users and affected communities.	Requirements on traffic and road safety, including road safety assessments and monitoring.	Yes
<b>World Bank Groups' EHSs, IFC, 2007</b>			
General EHS Guidelines, April, 2007, IFC	The General EHS Guidelines contain information on cross-cutting environmental, health, and safety issues potentially applicable to all industry sectors	Requirements on environmental, health, and safety issues during construction of project road.	Yes
EHS Guidelines for	The EHS Guidelines contain the	Requirements on the resource management of	Yes

<b>World Bank ESS Policy, Standards, Directive</b>	<b>Objectives</b>	<b>Requirements</b>	<b>Relevance &amp; Extent of Relevance to the sub-project/project</b>
Construction Materials Extraction, April, 2007, IFC	performance levels and measures that are considered to construction materials extraction activities such as aggregates, limestone, slates, sand, gravel, clay, gypsum, feldspar, silica sands, and quartzite	construction materials extraction activities such as aggregates, limestone, slates, sand, gravel, clay, gypsum, feldspar, silica sands, and quartzite.	

### 2.3 Comparison of GoI/GoHP legislations and ESF, 2016

42. The GoI/GoHP legislations and ESF, 2016 of World Bank have been compared and gaps if any are summarized in the Table 2-3.

**Table 2-3: Comparison of GoI/GoHP legislations and Regulations and ESF, 2016**

<b>S.No</b>	<b>ESS</b>	<b>Equivalent National Environmental Policy and Regulations</b>	<b>Policy Gaps and its redressal</b>
1	ESS-1 Assessment and Management of Environmental and Social Risks and Impacts	Environmental Impact Assessment Notification-2006, 14th Sep-2006, as amended in 2009 and 2013	The ESS 1 requires EA for road irrespective of its type. While, EIA notification is limited to Expressway, National highway and State Highway.  However, Environmental Impact Assessment Notification-2006 is not applicable to the project road.
2	ESS-2 Labour-and-Working-Conditions	<ul style="list-style-type: none"> <li>• The Building and Other Construction Workers (Regulation of Employment And Conditions Of Service) Act, 1996 and Himachal Pradesh Building and Other Construction Workers (Regulation Of Employment And Conditions Of Service) Rules, 2008,</li> <li>• Contract Labour (Regulation &amp; Abolition) Act 1970,</li> <li>• Minimum Wages Act 1948, Payment of Wages Act 1936,</li> <li>• Child Labour (Prohibition &amp; Regulation) Act 1986,</li> <li>• Inter-State Migrant workmen (Regulation of Employment &amp; Conditions of Service) Act 1979</li> </ul>	The National legal provisions almost cover all requirements in ESS2 except relating to community workers and a functional GRM for different types of workers. Hence, under this project, a Project's Labour management procedure has been prepared to regulate working conditions and management of worker relations including workers specific GRM, terms and conditions of employment, non-discriminations and equal opportunity, protection of work force, prohibition of child/force labour and provision of OHS.

S.No	ESS	Equivalent National Environmental Policy and Regulations	Policy Gaps and its redressal
3	ESS-3 and EHS Guidelines of IFC Resource-Efficiency-and-Pollution-Prevention-and-Management	<ul style="list-style-type: none"> <li>• Environmental protection Act, 1986 and subsequent amendments</li> <li>• Environmental Impact Assessment Notification-2006, 14th Sep-2006, as amended in 2009 and 2013</li> <li>• Air (Prevention and Control of Pollution) Act, 1981;</li> <li>• Water (Prevention and Control of Pollution) Act, 1974, for Pollution-Prevention-and-Management;</li> <li>• The Noise Pollution (Regulation And Control) Rules, 2000</li> <li>• National Resource Efficiency Policy, 2019 (Draft)</li> <li>• Notification for use of fly ash, 2003 and MoEF&amp;CC notification dated 25th March 2015</li> <li>• Municipal Solid Waste (Management &amp; Handling) Rules, 2000 (MSW Rules)</li> <li>• Hazardous Wastes (Management, Handling and Trans-boundary Movement) Rules, 2008.</li> <li>• Batteries (Management and Handling) Rules, 2001</li> <li>• Central Motor Vehicle Act 1988 and Central Motor Vehicle Rules 1989</li> <li>• The E-Waste (Management) Rules, 2016,</li> <li>• Plastic waste Management Rules, 2016</li> <li>• Construction &amp; Demolition, Waste Management Rules, 2016</li> </ul>	<p>The majority of ESS3 requirements are addressed by existing regulations and indirectly for resource efficiency and climate change aspects. Further, bridging of gap is most likely after notification of National Resource Efficiency Policy, 2019, currently at draft stage. However in its absence currently, the ESMP provides for commensurate mitigation measures</p>
4	ESS-4 Community-Health-and-Safety	<ul style="list-style-type: none"> <li>• Air (Prevention and Control of Pollution) Act, 1981;</li> <li>• Water (Prevention and Control of Pollution) Act, 1974, for Pollution-Prevention-and-Management;</li> <li>• The Noise Pollution (Regulation And Control) Rules, 2000</li> <li>• Guide Lines on Traffic Management in Work Zones IRC:SP:55 6 2014,</li> <li>• Municipal Solid Waste (Management &amp; Handling) Rules, 2000 (MSW Rules)</li> <li>• Hazardous Wastes (Management, Handling and Trans-boundary Movement) Rules, 2008.</li> <li>• Construction &amp; Demolition, Waste Management Rules, 2016</li> </ul>	<p>While other acts cover for all of ESS 4 requirements, gaps exist for Community- community exposure to health issues</p> <p>The gaps are addressed through suitable provisions in ESMP and contractor obligation as part of C-ESMP for Community health and safety include need for OHS plan, Influx management Plan, Workers camp management plan, Traffic and road safety management Plan</p>

S.No	ESS	Equivalent National Environmental Policy and Regulations	Policy Gaps and its redressal
5	ESS-5 Land-Acquisition-Restrictions-on-Land-Use-and-Involuntary-Resettlement	<ul style="list-style-type: none"> <li>The Himachal Pradesh Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (Social Impact Assessment and Consent) Rules 2015,</li> <li>Acquisition of Land by Private Negotiation and Upkeep of Land 2017-PWD/GoHP, January 2018 Record/General Guidelines and Instruction (Standing Order No .28) (PBW(B)F(5)40)</li> </ul>	Gap exists specifically related to aspects such as identification of non-titleholders as PAPs; cut off dates for non-titleholders and valuation of structures with depreciation. The gaps are addressed with suitable provisions in RPF.
6	ESS-6 Biodiversity-Conservation	<ul style="list-style-type: none"> <li>Biological Diversity Act, 2002,</li> <li>Wildlife Protection Act 1972 (WLPA),</li> <li>The Forest (Conservation) Act, 1980 FCA</li> </ul>	Provisions from the acts meets the ESS requirements.  BMP will be prepared to address the wildlife presence and movement outside protected area and in and around the project corridor.
7	ESS-7	Not applicable	
8	ESS-8 Cultural-Heritage	<ul style="list-style-type: none"> <li>Ancient Monuments and Archaeological Sites and Remains Act, 1958 and</li> <li>The Himachal Pradesh Ancient and Historical Monuments and Archaeological Sites and Remains Act, 1976</li> </ul>	Provisions from the act meets the ESS requirements. Chance find procedures is included in EMSP. Impacts on religious structures (not protected, but social and cultural value) will be mitigated or managed through provisions for restoration or reconstruction of CPRs in RAP.
9	ESS-9 Financial-Intermediaries	Not applicable	
10	ESS-10 Stakeholder-Engagement-and-Information-Disclosure	<ul style="list-style-type: none"> <li>Environmental Impact Assessment Notification-2006, 14th Sep-2006, as amended in 2009 and 2013</li> <li>The Himachal Pradesh Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (Social Impact Assessment and Consent) Rules 2015,</li> <li>GoHP standing order on Private Negotiations</li> <li>Right to information Act 2005</li> </ul>	Environmental Impact Assessment Notification-2006 is not applicable to the project road though it has provisions for public hearing as part of impact assessment process.  Similarly, HP RFCTLARR, 2015 has provisions for consultations during SIA.  The Standing order on private negotiations requires consultations but with affected land owners only  The Project has prepared a Stakeholder Engagement Plan (SEP) to engage with all stakeholders relevant to the different components sub-components of the project.

S.No	ESS	Equivalent National Environmental Policy and Regulations	Policy Gaps and its redressal
11	EHS Guidelines for Construction Materials Extraction, April, 2007, IFC	<ul style="list-style-type: none"> <li>• Environmental protection Act, 1986 and subsequent amendments</li> <li>• Environmental Impact Assessment Notification-2006, 14th Sep-2006, as amended in 2009 and 2013</li> <li>• Air (Prevention and Control of Pollution) Act, 1981;</li> <li>• Water (Prevention and Control of Pollution) Act, 1974, for Pollution-Prevention-and-Management;</li> <li>• The Noise Pollution (Regulation And Control) Rules, 2000</li> <li>• National Resource Efficiency Policy, 2019 (Draft)</li> <li>• Notification for use of fly ash, 2003 and MoEF&amp;CC notification dated 25th March 2015</li> <li>• Municipal Solid Waste (Management &amp; Handling) Rules, 2000 (MSW Rules)</li> <li>• Hazardous Wastes (Management, Handling and Trans-boundary Movement) Rules, 2008.</li> <li>• Batteries (Management and Handling) Rules, 2001</li> <li>• Central Motor Vehicle Act 1988 and Central Motor Vehicle Rules 1989</li> <li>• The E-Waste (Management) Rules, 2016,</li> <li>• Plastic waste Management Rules, 2016</li> <li>• Construction &amp; Demolition, Waste Management Rules, 2016</li> <li>• The Mines and Minerals (Development and Regulation) Act 1957</li> </ul>	<p>The majority of ESS3 requirements are addressed by existing regulations and indirectly for resource efficiency and climate change aspects. Further, bridging of gap is most likely after notification of National Resource Efficiency Policy, 2019, currently at draft stage.</p> <p>Project design considers measures for minimization of natural material extraction and reuse of extracted materials in project construction</p>



43. Based on comparative analysis of national/state's regulatory frameworks with ESS1-8 and 10, the requirements in regulatory frameworks were found to be aligned with ESSs. The exception being (a) GHG emission calculation, (b) resource efficiency, (c) community health and safety and (d) workers grievance redressal mechanism. These aspects are considered in different themes of impact assessment in line with international best practices, but not mandatory under existing regulatory frameworks. Currently, National Resource Efficiency Policy, 2019 is being framed (draft stage) with an objective to mainstream resource efficiency across all sectors by fostering cross-sectoral collaborations, development of policy instruments, action plans and efficient implementation and monitoring frameworks.
44. Further as gaps exists between GoHP, GoI and ESS5 requirements, gap-filling measures are reflected in the entitlement matrix of the Resettlement Policy Framework and in the Resettlement Action Plans. In case of stakeholder engagement, specifically, the EIA notification 2006 requires conducting of public hearings during process of impact assessment, but is limited to project that are categorized as Category-A, while, RFTLARR Act and also GoHP Standing order on Private Negotiations requires consultation with project affected people during Social Impact Assessment.
45. In the event of any conflict or inconsistency between the provisions of this GOI, GoHP and RPF and the provisions of World Bank's ESF, the provisions of the ESF shall prevail.

#### 2.4 Clearances/Permissions required for the Project Road

46. The project road does not require any prior environmental clearances from the state/government of India level. The preconstruction and construction stage permissions required for the project road are given in Table 2.4.

**Table 2.4 Clearances and Permissions Required for the Project Road**

S. No.	Clearances/Permissions required	Competent Authority to Accord Clearances	Responsibility to Obtain Clearance
<b>A. Pre-construction Stage</b>			
1	Permission for tree felling	Divisional Forest officer, Bilaspur, Department of Forests, GoHP and District Magistrate Bilaspur	HPRIDC
<b>B. Construction Stage</b>			
1	Consent to establish and Consent to operate construction camp sites, crusher units, hot mix plants, concrete batch mix plants, WMM plants, work force camps etc.	Himachal Pradesh State Pollution Control Board,	Contractor
2	Permissions for sourcing of water for construction activities (Surface and Ground Water )	Irrigation and Public Health Department, GoHP	Contractor
3	License to store HSD and Explosives at Construction camp if required.	Regional office of Chief Controller of Explosives, GoI, Himachal Pradesh	Contractor
4	Permission to Establish Construction camps	District Magistrate & Local Panchayat (s), land owners in case of private land	Contractor
5	Opening of new quarry sites for Stone aggregates	Geological Wing, Department of Industries, GoHP	Contractor
6	Extraction of Groundwater	Central Ground Water Board, GoI and GoHP	Contractor

S. No.	Clearances/Permissions required	Competent Authority to Accord Clearances	Responsibility to Obtain Clearance
7	Mining of minor mineral like borrow earth	District Environmental Impact Assessment Authority, GoHP	Contractor
8	Labour License	District Labor commissioner	Contractor

## 2.5 Institutional Framework

47. The project implementation involves multiple institutions, namely: HPRIDC of HPPWD, HPDOT and HP State Police Commission. HPRIDC will be responsible for the overall coordination of the project implementation. The reform of HPPWD and road infrastructure improvement will be implemented by HPRIDC. HP State Police Commission will implement the Road Safety component.
48. Himachal Pradesh Road & Other Infrastructure Development Corporation Limited, a wholly owned Company of Government of Himachal Pradesh was incorporated on 10.06.1999 under the Companies Act, 1956. HPRIDC is an apex organization in Himachal Pradesh engaged in fostering the growth of infrastructure development in the State. Its objectives are to:
- construct erect build, re-model, execute, repair, develop, improve, administer, manage, control, maintain, demolish, grade, curve, pave, macadamize, cement, Highways, Expressways, Roads, Paths, Streets, Bridges, Sideways, Bypasses, Tunnels, Pavements, Reclamation, Improvements, Road over Bridges, Road under Bridges, Underground Road, or any other structural or architectural work and also to do other similar construction, leveling or paving work at present being a part of the activity of the Himachal Pradesh Public Works Department;
  - facilitate and or undertake to construct, erect, build, renovate, develop, improve, manage, control maintain other infrastructure projects including those related to Power, Telecom Information and Technology, Transmission of Electricity, Water Supply Projects, etc.;
  - act as a special purpose vehicle for resource mobilization on behalf of the State Government for all infrastructure projects
49. HPRIDC headed by the Managing Director (Principal Secretary of HPPWD) and governed by a Board of Directors chaired by the Chief Secretary of the State is currently the focal unit for the development of the state core roads network (SCRN) and managing upgrading and major rehabilitation contracts. HPRIDC has acquired some experience from the implementation of HPSRP ó I. It has built capacity and has procurement, financial management, contract administration and support staff necessary for the implementation of the proposed project. HPRIDC will engage Environment and Social Safeguards officers and Project Management Consultant (PMC), which will be responsible for quality assurance and monitoring.
50. HPRIDC has established a system dealing with external complaints on procurement, fraud/corruption and construction quality. This system will include maintaining files to monitor status of follow up of each received comments, suggestions and grievances. The implementation of the system will be monitored by Chief Vigilance Officer of the PWD (who shall act Vigilance Officer (VGO) for the HPRIDC). The mechanisms will include provision for follow up investigations of substantial complaints to ensure independency and reliability of the system. For the complaint mechanism to function efficiently, the information concerning the alternative conduits for complaint (dedicated email address and physical mailing box) are being publicized. Complaints, suggestions and grievances handling system have been included at HPRIDC website: <http://admis.hp.nic.in/himachal/hpridc>. An Information Officer who has been designated by HPRIDC as a full-time Assistant Public Information Officer under the RTI Act is responsible for monthly updates of the system on the website

51. Responding to Complaints on Construction Quality Complaints received directly from the public relating to the quality of a specific work, good or service shall be in writing. They will be received and then reviewed by CE-cum-PD or if applicable, Zonal Chief Engineer of HPPWD concerned and dealt with in the following way. i) The CE-cum-PD shall record all complaints, whether they are referred from other recipients or directly, in a register to be maintained in a secure location in his own office. The email and physical address of the CE-cum-PD is available on web site. ii) The CE-cum-PD shall, within 5 working days of receipt of complaint, acknowledge receipt in writing to the complainant indicating that the HPRIDC is considering the issues raised and will discuss them with the concerned officers of the HPRIDC. iii) The CE-cum-PD shall then consult with the relevant officers of the HPRIDC and, after thorough review of the facts as well as interviewing of officers concerned as necessary, shall make a judgment as to the validity of the complaint. iv) Within 20 working days, the CE-cum-PD shall instruct the relevant officer to take remedial action as necessary. v) The CE-cum-PD shall write to the complainant within 30 working days of the receipt of such complaint as to the final decision of the competent authority. vi) In the event, that a complaint is received concerning an externally funded contract, the relevant funding agency shall be informed at each stage of the complaint handling process.

### CHAPTER 3 – BASELINE DATA

52. The baseline environmental profile of project influence area covering 15 km radius of the project as well as Bilaspur district as a whole has been described in the following sections. The environmental profile includes key attributes like physiography, drainage, geology, soil, hydro-geology, land use, flora, fauna, forest/vegetation cover, climate, ambient air quality, water quality, ambient noise levels, hazards and vulnerability of the project region among others.
53. In order to assess the baseline environment, the data has been accessed from authentic and verifiable sources as given in Table 3-1. Due attempt has been made to source and access only the latest available data from authentic and verifiable sources.

**Table 3-1: Data Sources for Baseline Environmental Assessment**

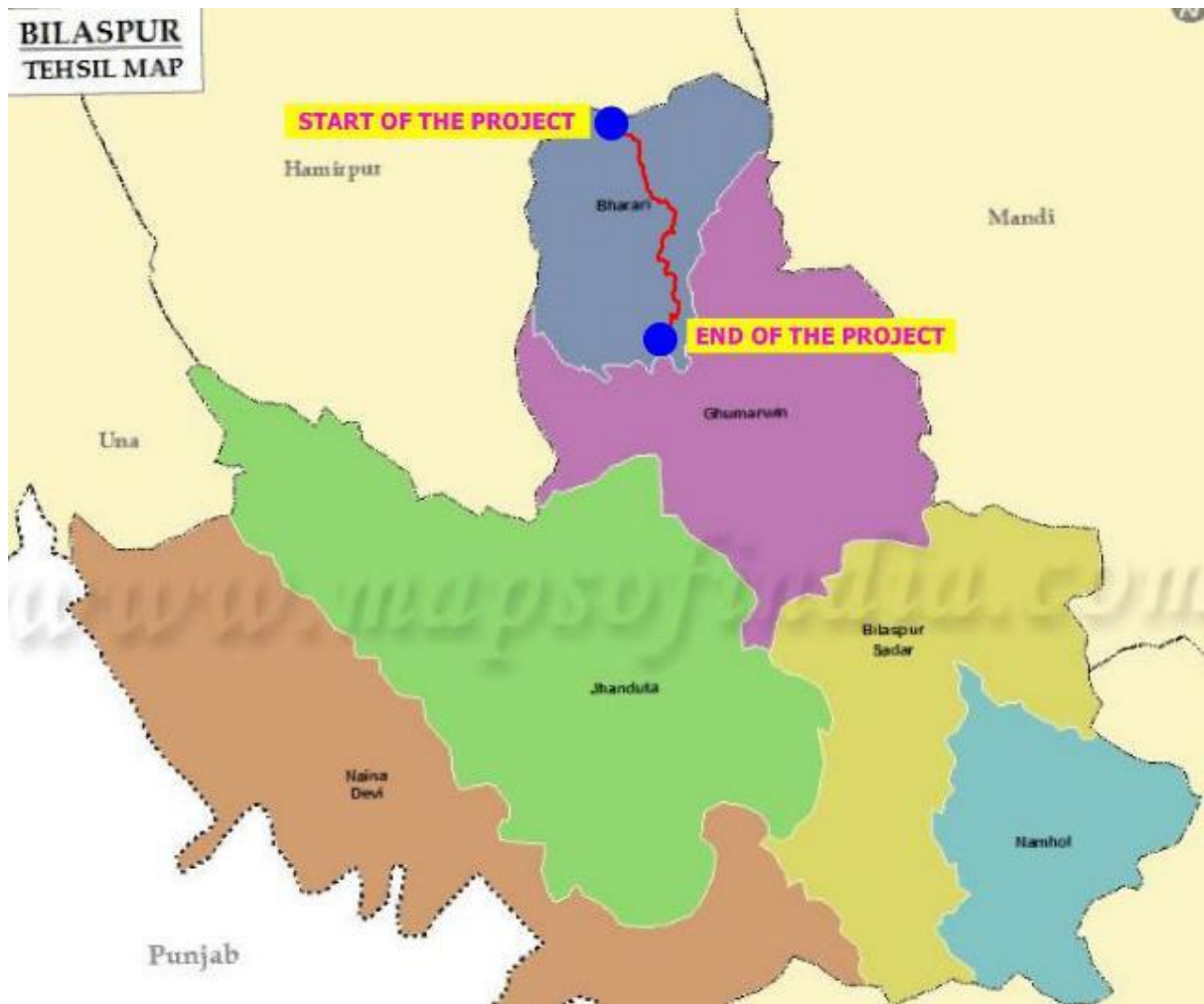
Environmental Attribute	Source of data / Information	Date and Year of the Data
Climate/Weather Parameters like Temperature, rainfall, wind speed and other similar climatological parameters	IMD (Indian Metrological Department), Shimla and New Delhi	Last 5 years (2014-2018) data has been used
Soil & Geology	Geological Survey of India, Central Ground Water Board, State Mining Department, GoHP	District Ground Water Brochure of Bilaspur District published by the central ground water board (Northern Himalayan region-Dharamshala), in year 2013 and Ground Water Year Book of Himachal Pradesh (Northern Himalayan region-Dharamshala), in Feb 6 2016.
Landslide locations/Slope stability	Physical inspections of the project road	Primary investigations of the project road during August 6 September 2019.
Drainage/ Flooding	Satellite Imagery/ Toposheet /Hydrology study/State Water Resource Department. Ground truth verification by Physical inspections of the project road.	District Ground Water Brochure of Bilaspur District published by the central ground water board (Northern Himalayan region-Dharamshala), in year 2013 and Ground Water Year Book of Himachal Pradesh (Northern Himalayan region-Dharamshala), in Feb 6 2016. Primary investigations of the project road during August 6 September 2019.
Surface Water Bodies, Surface water quality and Ground water Quality	Topography sheets/field study. Hydrological data from the CGWB Reports followed by ground truth verification by Physical inspections of the project road.  Also, Monitoring of the surface and ground water quality along the project road	District Ground Water Brochure of Bilaspur District published by the central ground water board (Northern Himalayan region-Dharamshala), in year 2013 and Ground Water Year Book of Himachal Pradesh (Northern Himalayan region-Dharamshala), in Feb 6 2016. Monitoring of the surface and ground water quality along the project road was carried out by Star Analytical Services, an NABL Accredited Laboratory during ESIA Studies (Sept-2019).
Ambient Air Quality and Ambient Noise levels	Monitoring of the ambient air quality and ambient noise level measurements along the project road was carried out.	Monitoring of the ambient air quality and ambient noise level measurements along the project road was carried out by Star Analytical Services, an NABL Accredited Laboratory during ESIA Studies (Sept-

Environmental Attribute	Source of data / Information	Date and Year of the Data
Forest/Protected Areas, Endangered Plant and Animal, Ecological Sensitive Area Wildlife Corridors/Migratory routes	Department of Forest, Govt. of Himachal Pradesh, Consultations with DFOs, Forest Range Officers of forest department and with local community. This was followed by ecological assessment of the project road corridor.	2019). Forest area as of 2018, published by Himachal Pradesh Forest Department, GoHP and Primary investigations of the project road by ecological assessment of the project road corridor by a qualified and experienced biodiversity expert during August 6 September 2019.
Trees and Vegetation Cover	Department of Forest, Govt. of Himachal Pradesh, Consultations with DFOs, Forest Range Officers of forest department and with local community. This was followed by ecological assessment of the project road corridor.	Physical inspections of the project road for ecological assessment by a qualified and experienced biodiversity expert during August 6 September 2019.
Population and Settlements within the RoW	Census of India, 2011 and Primary Surveys by of the project road corridor by a qualified and experienced social expert.	Census, 2011 data published by the Office of Registrar General & Census Commissioner, India and primary social economic survey of all households along the project corridor by social surveyors under guidance / supervision of key social specialist of ESIA team.
Cultural / Heritage and Ancient Structures.	Consultations with Archaeological Survey of India, State Archaeological Department, GoHP and web based data search.	Archaeological Survey of India, GoHP and web based data search for information on Cultural / Heritage and Ancient Structures within the PIA and Primary investigations of the project road during August 6 September 2019.

### 3.1 Land Environment

#### *Physiography*

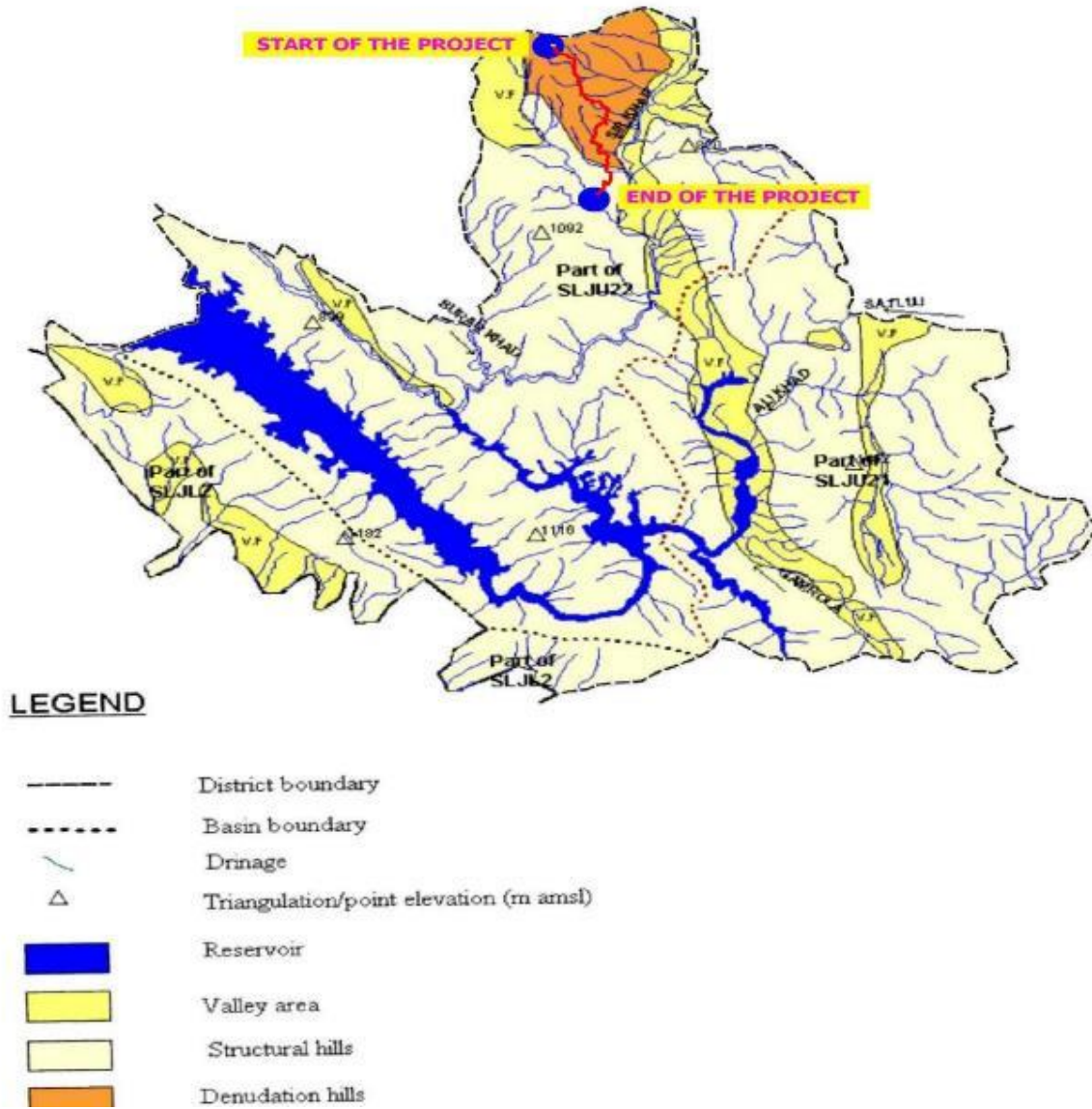
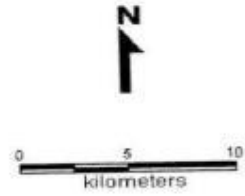
54. The project road entirely traverses within Bharari Tehsil of Bilaspur district, which is bounded by Una district in north-west and Hamirpur district in the north, Mandi district in east respectively. The Bilaspur district has seven Tehsils (Bharari, Ghumarwin, Bilaspur Sadar, Namhol, Jhanduta and Naina Devi). The alignment of project road in Bharari Tehsil is shown in Figure 3.1.



**Figure 3.1: Tehsils of Bilaspur District**

*(Source:- <https://www.mapsofindia.com/maps/himachalpradesh/tehsil/Bilaspur.html>)*

# Himachal Pradesh BILASPUR DISTRICT Physiography & Drainage



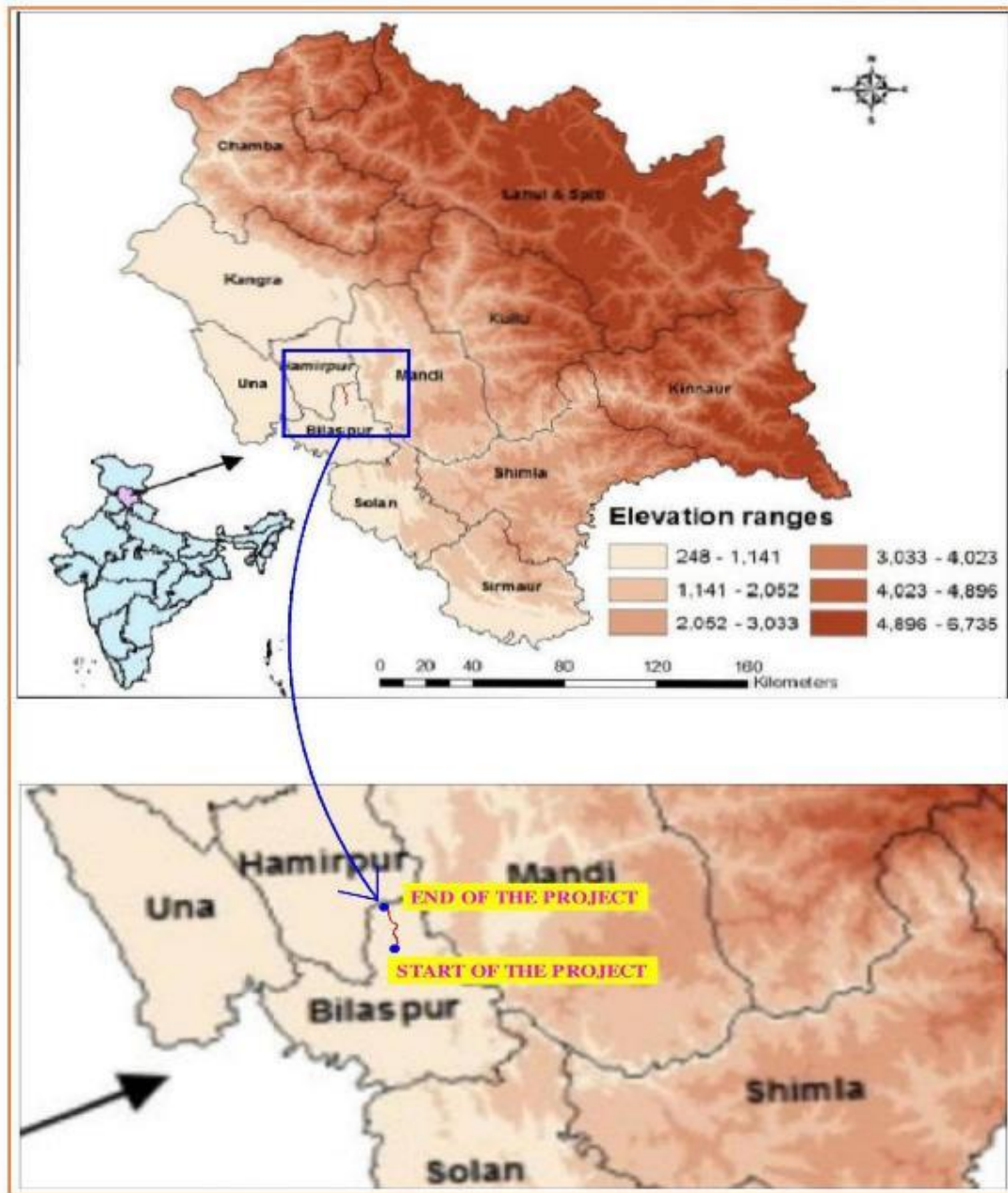
**Figure 3.2: Physiography & Drainage Pattern of Bilaspur District**

**(Source:- Central Ground Water Board, Government of India Ministry of Water Resources )**

55. Himachal Pradesh is drained by 5 river basins, out of which Sutlej is one of the major basins. The project road traverses largely through the denudation hills part of Sutlej basin as shown in Figure 3.2.

### Elevation

56. As per the elevation map of Himachal Pradesh, the project road lies in the range of 248-1141 m. The maximum and minimum elevation of the project road is 981m at km 13+300 and 697 m at Km 0+900. The elevation profile of Bilaspur district showing the project road is given in Figure 3.3.



**Figure 3.3: Elevation Profile of project road within Bilaspur District**  
(Source:- <https://www.researchgate.net/figure/Elevation-map-of-Himachal-Pradesh-state>)

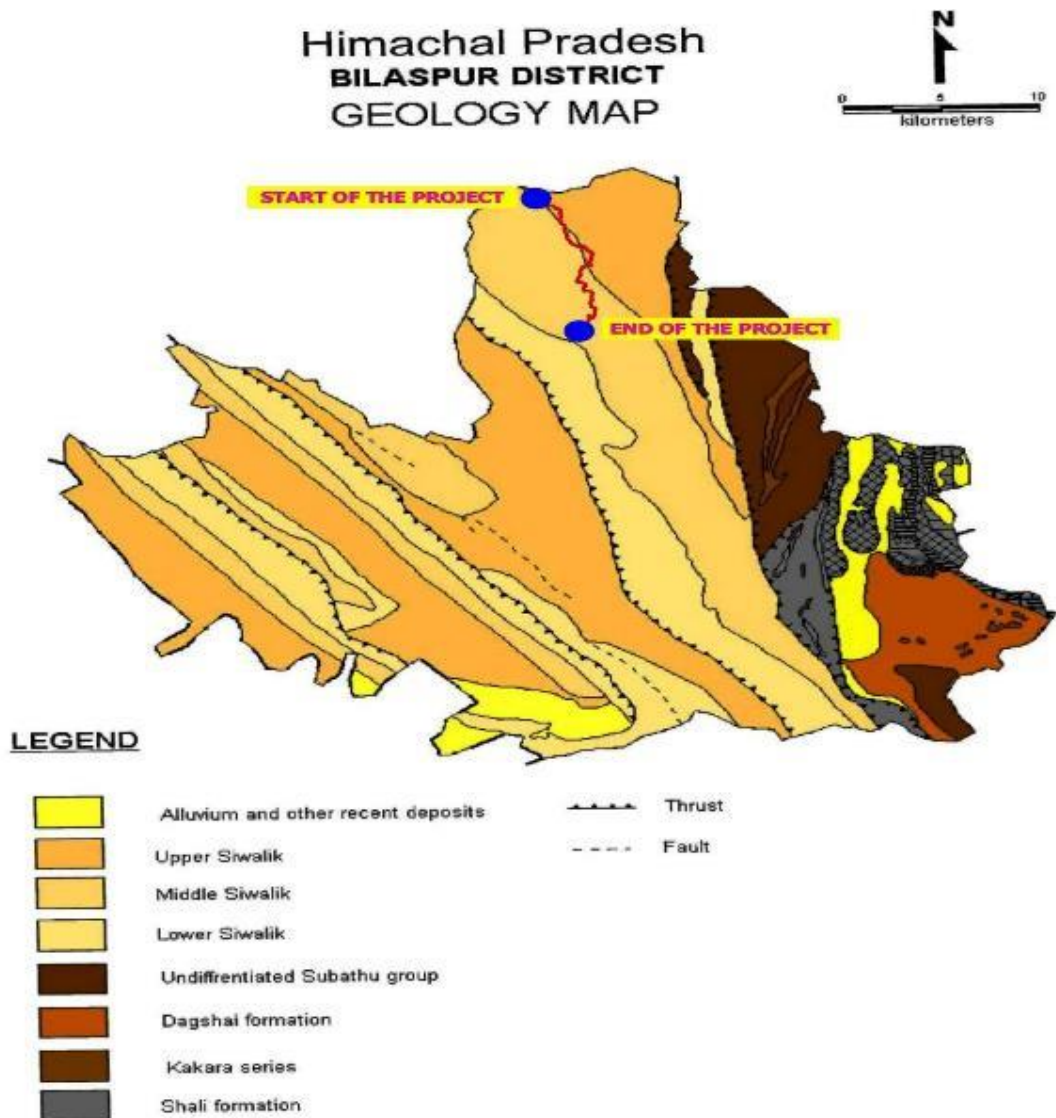


### ***Geo-morphology and Soils***

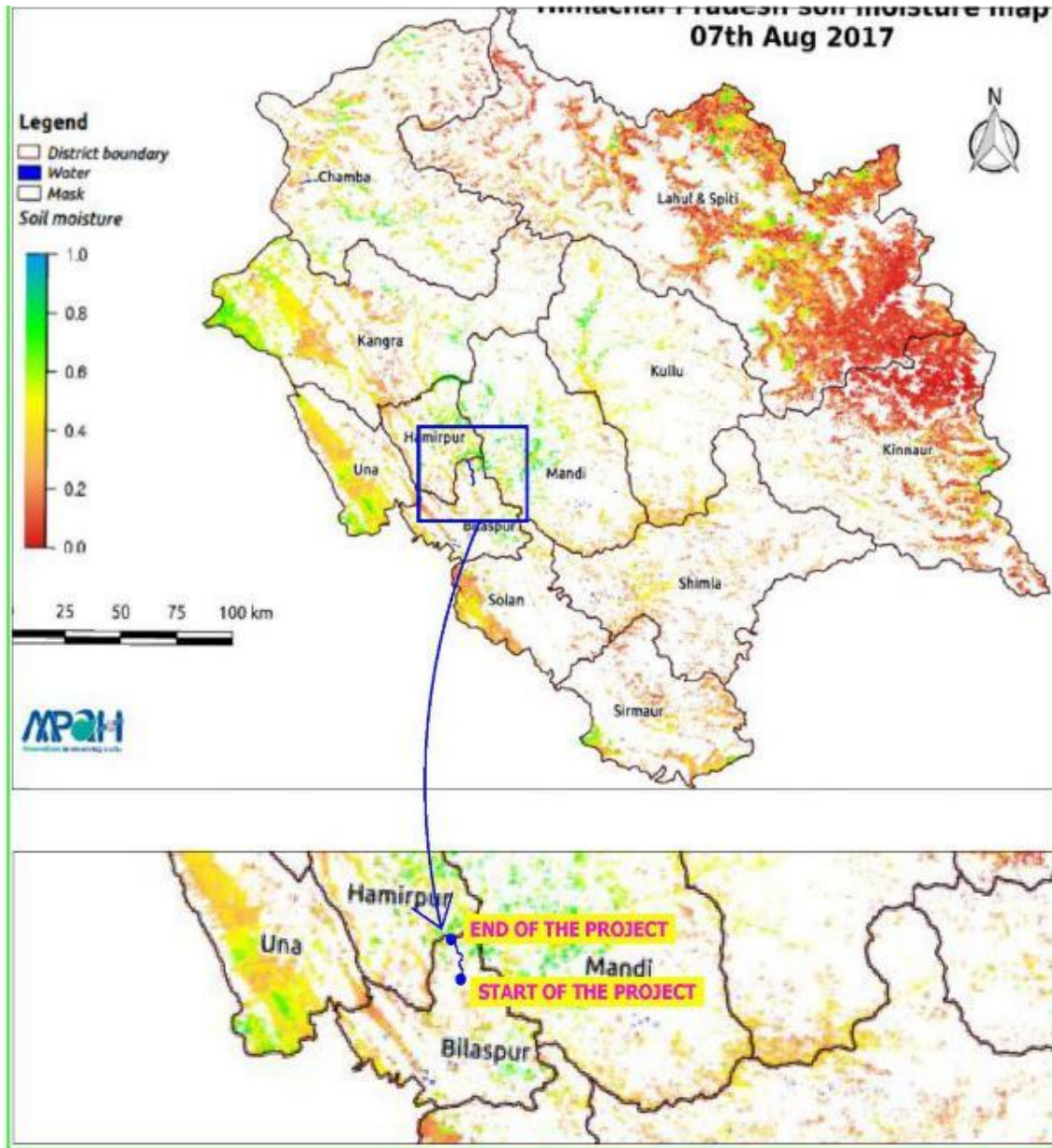
57. Bilaspur district is located on Siwalik ranges and forms part of the lesser Himalayas. It has a diverse landscape of hills, valleys with piedmont zone. There are seven main hill ranges i.e. Naina Devi, Kot, jhanjar, Tiun, Bandla, Bahaurpur and Ratanpur constituting the hill system.

### ***Soil Moisture and Fertility Levels***

58. In Bilaspur district, two types of soils are observed viz, alluvial soil and non-calcic brown soil. Most of the area in the district is covered with alluvial soil and only hilly area in the district is covered with non-calcic brown soil. Soil is rich in nutrients and is fertile. Also, the soil fertility along the adjoining areas of project corridor is reported to have High fertility level. The soil moisture of Bilaspur district showing the project road is given in Figure 3.4.



**Figure 3.4: Geology Map of Bilaspur District**  
(Source:- Geological website of Bilaspur district.)



**Figure 3.5: Soil Moisture of Bilaspur District**

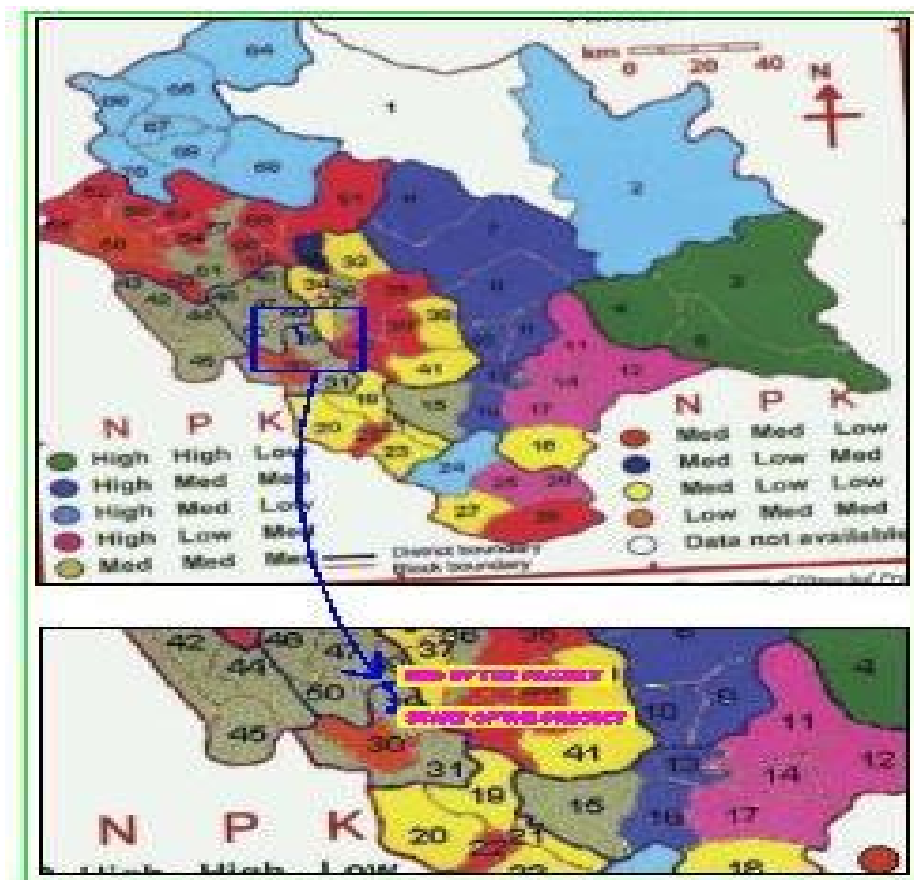
(Source:- <http://www.aapahinnovations.com/soil-moisture-map-state-himachal-pradesh>)

#### **Soil Monitoring Data**

59. The soil quality along the project corridor was tested near Mojoti village. The test results of the soil quality are given Table 3.2. The soil fertility (NPK value) of Bilaspur district as a whole is given in Figure 3.6, which indicates N as High, P as high and K as low.

**Table 3.2: Soil Test Results along Project Road**

S.No	Parameters	Units	Test Value
1	pH	--	7.68
2	Electrical Conductivity	μS	152.3
3	Bulk Density	g/cc	1.23
4	Phosphates	Kg/Ha	6.42
5	Potassium	Kg/Ha	128.4
6	Nitrogen	Kg/Ha	196.2
7	Total Organic Carbon	%	0.86
9	Copper	mg/ kg	2.03
10	Zinc	mg/ kg	0.97
11	Nickel	mg/ kg	0.25
12	Chromium	mg/ kg	2.49
13	Lead	mg/ kg	4.80
14	Cadmium	mg/ kg	<0.50
15	CEC	meq/100gr	1.36
16	SAR	meq/100gr	0.58
17	Texture and Composition of Soil	-	Sandy Loam
	Sand	%	64.5
	Silt	%	15.9
	Clay	%	19.6

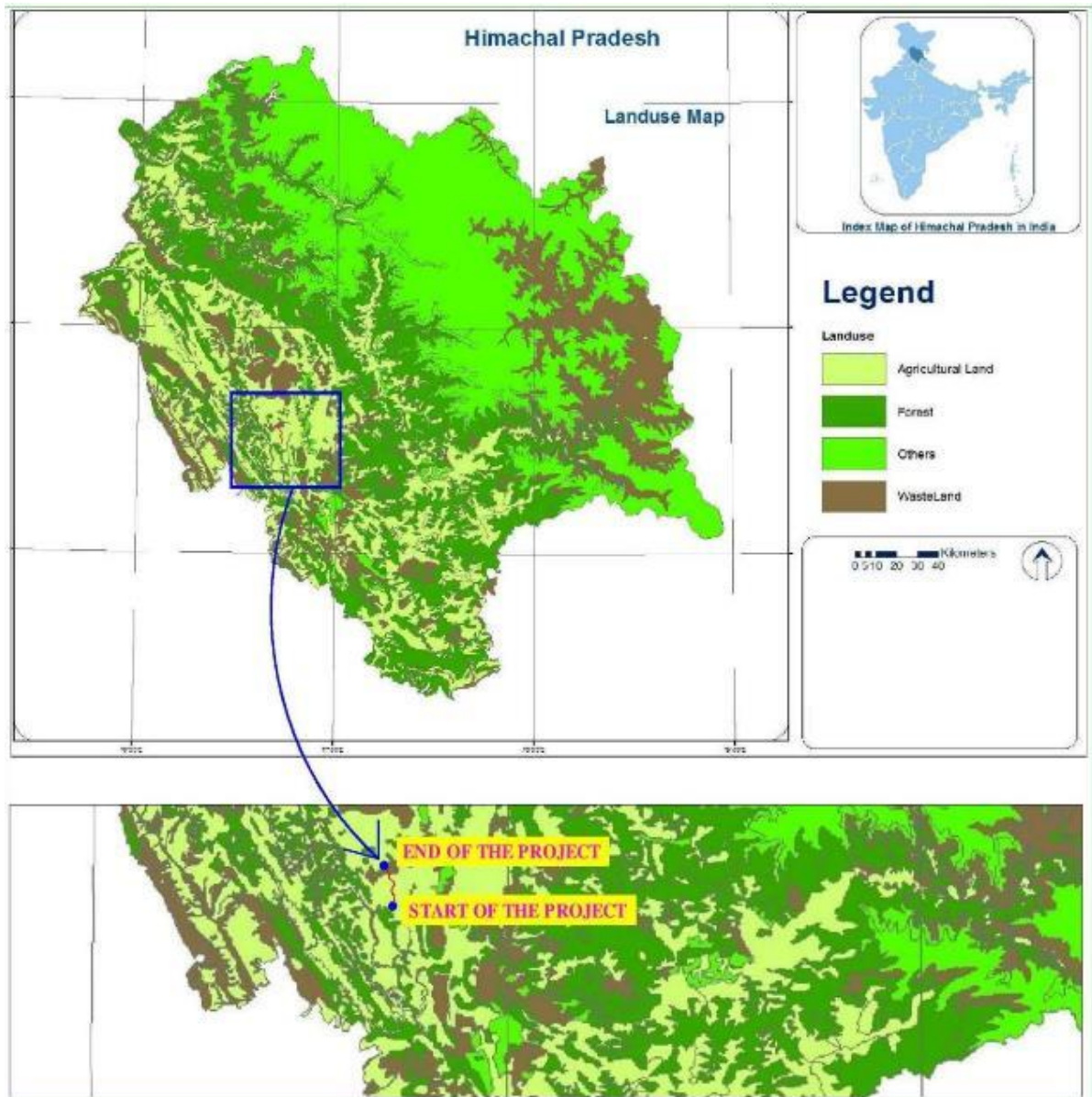


**Figure 3.6: Soil Fertility of Bilaspur District**

(Source:- <http://www.aapahinnovations.com/soil-moisture-map-state-himachal-pradesh/>)

### ***Land Use***

60. The project road traverses majorly along agricultural lands. The land use map of Himachal Pradesh along with the project road is shown in fig 3.7

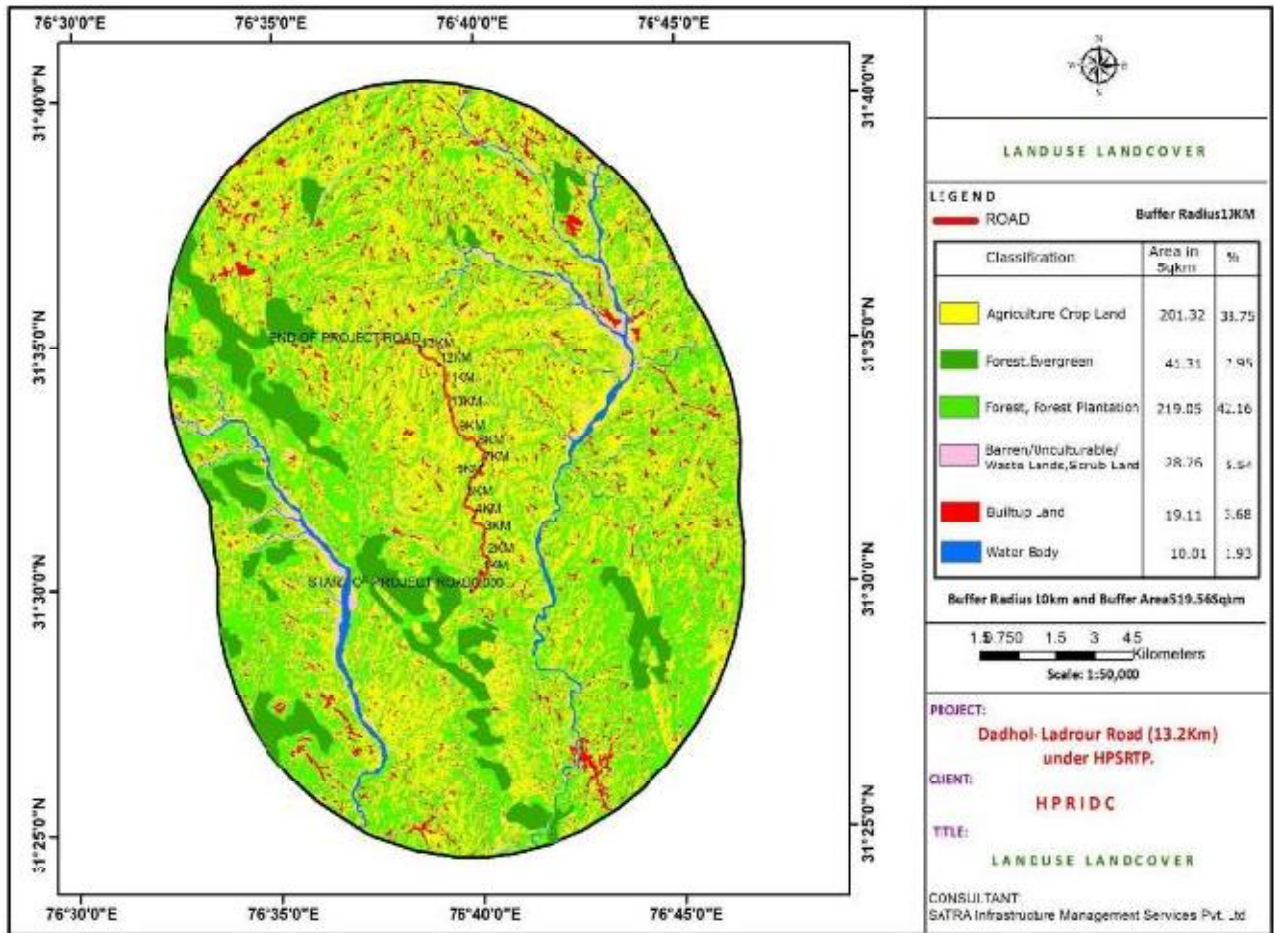


**Figure 3.7: Land use Map of Bilaspur District**  
*(Source:- Forest department of Himachal Pradesh)*

### ***Land Use / Land Cover of Project Corridor by NRSC***

61. Using, standard land use classification system proposed by National Remote Sensing Centre (NRSC), about Seven classes of level I, land use / land cover classes were identified and mapped using satellite data along the project corridor. Further, the imagery is interpreted and ground checked for corrections.

62. The land use / land cover with in the Project Influence Area (15km) is given in Figure 3.8. The Built up land occupies about 19.11 Sq km, Forest Plantation land occupies 219.05 Sq km, Water bodies around 10.01 Sq km, Agriculture Land 201.32 Sq km, Forest Land around 41.31 Sq km, Barren land around 28.76 Sq km.



**Figure 3.8: Land Use/Land Cover of Project Road**

***Agriculture***

63. In Bilaspur district, millets are the most dominant agricultural crop, which can also be seen in cultivable lands along the project road. The agriculture map along with the project road within the Bilaspur district is shown in 3.9.



**Figure 3.9: Agriculture Map of Bilaspur District**

(Source:- <https://www.mapsofindia.com/maps/himachalpradesh/himachalpradeshagriculture.html>)

### 3.2 Physical Environment

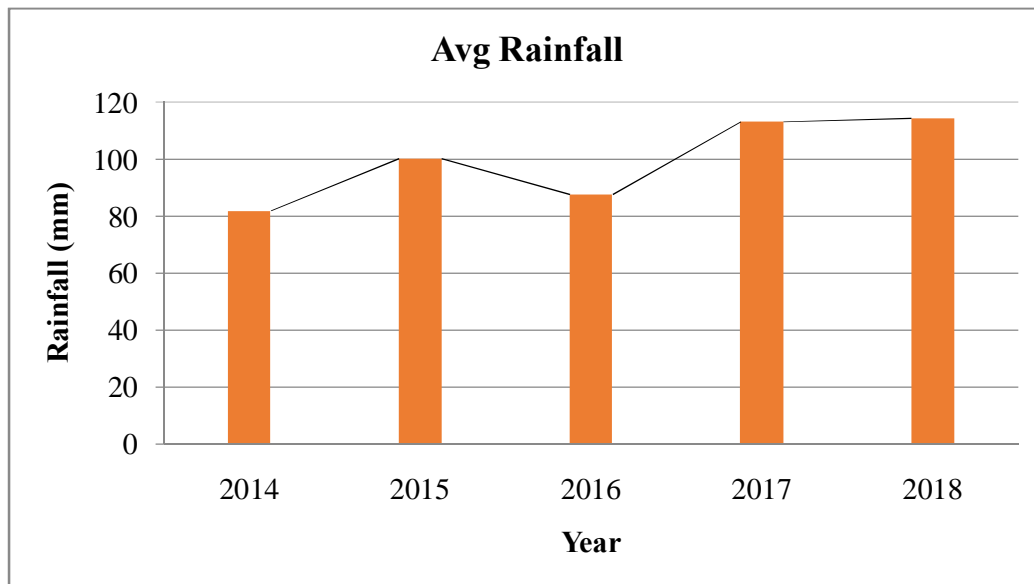
#### *Climate and Rainfall*

64. The climate of the district is temperate to sub-tropical. The summer is invariably hot. The winter season starts from November and continues till the middle of March. The minimum and maximum temperature varies from 1.3 °C in January to 34.7 °C in May.
65. The hills and valleys along the khads are quite dry in summer. In rainy season, humidity increases and the weather becomes hot and sultry. The area receives rainfall during monsoon period extending from June to September and also non-monsoon period (winter months). The annual average rainfall in the area is about 1106.28 mm and about 81.5% rainfall occurs during monsoon period (June to September). The annual rainfall over a period 2014 to 2018 in Bilaspur district is given in Table 3.3. The annual average rainfall is given in Figure 3.10.

**Table 3.3: Annual Average Rainfall in Bilaspur District (2014-2018)**

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2014	51.9	82.7	72.6	28.5	37.1	67.2	236.8	237.2	97	6.3	0	63.9
2015	64.7	82.5	196.6	63.1	28.9	84.4	294.5	280.9	57.9	14.9	2.6	31
2016	11.4	23	78.1	3.3	87.3	176.9	168.3	397.6	90.8	9.2	0	4.5
2017	193.8	19.9	47.9	54.3	47	99.7	169.7	513.3	168.2	0.1	0.2	42.9
2018	13.8	36.9	11.5	45.1	13.6	83.6	330.4	412.2	384.5	13.9	22	3.8

Source:- Metrological centre, Shimla



**Figure 3.10: Annual Average Rainfall**

**Snow fall**

66. The Project road doesn't experience snow fall, although in the winter season, precipitation as snowfall also occurs in the higher reaches up to 1000 m elevation and as rainfall in low hills and valleys of the Bilaspur district.

**Visibility**

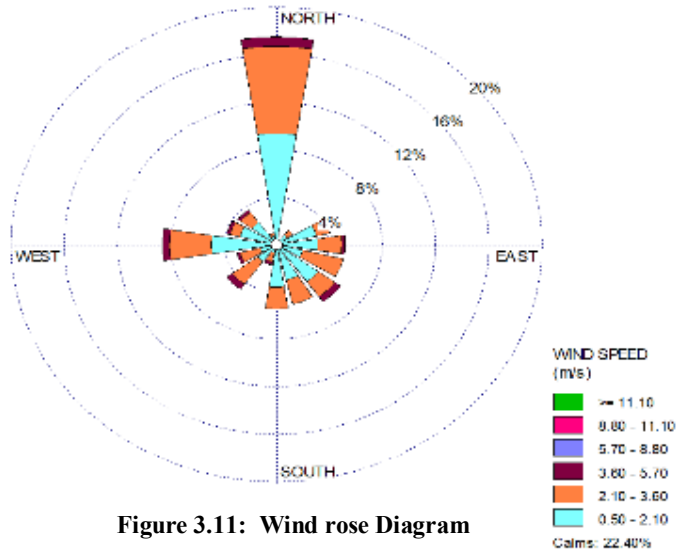
67. The project area has a visibility of 4 to 10 km for 308 days in morning hours and 308 days in evening and upto 1 km for less than a day in both morning and evening hours.

**Thunder storms**

68. The project influence area as well as project road does not experience any thunder storms, dust storm and hail in any part of year.

**Wind speed and direction**

The Wind Rose of the project road for the month of September 2019 is given in Figure 3.11. The most predominant wind direction is from North and the wind speed range between 0.5 to 2.10 meters/sec observed majorly along the project road.



**Figure 3.11: Wind rose Diagram**

**Ambient Air Quality**

69. The project area is devoid of any industries which contribute to air pollution. The only polluting source are vehicular emission and does not have large scale area base construction. The ambient air quality was established through air quality monitoring and carried at Dadhol and Ladror locations along the project road. The test results are given in Appendix 12.

70. The test results at both locations are below the National Ambient Air Quality Standards as well as 24 hour values of EHS guidelines.

**Table 3.4: Ambient Air Quality Monitoring Data**

Name of the Location & Code	Date of Monitoring	Week	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>
<b>Dadhol- AAQ1</b>	19.09.2019	1	57.8	19.5	6.9	13.5
	20.09.2019	1	61.5	21.1	13.5	12.8
	23.09.2019	2	58.3	20.3	7.2	13.6
	24.09.2019	2	59.1	18.6	7.5	12.4
	27.09.2019	3	58.9	21.6	6.4	11.5
	28.09.2019	3	60.2	19.2	7.8	12.2
<b>Ladror-AAQ2</b>	17.09.2019	1	58.6	14.5	7.5	14.1
	18.09.2019	1	57.2	15.2	7.1	13.6



Name of the Location & Code	Date of Monitoring	Week	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>
	21.09.2019	2	60.2	15.8	14.1	19.9
	22.09.2019	2	58.9	14.9	6.9	14.5
	25.09.2019	3	56.6	15.5	7.8	13.2
	26.09.2019	3	55.4	14.6	6.3	13.9
	29.09.2019	4	56.3	15.1	6.8	13.4
	30.09.2019	4	57.1	15.9	7.3	12.3
Limits as per NAAQS			100µg/m <sup>3</sup>	60µg/m <sup>3</sup>	80µg/m <sup>3</sup>	80µg/m <sup>3</sup>
EHS Guideline Values (24 hour, guideline value)			50	25	20	200 (hourly)

**Table 3-5: Environmental Monitoring Schedule & Methods**

S.No.	Item	Monitoring Schedule	Method
1	Air Quality Monitoring	24 hourly samples monitoring twice a week for one month at each location (Total 8 samples at each location)	Respirable Sampler with arrangement for monitoring PM2.5
2	Water Quality Monitoring	Grab samples from identified locations	Grab sampling
3	Noise Level Monitoring	Hourly recording of noise levels for one full day (24 hours) at each location)	Integrated Noise monitor
4	Soil Testing & Analysis	Grab Sample from each identified location	Grab samples

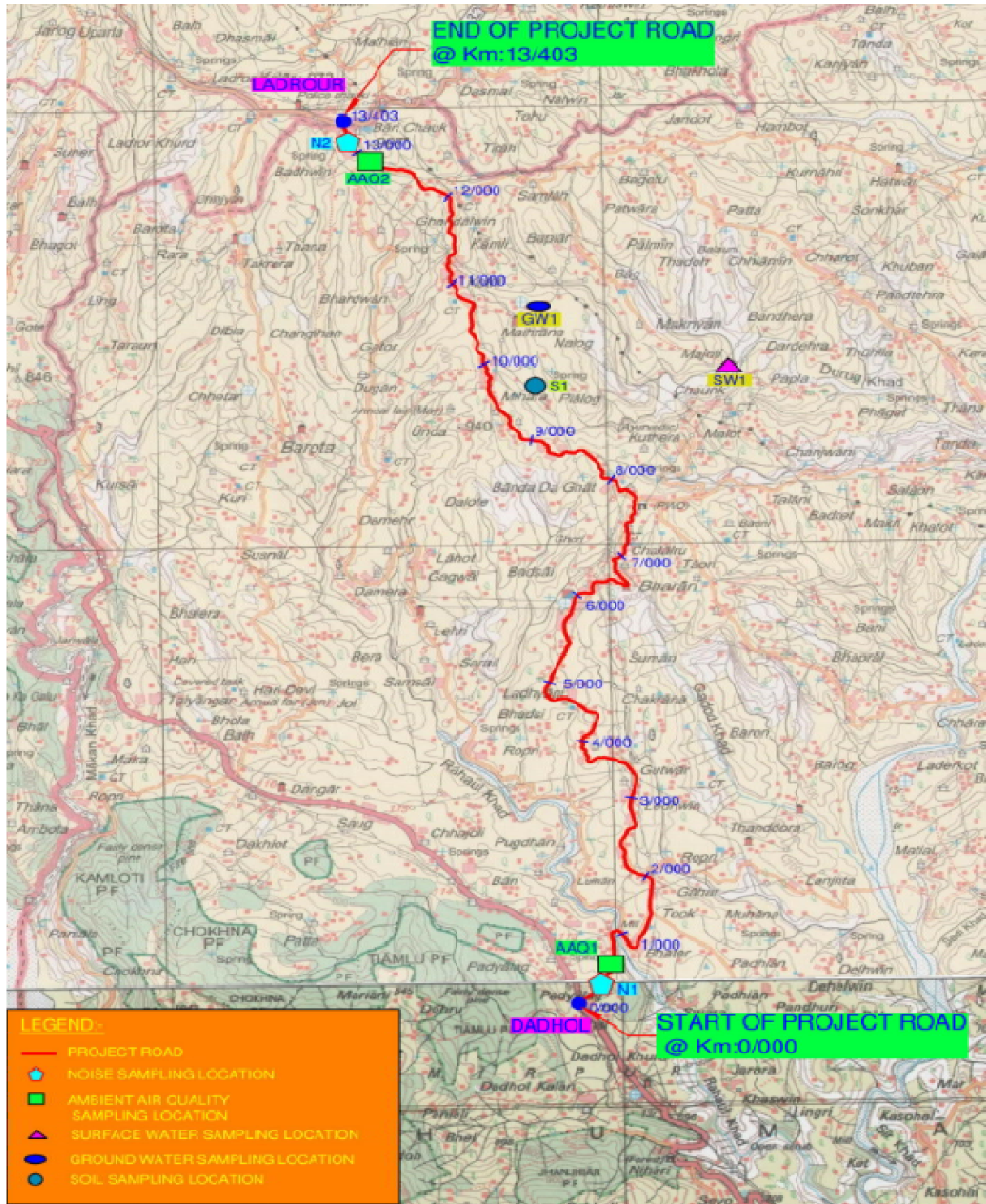


Figure 3.12: Map Showing Monitoring Locations along project Road

### Ambient Noise Levels

71. Ambient Noise levels monitoring was carried at Dadhol and Ladroul locations, which is mixed land use, junction of major highways with varying traffic volume includes both through and local.

72. The test results at both the monitored locations are below the National Ambient Noise levels well as one-hour values of EHS guidelines.

**Table 3-6: Noise Level Monitoring Data**

S.No	Date Of Monitoring	Sampling Location	Noise Results	
			Day Time In Leq dB (A)	Night Time In Leq dB (A)
1	20.09.2019	Dadhol (C)	60.5	51.2
2	21.09.2019	Ladrour (R)	48.5	38.9
National Ambient Noise levels		Commercial (C)	65	55
		Residential (R)	55	45
EHS Guideline Values (One Hour Leq (dBA))		Commercial	70	70
		Residential	55	45

**Surface Water**

73. There are no surface water bodies in the vicinity of the project road. Therefore, the surface water quality of Seer Khadd, a surface water body at Mojoti village, which is within 15km PIA was tested during the monitoring and the test results are given in Table 3-7. It can be seen that almost all tested parameters of surface water sample are within the safe limits of drinking water standards (IS 10500 permissible Limits), without any treatment.

**Table 3-7: Test Results of Surface water at Mojoti along Project Road**

S.No	Parameter	Unit	Method	Result	IS 10500 Test limits
1	pH	--	APHA 23rd Edition; 4500 H <sup>+</sup> B	8.21	No Relaxation
2	Turbidity	NTU	APHA 23rd Edition; 2130 B	< 1.0	5
3	Conductivity	µMho/Cm	APHA 23rd Edition; 2510 B	211.8	--
4	Total Dissolved Solids	mg/L	APHA 23rd Edition ; 2540 C	136	2000
5	Color	CU	APHA 23rd Edition ; 2120 B	< 1.0	15
6	Odor	--	--	Agreeable	Agreeable
7	P-Alkalinity as CaCO <sub>3</sub>	mg/L	APHA 23rd <sup>1</sup> Edition ; 2320 B	< 10.0	--
8	Alkalinity as CaCO <sub>3</sub>	mg/L	APHA 23rd <sup>1</sup> Edition ; 2320 B	78.6	600
9	Total Hardness as CaCO <sub>3</sub>	mg/L	APHA 23rd Edition ; 2340 C	109.5	600
10	Calcium as Ca	mg/L	APHA 23rd Edition ; 3500 Ca B	22.3	200
11	Magnesium as Mg	mg/L	APHA 23rd Edition ; 3500 Mg B	13.52	100
12	Sodium as Na	mg/L	APHA 23rd Edition ; 3500 Na B	3.96	--
13	Potassium as K	mg/L	APHA 23rd Edition ; 3500 K B	< 1.0	--
14	Chlorides as Cl <sup>-</sup>	mg/L	APHA 23rd Edition ; 4500 Cl <sup>-</sup> B	8.99	1000
15	Sulphates as SO <sub>4</sub> <sup>-2</sup>	mg/L	APHA 23rd Edition ; 4500 SO <sub>4</sub> <sup>-2</sup> E	28.63	400
16	Nitrate Nitrogen as N	mg/L	APHA 23rd Edition; 4500 NO <sub>3</sub> <sup>-</sup> B	< 1.0	No Relaxation
17	Fluorides as F <sup>-</sup>	mg/L	APHA 23rd Edition ; 4500 F <sup>-</sup> D	< 0.1	1.5
18	Iron as Fe	mg/L	APHA 23rd Edition ; 3500 Fe B	< 0.1	No Relaxation

S.No	Parameter	Unit	Method	Result	IS 10500 Test limits
19	Manganese as Mn	mg/L	APHA 23rd Edition ; 3500 Mn B	< 0.01	0.3
20	Phenolic Compounds as Phenols	mg/L	APHA 23rd Edition; 5530 D	< 0.001	0.002
21	Copper as Cu	mg/L	APHA 23rd Edition ; 3111 B	< 0.01	No Relaxation
22	Cadmium Cd	mg/L	APHA 23rd Edition ; 3111 B	< 0.001	1
23	Zinc as Zn	mg/L	APHA 23rd Edition ; 3111 B	< 0.5	No Relaxation
24	Lead as Pb	mg/L	APHA 23rd Edition ; 3111 B	< 0.001	1.5
25	Mineral Oil	mg/L	APHA 23rd Edition ; 5520 B	< 0.001	No Relaxation
26	Mercury	mg/L	Instrument Manual Method	< 0.001	15
27	Silver as Ag	mg/L	Instrument Manual Method	< 0.5	No Relaxation
28	Selenium as Se	mg/L	APHA 23rd Edition ; 3111 D	< 0.05	No Relaxation
29	Dissolved Oxygen	mg/L	APHA 23rd Edition 4500-O C	8	No Relaxation
30	Chemical Oxygen Demand	mg/L	APHA 23rd Edition 5220 B	5.3	No Relaxation
31	Biochemical Oxygen Demand(3dayø at 27°C)	mg/L	IS : 3025(Part-44) :2009	1	Not specified
32	Total Coli forms	MPN/100 ml	IS:1622	38	Not specified
33	Fecal Coli forms	MPN/100 ml	IS:1622	14	Not specified

Source:- Field Investigations

74. The test results for DO (8 mg/l), BOD (1 mg/l), Total Coliforms Organism (38 MPN/100 ml) were compared with CPCBø permissible limits to classify Designated Best Use of Water and found to be under Class A. The designated best use of surface water classification by CPCB is given in Table 3.8.

**Table 3-8: Test Results of Surface water at Mojoti along Project Road**

Designated Best Use	Class of Water	Criteria
Drinking water source (with conventional treatment)	A	Total Coliforms Organism MPN/100ml shall be 50 or less
		pH between 6.5 and 8.5
		Dissolved Oxygen 6mg/l or more
		Biochemical Oxygen Demand 5 days 20C 2mg/l or less
Outdoor bathing (organised)	B	Total Coliforms MPN/100ml shall be 500 or less
		pH between 6.5 to 8.5
		Dissolved Oxygen 5 mg/l or more
Drinking Water Source (without conventional treatment)	C	Total Coliforms MPN/100 ml shall be 5000 or less
		pH between 6 to 9
		Dissolved Oxygen 4 mg/l or more
		Biochemical Oxygen Demand (BOD) 5 days 20°C 3 mg/l or less
Propagation of Wild life and	D	pH between 6.5 to 8.5 for Fisheries

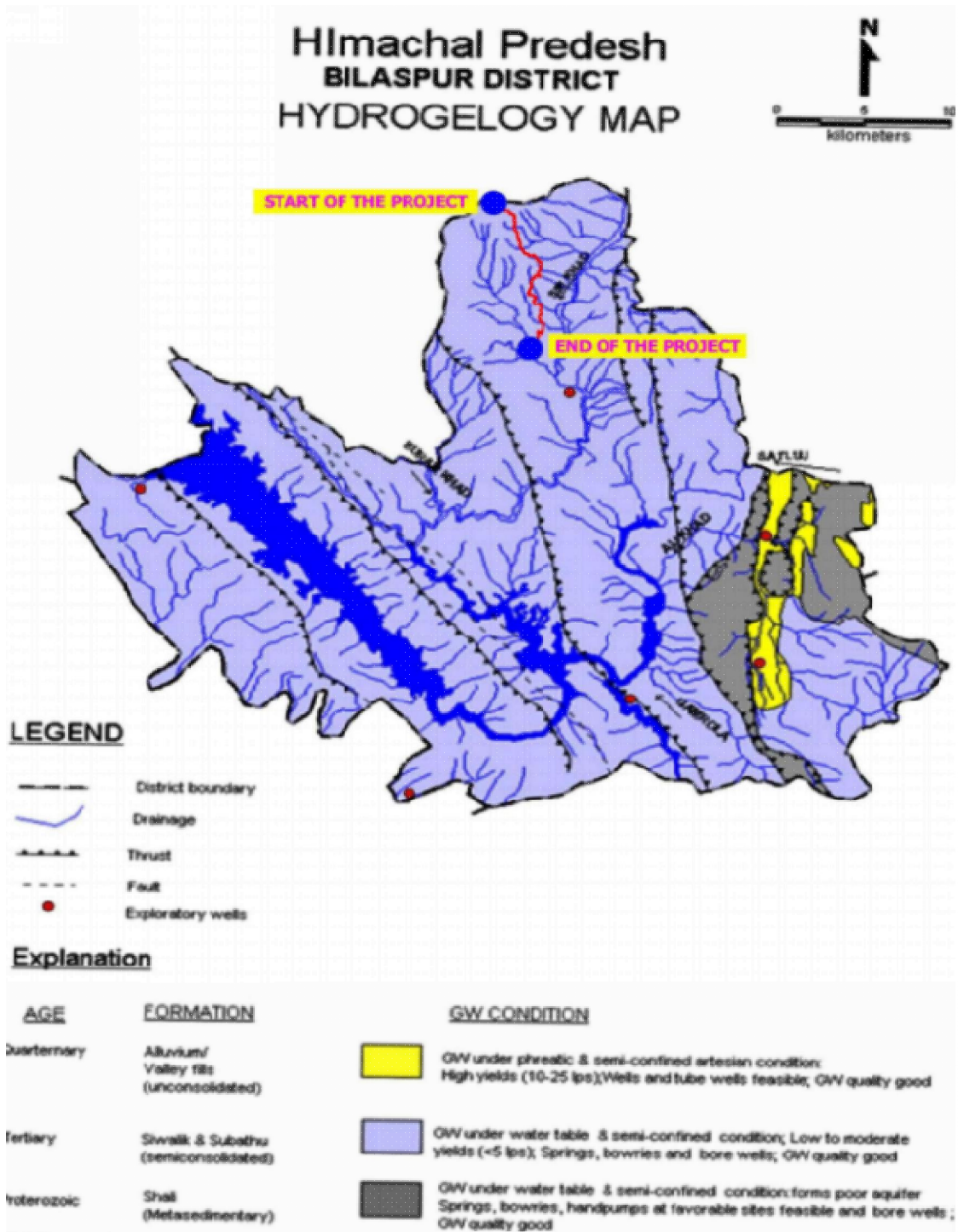
Designated Best Use	Class of Water	Criteria
Fisheries		Dissolved Oxygen 4 mg/l or more
		Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste Disposal	E	pH between 6.0 to 8.5
		Electrical Conductivity at 25°C Max 2250µ mhos/cm
		Sodium absorption ratio Max. 26
		Boron, Max. 2 mg/l

### ***Ground water***

75. Hydro geologically, both the unconsolidated valley fill and alluvial formation are occurring in the valley area and semi-consolidated sediments belonging to Siwalik Group form aquifer system in the district. Porous alluvial formation forms the most prolific aquifer system in the valley area where as the sedimentary semi-consolidated formation forms the aquifer of low yield prospect.
76. The ground water development scenario in Bilaspur district has not been assessed because of difficulty in approach for heavy machinery. High hill ranges occupy more than 95 % of the area of the district and ground water development on a smaller scale is seen in the valleys. Hence, it is expected to be under safe category. The Hydrogeology of Bilaspur District showing the project road is given in Figure 3.13.

### ***Ground Water Quality***

77. The quality of ground water quality along the project road was assessed through a sample collected near Mihara (10+500km). The monitoring and the test results are given in Table 3-9. It can be seen that almost all tested parameters of ground water sample are within the safe limits of drinking water standards (IS 10500 permissible Limits), without any treatment.



**Figure 3.13: Hydrogeology of Bilaspur District**  
(Source:- <https://www.researchgate.net/figure/Elevation-map-of-Himachal-Pradesh-state>)

**Table 3-9: Test Results of Ground water at Mihara along the Project Road**

S.No	Parameter	Unit	Method	Result	IS 10500 Limits	
					Acceptable	Acceptable
1	pH	--	APHA 23rd Edition; 4500 H <sup>+</sup> B	7.65	6.5-8.5	No Relaxation
2	Turbidity	NTU	APHA 23rd Edition; 2130 B	< 1.0	1	5
3	Conductivity	µMho/ Cm	APHA 23rd Edition; 2510 B	869.1	--	--
4	Total Dissolved Solids	mg/L	APHA 23rd Edition ; 2540 C	562	500	2000
5	Color	CU	APHA 23rd Edition ; 2120 B	< 1.0	5	15
6	Odor	--	--	Agreeable	Agreeable	Agreeable
7	P-Alkalinity as CaCO <sub>3</sub>	mg/L	APHA 23rd <sup>1</sup> Edition ; 2320 B	< 10.0	--	--
8	Alkalinity as CaCO <sub>3</sub>	mg/L	APHA 23rd <sup>1</sup> Edition ; 2320 B	380	200	600
9	Total Hardness as CaCO <sub>3</sub>	mg/L	APHA 23rd Edition ; 2340 C	425	200	600
10	Calcium as Ca	mg/L	APHA 23rd Edition ; 3500 Ca B	40.08	75	200
11	Magnesium as Mg	mg/L	APHA 23rd Edition ; 3500 Mg B	79.07	30	100
12	Sodium as Na	mg/L	APHA 23rd Edition ; 3500 Na B	3.47	--	--
13	Potassium as K	mg/L	APHA 23rd Edition ; 3500 K B	1.24	--	--
14	Chlorides as Cl <sup>-</sup>	mg/L	APHA 23rd Edition ; 4500 Cl <sup>-</sup> B	24.99	250	1000
15	Sulphates as SO <sub>4</sub> <sup>-2</sup>	mg/L	APHA 23rd Edition ; 4500 SO <sub>4</sub> <sup>-2</sup> E	16.46	200	400
16	Nitrate Nitrogen as N	mg/L	APHA 23rd Edition; 4500 NO <sub>3</sub> <sup>-</sup> B	2.16	45	No Relaxation
17	Fluorides as F <sup>-</sup>	mg/L	APHA 23rd Edition ; 4500 F <sup>-</sup> D	1.06	1	1.5
18	Iron as Fe	mg/L	APHA 23rd Edition ; 3500 Fe B	< 0.1	0.3	No Relaxation
19	Manganese as Mn	mg/L	APHA 23rd Edition ; 3500 Mn B	< 0.01	0.1	0.3
20	Phenolic Compounds as Phenols	mg/L	APHA 23rd Edition; 5530 D	< 0.001	0.001	0.002
21	Hexavalent Chromium as Cr+6	mg/L	APHA 23rd Edition, 2012; 3500 Cr B	< 0.01	0.05	No Relaxation
22	Residual Chlorine as Cl	mg/L	APHA 23rd Edition ; 4500 Cl B	< 0.01	0.2	1
23	Total Cyanide	mg/L	APHA 23rd Edition ; 4500 CN <sup>-</sup> C, E	< 0.01	0.05	No Relaxation
24	Copper as Cu	mg/L	APHA 23rd Edition ; 3111 B	< 0.01	0.05	1.5

S.No	Parameter	Unit	Method	Result	IS 10500 Limits	
					Acceptable	Acceptable
25	Cadmium Cd	mg/L	APHA 23rd Edition ; 3111 B	< 0.001	0.003	No Relaxation
26	Zinc as Zn	mg/L	APHA 23rd Edition ; 3111 B	< 0.5	5	15
27	Lead as Pb	mg/L	APHA 23rd Edition ; 3111 B	< 0.001	0.01	No Relaxation
28	Mineral Oil	mg/L	APHA 23rd Edition ; 5520 B	< 0.001	0.5	No Relaxation
29	Mercury	mg/L	Instrument Manual Method	< 0.001	0.001	No Relaxation
30	Silver as Ag	mg/L	Instrument Manual Method	< 0.5	0.1	No Relaxation
31	Selenium as Se	mg/L	APHA 23rd Edition ; 3111 D	< 0.05	0.01	No Relaxation
32	Total Coli forms	MPN/100ml	IS:1622	2	Shall not be detectable in any 100 ml Sample	
33	Fecal Coli forms	MPN/100ml	IS:1622	Absent		

Source:- Field Investigations

### 3.3 Biological Environment

#### Forest

78. The 80 percent of state's geographical area is hilly and mountainous with altitude ranging from 460 meters to 6,600m AMSL. About 63.6 percent of state's area is classified as forest area, though only 26.4 percent (ISFR, 2015) is under actual forest cover. In the state, legally forest is classified into Reserve Forest, Demarcated Protected Forest, un-demarcated protected forest, other forest, not managed by forest department.

#### Legal Classification of Forest areas in HP 2018

Category wise Forests	Area (Km <sup>2</sup> )	Percentage
Reserved Forests	1883	4.96
Demarcated Protected Forests	12852	33.87
Un-demarcated Protected Forests	16035	42.25
Others forests (Managed by Forest Department)	7160	18.87
Not managed by Forest Department	18	0.05
<b>Total</b>	<b>37948</b>	<b>100</b>

Source:- <https://hpforest.nic.in>

79. As of year 2018, Bilaspur forest circle has a forest cover of 52,269 Ha constituting reserve forests, demarcated protected forests; un-demarcated protected forests are given in Table 3-10. The forest map of Himachal Pradesh along with the project road is shown in Figure 3.14.

**Table 3-10: Forest Cover of Bilaspur Circle and Himachal Pradesh**



Circle	Division	Forest Area (Ha)		
		Reserve forests (RF)	Demarcated protected forests (DPF)	Un-demarcated protected forests (UDPF)
Bilaspur	Bilaspur	90	15668	18551
	Kunihar	0	5667	12293
<b>Whole Himachal Pradesh</b>		<b>188339</b>	<b>1285184</b>	<b>1603535</b>

**Forest Area along Project Corridor**

80. The project road falls within the jurisdiction of Bilaspur division, but there are no forest areas along the 13.5km long Dadhol-Ladroun road.

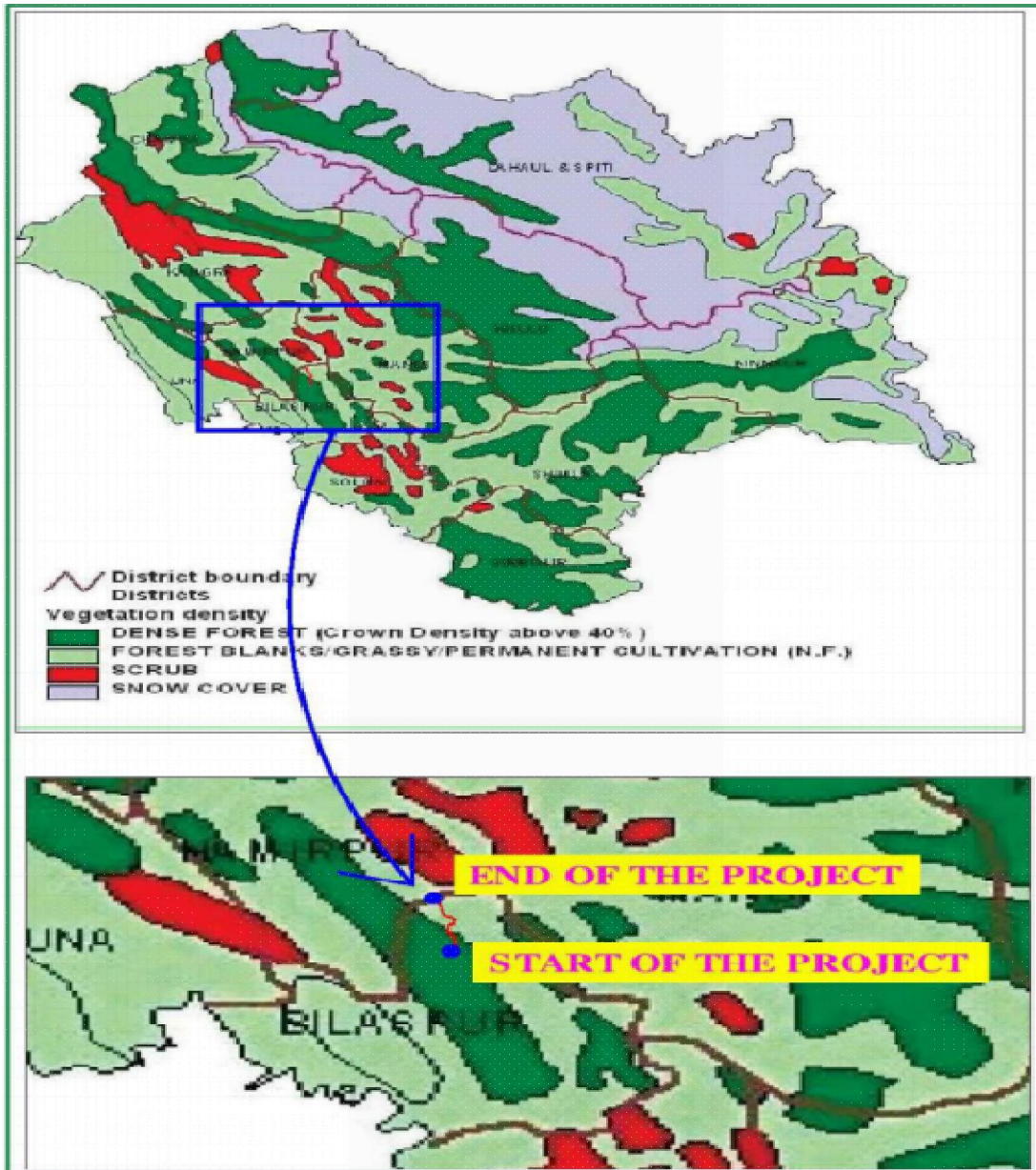
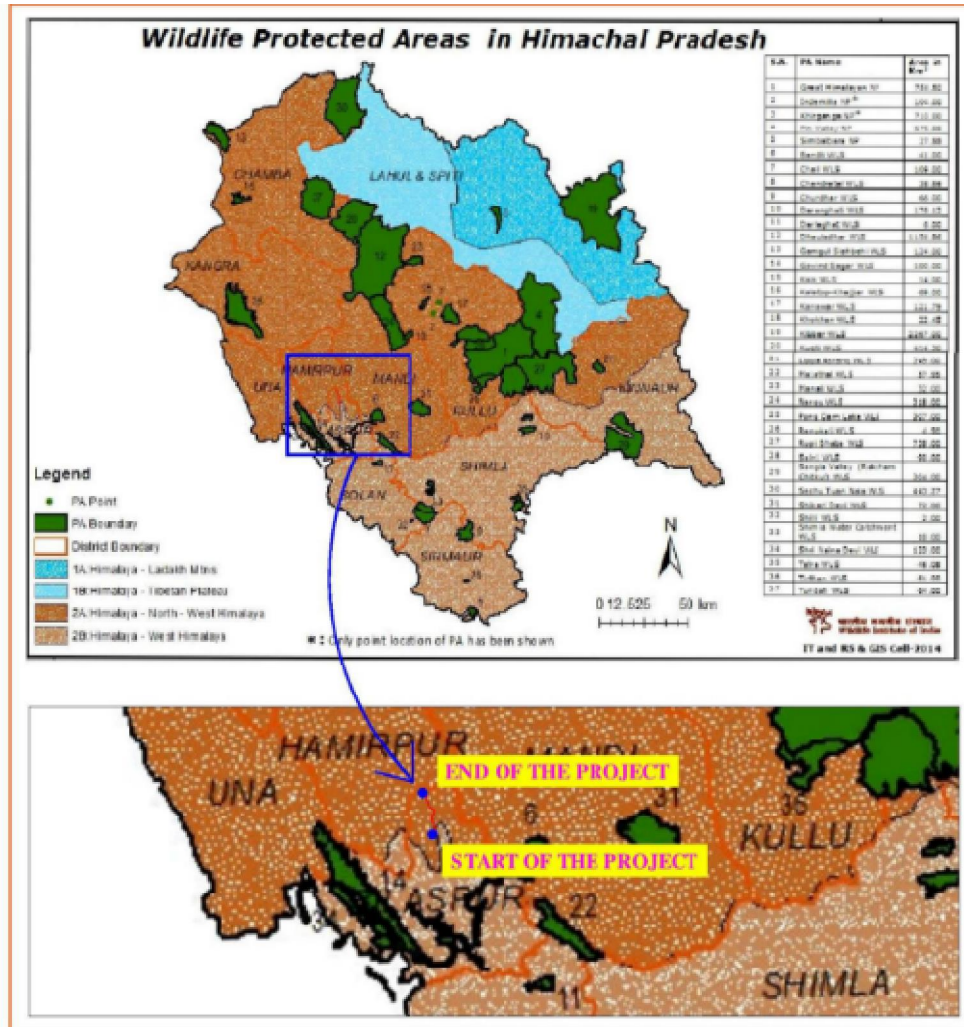


Figure 3.14: Forest Cover of Bilaspur District (Source: <https://hpforest.nic.in/>)

**Protected Area**

81. There are no National Park, Wildlife Sanctuary, Biosphere Reserve and any other notified sensitive area within 15km on either side of the project road. There is no forest area falls within the present road corridor and Chhanjiar forest is the only prominent Forest recorded 2 km away from road corridor near Dadhol. Further, no wildlife crossing corridors are reported along the project corridor. The Wildlife Protected areas in Himachal Pradesh are shown in Figure 3.15.



**Figure 3.15: Himachal Pradesh Wildlife Protected Area Map**  
 (Source: <https://hpforest.nic.in/>)

**Biodiversity**

82. The state Himachal Pradesh encompasses tropical to temperate forests, alpine meadows and snow, high biodiversity and endemism, oaks-centered biodiversity, predominance of evergreen forests. The state has a wide ecological diversity due to large variation in altitude, latitude and rainfall and its seasonality.

## Flora

83. The project road corridor has a luxuriant growth of 60 angiosperm taxonomic group, which include invasive species like *Ageratum conyzoides*, *Eupatorium adenophorum*, *Lantana camara*, *Parthanium hysterophoros*, among others. The list and number of taxonomic groups found along the project road are in Table 3-11. *Acacia catechu*, *Adhatoda vasica*, *Agave Americana*, *Asparagus adscendens*, *Barleria cristata* *Bombax ceiba*, *Bauhinia vahlii*, *Cassia fistula*, *Dendrocalamus strictus*, *Embllica officinalis*, *Murraya koenigii*, *Solanum nigrum*, *Tinospora cordifolia* are some of the flora having medicinal value and recorded along the project corridor.

**Table 3-11: List of Taxonomic group species along the project road**

S.No	Taxonomic group	Number
1	Angiosperm	60
2	Pteridophyta	2

84. The ecological investigations along the project corridor was conducted at two locations, whose findings indicated the presence of variety of trees, shrubs and herbs. The dominant species recorded is listed in Table 3-12.

**Table 3-12: List of dominant Trees, Shrubs and Herbs species along Project Road**

Location	Tree	Shrub	Herb
<b>Location-1</b> (Near Ghandalvi Village)	<i>Acacia catechu</i> , <i>Dalbergia sissoo</i> , <i>Morus alba</i>	<i>Carissa opaca</i> , <i>Murraya koenigii</i> , <i>Adhatoda vasica</i>	<i>Ageratum conyzoides</i> , <i>Parthanium hysterophoros</i> , <i>Bidens biternata</i>
<b>Location-2</b> (Near Ladhiani Village)	<i>Dalbergia sissoo</i> , <i>Morus alba</i> , <i>Grawia optiva</i>	<i>Adhatoda vasica</i> , <i>Murraya koenigii</i> , <i>Lantana camara</i>	<i>Ageratum conyzoides</i> , <i>Tridax procumbens</i> , <i>Parthanium hysterophoros</i>

85. In addition to dominant species, the flora reported in the project area is summarized here under: -

**Trees:** *Annogeissus latifolia*, *Lannea grandis*, *Acacia catechu*, *Stephegyne parviflora*, *Aegle marmalos*, *Bombax ceiba*, *Syzygium cumini*, *Feronia limonia*, *Ehretia leaves*, *Flacourtia indica*, *Zizyphus zuzuba*, *Mangifera indica*, *Cassia fistula*, *Wendlandia exerta*, *Embllica officinalis*, *Ficus religiosa*, *Ficus bengalensis* *Terminalia tomentosa*, *Bauhinia variegata*, *Lucaenia leucocephala*, *Grewia optiva*, *Dalbergia sissoo*, *Pinus roxburghii*, *Albizia lebbek*, *Albizia chinensis*, *Eucalyptus grandis*, *Grevillea robusta*, *Callistemon lanceolatus*, *Jacaranda mimosaefolia*, *Toona ciliata*, *Populus alba*, *Melia azadirachta*, *Morus alba* and *Broussonetia papyrifera*.

**Brush Wood:** *Carissa opaca*, *Dodonea viscosa*, *Woodfordia fruticosa*, *Murraya koenigii*, *Adhatoda vasica*, *Nyctanthus arbortristis*, *Mallotus phillipensis*, *Euphorbia royaleana*, *Zizyphu nummularia* and *Lantana camera*.

**Climbers:** *Bauhinia Vahllii*, *Pueraria tuberosa*, *Mimosa rubicaulis*, *Zizyphus oenoplia*, *Cissampelos pareira*, *Clematis gouriana*, *Caesalpinia sepiaria*, *Abrus precatorius*, *Cuscuta reflexa*, *Crytolepsis buchanani*, *Vallaris solanacea*, *Lohnocarous frutescens*.

**Grasses:** *Eulaliopsis binata*, *Eriophorum comosum*, *Cynadon dactylon*, *Chrysopogon fulvus*, *Heteropgon controtus*, *Botheriochloa intermedia*, *Themeda anathera*, *Cymopogon marthi*, *Aristida depressa*.

86. *Acacia catechu*, *Dalbergia sissoo*, *Morus alba*, and *Grawia optiva* found regularly distributed in tree layer throughout the project road/corridor. Dominant shrub species recorded along the project road are *Murraya koenigii*, *Adhatoda vasica*, *Lantana camara* and *Carissa opaca*. A predominance of herb species like *Ageratum conyzoides*, *Parthanium hysterophoros*, *Bidens*

*biternata* and *Tridax procumbens* was recorded in the study area along with various grass species. In addition, invasive species like *Ageratum conyzoides*, *Eupatorium adenophorum*, *Parthenium hysterophorus* and *Lantana camara* along with some scattered tree and shrub species.

### **Endemic & RET Species**

87. The flora recorded along the project corridor were assessed for their conservation status by cross checking with IUCN Red Data Book of Indian plants (Nayar and Sastry, 1987-1990) and none of the plant taxa was found under the Rare endangered and threatened (RET) category. All the species recorded along the road corridor were distributed more frequently and vigorously even outside the RoW of the project road.
88. During the baseline assessment, enumeration of trees within RoW was carried out and total of 3614 (LHS ó 1748, RHS ó 1832) trees were recorded (Table 3-13).

**Table 3-13: Enumeration of trees within RoW**

S. No.	Chainage (Km)	Side		Total Nos. of Trees in ROW
		LHS	RHS	
1	0+000 - 1+000	119	122	241
2	1+000 - 2+000	127	168	295
3	2+000 - 3+000	133	145	278
4	3+000 - 4+000	160	164	324
5	4+000 - 5+000	155	172	327
6	5+000 - 6+000	185	166	351
7	6+000 - 7+000	177	188	365
8	7+000 - 8+000	191	164	355
9	8+000 - 9+000	81	85	166
10	9+000 -10+000	99	123	222
11	10+000 -11+000	180	59	239
12	11+000 -12+000	66	119	185
13	12+000 -13+000	47	140	187
14	13+000 -13+435	28	17	79
	<b>Total</b>	<b>1748</b>	<b>1832</b>	<b>3614</b>

Source: Primary Survey

### **Fauna**

89. There are no National Park, Wildlife Sanctuary, Biosphere Reserve and any other notified sensitive area within the 15 Km radius of the project road. Although, there are no forest areas (of any category) and no wildlife crossing corridors are reported along the project corridor, but strip of natural vegetation is present both sides of road. In order to study the mammals of the study area, 2-3 km long transects and trails were walked. Direct sighting and calls as well as indirect evidences such as scats, pugmarks, scraps, horns and other trophies were recorded during the survey walk. Secondary data as well as information elicited from the local people were also noted for the presence and absence of wild animals in the study area.
90. A total of 23 mammalian species that include Rhesus Macaque, Langur, Red Muntjac, Sambar, wild pig, jungle cat, palm civet, Indian civet, golden jackal etc. were recorded. However, none of the species reported in the project area is under Schedule-I category of Indian Wildlife Protection Act-1972. During primary survey, no such endangered species encountered which comes under the Rare and endangered category of IUCN. Though, during local consultations along the project corridor indicate that they frequently face attacks from monkeys near Ladhiyani village.

91. **Herpatofauna:** House Lizard (*Hemidactylus brookii*) was sighted during primary study in the study area. Monitor lizard (*Varanus bengalensis*) was also reported from study area along with Rat Snake (*Ptyas mucosa*), Indian Cobra (*Naja naja*), and Common Indian Karait (*Bungarus caeruleus*). Among recorded Herpatofauna species, Monitor Lizard has placed in Schedule-I list of Wildlife Protection Act-1972.

**Avifauna**

92. Avifauna was also sampled by using the same trails used for mammals. A prismatic field binocular (Nikon ACULON A211 10x50) was used for the bird watching during survey walk. Bird survey has been carried out during 06 to 09 AM hrs during this study. Most of the birds have been identified in the field by using the field guide. A total of 70 Bird species has been recorded during this study, which includes Black Francolin, Red Junglefowl, Kalij Pheasant, Cheer Pheasant, Pallid Harrier, Eurasian Sparrowhawk, Steppe Eagle, Water Rail, Common Pigeon, Oriental Turtle Dove, Eurasian Collared Dove, Spotted Dove, Rose-ringed Parakeet, Plum-headed Parakeet, Common Hawk Cuckoo, Indian Cuckoo, Eurasian Cuckoo, Himalayan Cuckoo, Asian Koel, Common Hoopoe, Indian Roller, White-throated Kingfisher, Common Kingfisher, Green-Bee-eater, Great Brbet, Blue-throated Barbet, Speckled Piculet, Himalayan Woodpecker, Common Lora, Long-tailed Minivet, Black Drongo, Ashy Drongo, Yellow-bellied Fantail, Eurasian Jay, Black-headed Jay, Yellow-bellied Blue Magpie, Red-billed Blue Magpie, Grey Treepie, House Sparrow, Russet Sparrow, Grey Wagtail, White Wagtail, Rock Bunting, Indian Peafowl etc.

93. Among recorded/reported avifauna, Common peafowl (*Pavo Cristatus*), Cheer Pheasant (*Catreus wallichii*) and Kalij Pheasant (*Lophura leocomelanos*) comes under Schedule-I (part III) category under Wildlife Protection Act-1972. No important bird areas have been reported within the 15km PIA of the project road. Photographs taken during the ecological investigations along the project road is given in Fig.3.17.



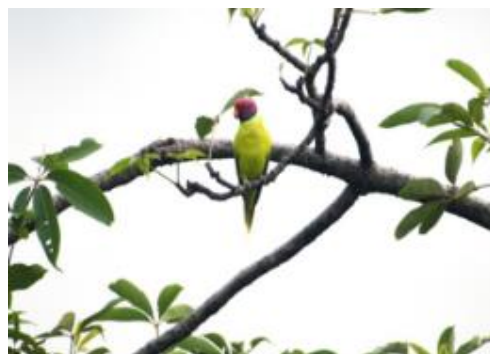
**Black Drongo**



**Jungle Babbler & Squirrel**



**Oroxyllum indicum**



**Plum Headed Parakeet**



**Vegetation Sampling**



**Amla (*Emblca officinalis*)**

**Figure 3.17: Photos of recorded during ecological investigations along Project road**

### **Aquatic Ecosystem**

94. There is no prominent aquatic ecosystem present in the study area. Govind Sagar Dam is the nearest water body in the region which is about 8-10 km away from present project corridor.

### **3.4 Social Environment**

#### **Baseline socio-economic information**

95. The baseline study included the collection of information from primary and secondary sources. From primary sources various information like socio-economic condition of the population, impact on private structures (residential, commercial and squatters) in addition, detailed information on impact on community assets has also been collected (religious structure, educational institutions are collected. The study has been considered as 15 km radius in the influence area of the existing corridor length of 13.5 km.

#### **Demographic Features of Bilaspur District**

96. Demographic profile: Demographic profile has an important bearing on the development process. According to the 2011 census, the total population of Bilaspur district is around 3.81 lakhs comprising 1.92 lakhs males and 1.89 lakhs females. The population of the district has increased by 5.56% during 2001 to 2011. It constitutes 5.6% of the state population. Out of the total population of the district 93.4 per cent lives in rural areas while 6.6 per cent lives in urban areas. The economy of the district is mainly agrarian and majority of the population in the districts is engaged in cultivation.

**Table 3.14: Demographic profile of Bilaspur District of Himachal Pradesh**

<b>Description</b>		<b>Total</b>	<b>Rural</b>	<b>Urban</b>
No. of Households		80,323	74,712	5,773
Population	Persons	381,956	356827	25,129
	Males	192,764	179,653	13,111
	Females	189,192	177,174	12,018
Sex ratio (Females per 1000 Males)		981	986	917
Proportion of SC Population (%)		25.9		
Proportion of ST Population (%)		2.8		

97. **Demography:** The sociological aspects of this study include human settlements, demography, and social strata such as Scheduled Castes and Scheduled Tribes and literacy levels besides infrastructure facilities available in the study area. The economic aspects include occupational structure and income levels of workers. As per census 2011 profile of Bilaspur district is as follows:
- The total population of Bilaspur district is 381,956 that has a break up of 192,764 (50.5%) males and 189,192 (49.5%) females. This shows that the female population is higher than male population.
  - Decadal population growth has increased by 12 per cent. Out of the total population of the district 93.42 per cent lives in rural areas while 6.57 per cent lives in urban areas.
  - The sex ratio of the study area is 981 females per every 1000 males.
  - Among the total population of district, 25.9% (98,989) consists of Scheduled Caste, 2.8% (10,693) are of the Scheduled Tribe population and 71.28% (272,274) people belong to other castes.
  - Among the total population, 84.6% of the people are literate excluding the 0-6 age group. This shows that most of the population is literate.
  - Among the literates 91.2% are males and 78.0% are females. This shows that the male literates are more than the female literates.
  - Average Household Size is 4.7 persons
  - Population density works out to about 327 persons per km<sup>2</sup>, in the district.
98. **Working Population:** According to Census 2011, the total workers including main and marginal workers constitute to 53.9 per cent of the total population of the district. Of the total workers, the share of main worker is 27.1 and the marginal are 26.8 per cent. The remaining 46.1 per cent of total population is occupied by the category of non-workers.
99. **Salient features of the proposed road and influence area and amenities en-route the corridor is presented in Table 3.15 and 3.16**

**Table 3-15: Salient features of Proposed Road and Influence Area**

S.No	Description	Details
1	Project Road Length in Km	13.4
2	District	Bilaspur
3	Connecting Places	Dushadka ó Bhatad ó Bharari ó Gandalwin -Ladraur
4	Near By NH/SH	Road bifurcates from Mataur ó Shimla National Highway (NH-88) at Dadhol (Padyalag) Km/ RD. End at Ladraur MDR 32 connects Mundkhar ó Juha.
5	Attractive Places	Baba Nehar Singh Mandir , Mata Sohni Devi Ji Temple, Bharthari temple
7	Wild Life Sanctuaries and Protected Areas	None
8	Water Bodies	Seer Khadd Branches, Kunah khaad River, Dehra lake
9	Protected Archaeological/ Historical Monuments	None
10	Industries	None
11	Mines and minerals	None
12	Airport/Railway	None

Source: Census-2011, Amenities- District Household Census

**Table 3-16 : Details of amenities in the project influence area/district**

S.No	Amenities	No.
1	Primary School	171
2	Middle School	82
3	Secondary School	37
4	Government Collages	2
5	Community Health centres	3
6	Primary Health centres	17
7	Maternity and Child Welfare	10
8	Veterinary Hospital	22
9	Hand Pumps	56
10	Post Offices	61
11	Commercial Banks	9

Source: Census-2011, Amenities- District Household Census

100. Description on Project Corridor: The geographical coverage for SIA of the project extends to 12m of the impact zone of study area along 13.5 km corridor (Existing Length) upgradation to intermediate lane configuration from project road comprises as many as 15 villages in 1 Tehsil of the impact zone. The impact zone is considered as the final corridor or impact or the proposed right of way as per the final design. The social surveys were carried based on the above consideration
101. Socio Economic Characteristics of the Project Impact Zone: Development of infrastructure projects like National Highways/State Highways improvements and upgradation of the existing roads will have significant impacts on the standard of living of the people, their assets, livelihoods, and way of life, health, wellbeing, culture and community. Planned development project impacts could be negative, as well as positive. The socio-economic assessments seek to identify the impacts of the proposed project and focus on the ways and means to minimize the incidents of negative impacts and suggest the mitigation measures. Therefore, it is vital to understand the existing baseline socio-economic scenario in the study area to analysis the magnitude of the possible impacts. The basic socio-economic profile of the study area is presented as follows;
102. Demography, socio-economic profile and social amenities: The sociological aspects of this study include human settlements, demography, and social strata such as Scheduled Castes and Scheduled Tribes and literacy levels besides infrastructure facilities available in the study area. The economic aspects include occupational structure and income levels of workers. The profile comprises of the study area.
- The total population of 15 villages which are within Bharari tehsil is 8552, in which the male population is 4185 (48.49%) and the female population is 4367 (51.06%). This shows that the female population slightly higher in ratio. In the villages of Dadhol & Lehri Sarail, female population is 11% higher than the male population as per census 2011.
  - The male and female ratio of the study area is 1043 females per every 1000 males.
  - Of the total study area population, 0.04% (3) consists of Scheduled Tribes, 21.19% (1812) are of the Scheduled caste population and 78.77% (6737) people belong to other castes.
  - The schedule tribe population along the project road is just 0.5% and at the district level it is 2.80%. The ST population is already in main stream society with urban life styles and cultures, good living standards, high literate rate and occupation. Hence, there is no Indigenous population in this corridor and IPDP is not warranted.
  - Among the total population, 88.21% (6749) of the people are literate and 11.79% (1803) of the people are illiterate. This shows that more than half of the population is literate.



- Among the literates 48.72% (3728) are males and 51.27% (3923) are females. This shows that the female literates are more than the male literates.
- Totally the illiterate constitute 21.08% (1803) of which the female 12.94% (1107) and the male 8.14% (696) of the population. This shows that the female illiterates are more than the male illiterates.

**Table 3-17 : Details of the Revenue Villages in the Study Area**

S.No	Name	TRU	No. HH	TOT_P	TOT_M	TOT_F	P_SC	P_ST
1	Kothi (285)	Rural	82	357	178	179	17	0
2	Ghandalwin (281)	Rural	259	1082	517	565	171	2
3	Tikri (323)	Rural	24	92	46	46	0	0
4	Mihara (291)	Rural	127	532	278	254	54	0
5	Badsara (292)	Rural	33	164	79	85	10	0
6	Panjaila (258)	Rural	3	17	9	8	17	0
7	Lethawin (296)	Rural	60	295	151	144	48	0
8	Gatwar (295)	Rural	50	214	101	113	77	0
9	Ladhyani (294)	Rural	192	915	474	441	231	1
10	Bhater (298)	Rural	67	289	127	162	62	0
11	Dadhol Kalan (265)	Rural	215	956	450	506	243	0
12	Padyalag (267)	Rural	137	631	323	308	196	0
13	Lehri Sarail (272)	Rural	569	2639	1271	1368	654	0
14	Bari Kalan (269)	Rural	53	277	135	142	32	0
15	Bari Khurd (268)	Rural	17	92	46	46	0	0
Total			<b>1888</b>	<b>8552</b>	<b>4185</b>	<b>4367</b>	<b>1812</b>	<b>3</b>
%			<b>4.53</b>	<b>100</b>	<b>48.94</b>	<b>51.06</b>	<b>21.19</b>	<b>0.04</b>

TRU- Total Rural/Urban, No. HH-Households, TOT\_P-Total Population, TOT\_M-Total Male, TOT\_F-Total Female, P\_SC- Population Schedule Caste, P\_ST- Population Schedule Tribe.

*Source: Primary Census Abstract, Census of India, 2011*

### Occupational Distribution

- Among the total population 48.74% (4168) are non-workers and remaining constitute the working population i.e. 51.26% (4384). The overall work force participation rate is nearly equal to the state work force about 51.58 %.
- Among the working population 59.23% (2597) are main workers and 40.76% (1787) are marginal workers.

### Social Amenities

- There are 6 primary schools, 8 Middle schools and 4 Secondary schools with no degree colleges. For the Degree collages and professional courses students visit Ghumarwin and Hamirpur located 10-15 Kms away.
- There are two community Health centers, three Primary health sub center and two Maternity and child welfare centers.

- For animal husbandry care there 5 veterinary hospitals. There are 13 number of hand pump functional all around the year. The village wise amenities along the project road are given in table.

### Socio-economic Status of Project Villages

103. The socio-economic and census surveys were conducted on various dates in the month of August and September 2019 for primary data collection. Field survey helped collect the fairly reliable data with respect to the major livelihood source, family income and expenditure, education and health status, basic amenities availability, lifestyle and standards of living etc of the residents in the project impact zone. It also helped in eliciting information about the environmental and socio-economic impacts for ancillary works of the project in the area and the measures initiated by them to mitigate those impacts.
104. Field survey was carried out in the influence zone containing a total of about 136 households. The potential respondents in the households were contacted personally by the field investigators who explain the purpose of the visit and seek their participation by sharing relevant information impartially. The field investigators also clarified the doubts and apprehensions expressed by the respondents. Once the responded were willing and ready to participate, household level socio economic questionnaire was administered with the help of interview based structured questionnaire. A number of questions were open ended questions to facilitate capturing perceptions of the respondents objectively. In addition to household survey, rapid participatory rural appraisal tools comprising transect walks, focused group discussions, interview with the stakeholders consultation were used in collecting the village level qualitative information.
105. The data collected during the field survey and desk research phases was processed, tabulated, analysed and validated with the help of basic quantitative and qualitative analytical tools. The socio-economic impact of the proposed project was assessed in terms of its effects on:
- Developmental Profile & Economic Structure
  - Livelihoods and incomes
  - Agriculture practices
  - Cultural and aesthetic sites
  - Life styles and quality of life
  - Community infrastructure ó physical and social ó facilities available

### Profile of the likely Project Affected Families

106. Profile of the 136 affected families are presented below. Analysis on literacy level of the affected household shows that all of them are literates except around a negligible percent 12.12 percent is illiterates. The average household size for the project affected population is 3.6.

**Table 3-19: Socio-cultural characteristics of structures affected population**

Item	Description	No	% of total
<b>Population</b>	Male	212	44.44
	Female	265	55.56
	Total	477	100.0
<b>Religious Group</b>	Hindu	128	96.97
	Muslim	4	3.03
	Total	132	100.0

Item	Description	No	% of total
<b>Social Group</b>	General	112	81.82
	BC	18	13.64
	SC	5	3.79
	ST	1	0.76
	Total	136	100.00
<b>Family Type</b>	Joint	115	84.09
	Nuclear	13	9.85
	Individual	8	6.06
	Total	136	100.00
<b>Years of stay</b>	Up to 10 year	31	21.97
	10 to 20 Years	22	16.67
	21-50 Years	50	36.36
	Above 50	33	25.00
	Total	136	100.00
<b>Education level of HH</b>	Illiterate	16	12.12
	New-literate	1	0.76
	Primary	2	1.52
	Middle	16	10.61
	High school	42	31.82
	Intermediate	25	18.94
	Graduate	20	13.64
	Post graduate	8	6.06
	Professional	1	0.76
	Others	5	3.79
	Total	132	100.00

Source: Primary data Collection, 2019

107. Economic Profile: The work participation rate is 37.26 per cent in the study area is slightly lower than the national work force participation of 39.1 per cent. Occupation wise, most of them are engaged into Trade/business (18.94%), Petty Shop Keeping (11.36%), Agriculture (15.15%), and retired persons (10.61%). The incidence of Govt. Employees, Private Employees and Others is around 16.67 percent, 13.64 percent respectively. Details are presented in Table 3-20.

**Table 3-20: Economic profile of the Affected Population along Project Road**

Item	Description	No	% of total
Occupation of HH	Agriculture	20	15.15
	Trade/Business	25	18.94
	Petty shop keeping	15	11.36
	Agri labour	9	6.82
	Non-Agri labour	3	2.27
	HH Industries/Artisan activity	1	0.76
	Service	19	14.39
	Professional	6	3.03
	Self employed	0	0.00
	Retired	14	10.61
	Government services	6	3.03
	Others	18	13.64
	Total	136	100.00

108. The income levels of majority of the households fall under higher middle-income category earning more than Rs. 4,00,000 per annum (81.77%). The incidence of lower-income families is about 3.32 percent who earn below 1,80,000 per annum. About 7.5 percent of them are middle income families who are earning Rs. 1,80,000 to 4,00,000 per annum.
109. The expenditure pattern of the affected households show that majority of them have an average monthly expenditure above Rs.30,000 per month. The monthly expenditure of the Affected Population along Project Road details are given in Table below.

**Table 3-21: Monthly expenditure of the Affected Population along Project Road**

Monthly Expenditure (Rs)	Description	No of HH	% of HH
	<10000	3	1.5
	10000 to 20000	4	2.27
	20000 to 30000	11	7.57
	>30000	118	88.66
	<b>Total</b>	<b>136</b>	<b>100</b>

110. Household Assets: For inferring the standard of living of the households, their possession of various consumer durables was recorded during the survey. All the families have minimum standards of living which can be inferred from the assets owned, given in table below.
111. It can be seen from the table 3-23, from the context of possession of Household assets, of the surveyed households, 80.30%, 74.24%, 62.12% and 98.48 % possess TV, Fridge, washing Machine and cell phones respectively.

**Table 3-22: Number of HH's with Assets of the Affected Population along Project Road**

S.No	No of HH with Assets	Total	% to total*
1	TV	106	80.3
2	Fridge	98	74.24
3	Washing Machine	82	62.12
4	Cycle	26	19.69
5	Motor Cycle	35	26.51
6	Car	8	6.06
7	Telephone (Land Line)	4	3.03
8	Mobile (cell Phone)	136	100.00
<i>Source: Primary data Collection</i>			

112. Savings & Indebtedness: The households enumerated during socio economic survey, 33 households have long term deposits and only 2 have short term deposits in the banks and others are 19 has in form of insurances as given in table 3-23.

**Table 3-23: Financial Deposits of the Affected Population along Project Road**

Type of Deposit	Institution where deposited	No.s
Long Term	Bank, LIC	33
Short term	Bank, LIC	2
Others	LIC	19
<b>Total</b>		<b>54</b>

Source: Primary data Collection, 2019

113. Whereas families indebted to the banks are 25, who owe for various purposes, interestingly they have not borrowed from the any money lenders as given in table 3-24.

**Table 3-24 : Details of Indebtedness of Households**

Purpose Of Borrowing	Source of Borrowing	No of HH's
House Hold Expenditure	Bank, Finance	3
Agriculture	Bank, Finance	8
House Construction	Bank, Finance	6
Commercial	Bank	4
Animal Husbandry	Bank	2
Others		1
Total		25

Source: Primary data Collection

114. Health: Data on health status of households indicate that nearly 8.33% of the families have some form of illness in a given year by their family members. Details of health status are given in table. No major illness or chronic diseases were reported during the social survey.

**Table 3-25 : Health Status of PAFs**

S. No	Health Status of PAFs	Number	%
1	Illness	11	8.33
2	No illness	121	91.66
<b>Total</b>		<b>132</b>	<b>100</b>

## Gender

115. Over the last five decades, gender wise decadal population of females is increasing than the male population with an average of 19.975 per cent. Status of the women had made a good progress in Himachal Pradesh. Women complete higher level of secondary school than in many other states. The sex ration in the study area is 1043 females per thousand males, which is higher the district sex ration of 981. Women in this region also have a good literacy rate of 51.27% compared to male population.
116. During the analysis of census and socio-economic survey, the gender disaggregated data has been collated on their literacy, income, status etc and presented in the following sections as baseline information. The ESIA also presented different women development proactive schemes operational in the state as well as other proactive schemes for women upliftment in the society. During preparation of RAP such information will be used for developing gender specific sustainable development measures schemes which will help to elevate the status of women in the society as well as improve their quality of life in particular. The M&E process of the project to capture the upliftment as post project situation with the gender disaggregated information.

<sup>5</sup>Source : Gender Statistics, HP, DoES, Shimla

117. A hill women's life is extremely busy from early morning to late evening and sometimes even till late at night. They work side by side with men in agriculture and their role is as important in the field as well as at home. From the affected population, it has been observed the males consists 44.44% and females are 55.56% reflects female population is slightly higher. While the health center nearby have informed women are aware about the health problems and do take advice on gynecological problems. There were no HIV subjects recorded during the survey.
118. Gender based violence is common problem in developing countries and women were most likely to get experience it than men. The common profiling of the GBV is the physical abuse by men to victims and verbal abuse by women. From the data collected the household respondent's most common and regular affair activity until such abuse severely become worse. These activities do not get registered officially at law enforcing agencies or hospital because the domestic abuse is seen as a private affair not disclosed in public.

### Status of Women

119. **Project Affected Women by Age Group:** Of the total female population, around 50 percent population are in the age group between 15-40. Around 23 percent women population are in the age group of 6-14. There are 4.63 percent women population are in the age above 60.

#### Distribution of Project Affected Women by Age Group

Age Group	%
<6	5.84
6-14	23.17
15-25	15.45
25-40	34.21
41-60	16.77
>60	4.63

120. **Project Affected Women by Education:** It can be seen from the following table that of the total female population those who are in the age group above 6, 2.14 percent are illiterate. There are 32.56 %, 15.60%, 18.64% and 14.21% are primary, middle class, SSC and Pre University educated. Around 7.26 % are degree holder. There are 6.34% and 3.25% are technically qualified and post graduate degree holder.

#### Distribution of Project Affected Women by Education

Age Group	%
Illiterate	2.14
Primary	32.56
Middle Class	15.60
SSC	18.64
Pre University	14.21
Degree	7.26
Post Graduate	3.25
Technical	6.34

121. **Impact on women and Other Vulnerable Group:** The Department of Social Justice and Empowerment Government of Himachal Pradesh is responsible for the welfare of persons with disabilities in Himachal Pradesh. The state has an estimated population of 1,55,9501 persons with disabilities in a total population of 6, 856, 5092 people. The disability classification with population break up as per Census 2011, Government of Himachal Pradesh is as follows. It can be mentioned here that there is no such data base available for district, tehsil, sub- tehsil and village level.

122. The vulnerable section of the society for the purpose of the project includes, woman headed families, transgender, scheduled families (both caste and tribes), families below poverty line, destitute, old aged and orphans. No orphan, women headed household, destitute, old aged, families below poverty line was found. Some Scheduled Caste(5) and Schedule tribe(1) families was found during the survey.

**Table 3.-26: Disability category and Population in Himachal Pradesh**

Disability Category	Population with Disability
Seeing	26076
Hearing	26700
Speech	8278
Movement	32550
Mental Retardation	8986
Mental Illness	5166
Any other	29024
Multiple Disability	18536

123. **Women's Role in Household:** Participation of women in economic activity and decision making process at house and community level is a sign of general socio-economic development of the women in particular and society in general. The survey tried to collect information about various activities in which the women members of family are participating. The analysis of data revealed that women in the surveyed families engaged in activities such as cultivation, Allied Activities (Dairy, Poultry, Sheep rearing, etc.), trade & business, household work, and agriculture labour. There are families in which women members are involved in more than one activity; hence, the total figure is more than the affected household figure of 132. All women (100%) member look after household activities like any other women member in the country.
124. There are about 72.32% of women member engaged in cultivation. Only 4.24% of women members are involved in other activities, 65.25% women are involve in collection of water, 21.21% are engaged as an agricultural labors. 13.74% are helping their family members in trade and business. Only 5.25% women are in service and merely 20.81% of women are worked as allied activities. Details are provided in the Table 3.13 below. Women were involved in multiple activities in the daily life and the percentage of their involvement in various activities is given in table 3-27.

**Table 3-27 : Engagement of women in economic and non-economic activity**

S.No	Activities women engaged	% Woman
1	Cultivation	72.32
2	Allie Activities,	20.81
3	Sale of forest products	1.41
4	Trade & business,	13.74
5	Agricultural labour,	21.01
6	Non Agricultural labour	5.25
7	HH Industries	1.41
8	Services	5.25
9	Household Work including cooking	54.75
10	Taking care of infants/children	71.52

S.No	Activities women engaged	% Woman
11	Fetching water	65.25

125. **Role of Women in Family Financial Matter:** Data related to involvement of women in various family financial matters has been collected to understand the level of involvement of women members in various financial aspects. The factors considered are education of children, health care, purchase of assets, social function etc. the details are given below table 3-28.

**Table 3-28: Involvement of women in family**

Decision Making		%
Education	Yes	83.48
	No	10.27
Health	Yes	86.61
	No	7.14
Financial	Yes	83.48
	No	10.27
Assets	Yes	81.25
	No	12.5
Day Activities	Yes	76.79
	No	16.96
Social	Yes	82.59
	No	11.16
Others	Yes	4.02
	No	89.73

126. The proposed project road will improve the accessibility of the inhabitants of the rural as well as industrial areas to education, health, employment, tourism and trading opportunities and will consequently alleviate poverty in the process. The improvement will help to increase new economic and employment opportunities by providing improved linkages to markets, production centers and other areas of economic opportunities. As a result, people will have wider options in buying and selling their commodities. The villagers would be able to transport their produce faster and get more profit margins instead of depending solely on local markets and middlemen. Fourth, improved connectivity will facilitate travel to tehsil headquarters and other local government/development agencies. Women will especially benefit, since their mobility will be augmented both in terms of access to social services, as well as access to higher levels of schooling. Women's access to higher levels of health care outside the village particularly during the time of childbearing will also improve considerably. Hence, the proposed Project will bring in economic and social changes in the area, which in turn would bring economic prosperity and would lead to poverty alleviation. Within this given background, this chapter has made an attempt to understand the social, economic and demographic characteristics of project. Baseline user satisfaction on key parameters such as travel time, improved mobility, etc. is being conducted as part of project preparation. This shall help provide more accurate information against which the improvements will be measured subsequently.
127. **Women Time Disposition:** This section highlights women's involvement in various activities throughout the day. As the table below shows, over nine hours in a day, a woman



spends on household chores, and nearly 7 hours on relaxation. This leaves very little time for any other activity, which may be economically gainful. However, in rural scenario, number of activities is carried out simultaneously. As the table shows some women spend time in wage earning or help family members in cultivation or in household industry. Table below presents average time spent by responding women in individual routes.

**Table 3-29: Women – Time Disposition**

Activities	Average time spent per women (hours)
Cooking	2.3
Washing	1.1
Collection of drinking water	1.3
Cleaning of house	0.5
Cattle rearing	1.6
Child rearing	2.4
Wage earning	3.2
HH industries	2.6
Support to cultivation	2.5

128. **Work Participation:** Himachal Pradesh has made good progress on gender issues. Women complete higher levels of secondary school than in many other states. Moreover, gender gaps in schooling are closing. It is important to note that female labor force participation in the state is the highest in the country. Despite these achievements, challenges remain. The state's ratio of girls to boys is below the national average, having improved only slightly in recent times. While female labor force participation in the state is high, it has declined after 2005. In rural areas, there are very few non-farm jobs for women. In contrast, urban women work less, but they have the same types of jobs as urban men. The female work participation rate on an average in 1991 was 38.75 percent which has increased to 46.34 percent in 2001. There has been remarkable improvement in the work force participation rate of women as evident from various censuses. Similarly the male work force participation rate on an average in 1991 was 53.20 percent which has increased to 56.95 percent in 2001.
129. **Literacy:** Literacy rates among women in the state risen dramatically from only 4.8 percent in 1951 (males 7.5 percent and female 2 percent) to 83.87 percent in 2011 (male 90.83 percent and female 76.6 percent). Health Status There is no doubt that women's health is affected in gender specific ways by environmental degradation and poverty.
130. **Mortality:** The depletion of environment leads to a scarcity of natural resources, which means women's workload is increased as they spend more time searching for fodder and fuel wood to meet their family's daily needs. Discrimination against a female child is evident from the fact that girls experience higher rate of mortality in younger age- groups as compared to the boys. In 2009, the female infant mortality rate was observed to be 45 as compared to male infant mortality rate of 44. Health of women is an important factor in determining the overall health of the society. If pregnant women are not well nourished they are more likely to give birth to weaker babies leading to higher infant mortality rate. It is also observed that where ever the infant and child mortality is higher, the birth rates are also higher. Women are exposed to a high risk of death due to pregnancy.
131. **Empowerment:** A good number of women have been elected to Panchayati Raj institution in Himachal Pradesh for the term 2011 -2016. In Himachal Pradesh there are 3243 Gram Panchayats, out of which 1639. (50.54 percent) seats have been occupied by women in 2011 panchayat elections. Out of total seats occupied by women 987 (60.21 percent) occupied by

general women, 421 (25.68 percent) scheduled cast women, 104 (6.34 percent) scheduled tribes women and 127 (7.74 percent) by OBC women.

132. During consultations, the women participants opined that the road improvement will help them to improve the quality of life in various aspects like mobility will improve of school and college going girls. The improvement will help the women SHGs to market their product in district and taluka head quarter easily and quickly which inturn increase the demand of the product. This will improve the better business prospect thus increase the income level. The improved road will help to reach the tehsil and district hospital for better health facilities.

### 3.5 Cultural Environment

#### *Archaeological and Historical Monuments*

133. There are no protected archaeological or historical monuments within Bharari tehsil as a whole as well as within 200m on either side of project road.

#### *Common Property Resources*

134. A total of 48 common properties like hand pump, hospitals, bus stop, schools, temples etc. are identified along the project road (Table 3-30).

**Table 3-30: Details of Common property resources within RoW**

S.No	Common Property	LHS	RHS	Total
1	Hand pumps	10	19	29
2	Hospitals	0	1	1
3	Bus stop/ Rain shelter	4	6	10
4	Schools	1	2	3
5	Temples	1	3	4
<b>Total</b>		<b>16</b>	<b>32</b>	<b>48</b>

### 3.6 Hazard and Vulnerability Profile

135. The Hazard and Vulnerability profile of the project region and Bilaspur district, which includes the landslide hazards, wind hazards, earth quake hazards, flood hazards as a whole are summarized here under.

#### *Landslide Prone Area Zones*

136. As per the land hazard zonation atlas of India, Bilaspur district has 216 Sq.Km of severe to very high landslide prone area of the total landslide prone area of 1142 Sq.Km. The landslide prone area details in Bilaspur and HP as whole is given in Table 3-31.

**Table 3-31: Landslide prone areas of HP (SqKm)**

District	Severe to very High	High	Moderate to Low	Unlikely	Total Area
Bilaspur	216	842	83	1	1142
Chamba	2120	3829	351	70	6370
Hamirpur	0	851	204	45	1100

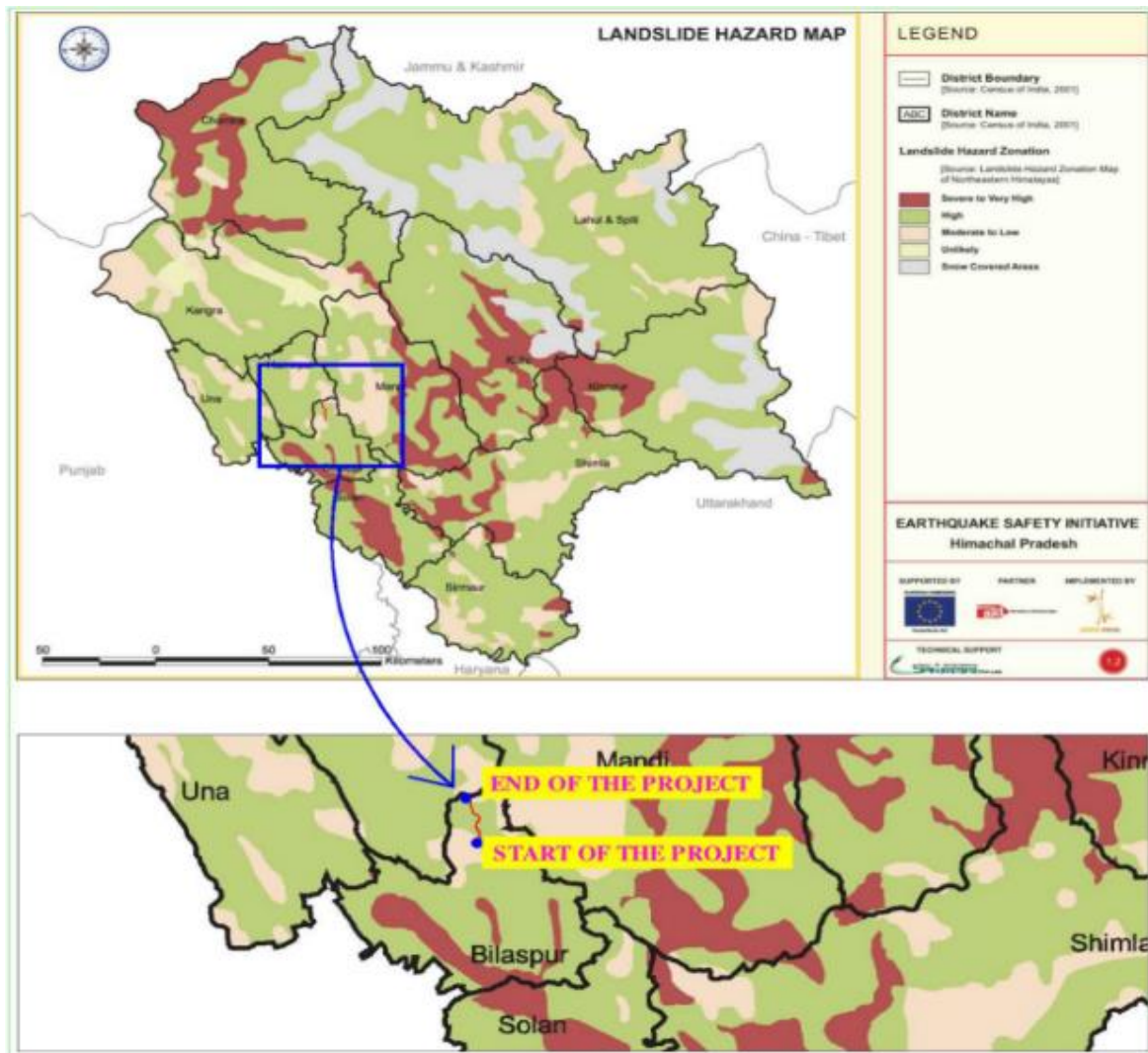
District	Severe to very High	High	Moderate to Low	Unlikely	Total Area
Kangra	123	3698	1233	557	5611
Kinnaur	868	4956	498	0	6322
Kullu	1820	3512	65	3	5401
Lahaul & Spiti	127	11637	1825	2	13591
Mandi	968	1978	826	98	3870
Shimla	893	3345	767	14	5019
Sirmaur	95	1805	614	228	2742
Solan	556	1118	157	79	1910
Una	2	678	517	311	1508

Source: BMTPC, Landslide Hazard Zonation Atlas of India

137. As per Landslide Vulnerability map of Himachal Pradesh, the project road traverses in severe to very high landslide zones as shown in Figure . During the field investigations, 2 stretches with cumulative length of 390 m along the project road have been identified, which are prone to landslides and slippages. Chainage wise landslide locations are listed in table 3-32.

**Table 3-32: Landslide locations along project road**

S.No.	Location	Effective length (m)
1	Km 0+800 to 1+100	100
2	Km 3+800 to 4+700	290



**Figure 3.18: Landslide Hazard Map**  
 (Source :- <https://ndmahimachalpradesh.gov.in>.)

**Wind Hazard**

138. Himachal Pradesh has disaster management plan (2014) for each district and as per the report, the project district can experience wind speed upto 55m/s. The wind hazard map (Figure 3.19) of Himachal Pradesh, the project road completely traverses in moderate damage risk zone-II.



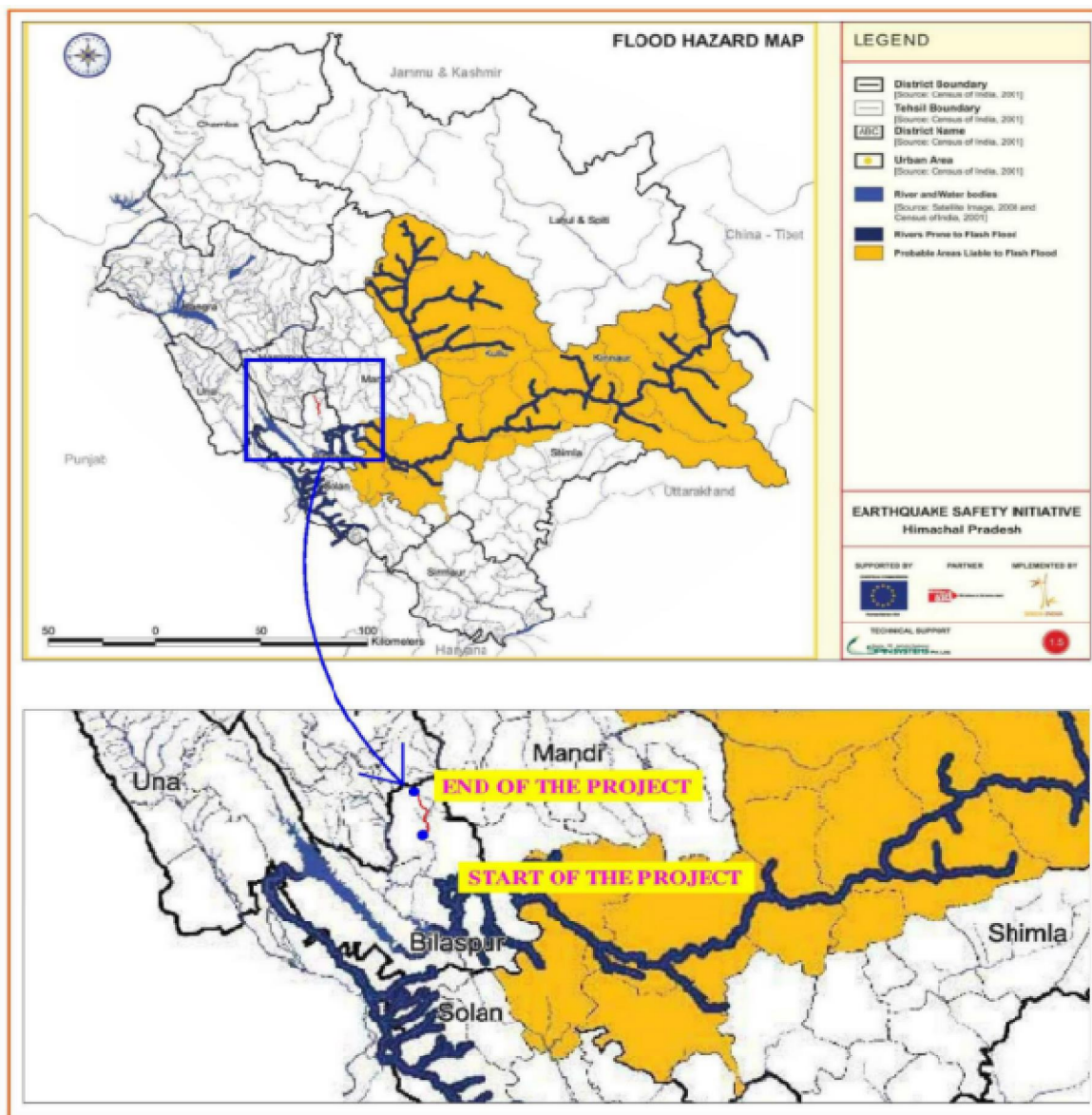
**Figure 3.19: Wind Hazard Map of Bilaspur District**  
 (Source :- <https://ndmahimachalpradesh.>)

**Flood Zones**

139. The project road lies in the range of 248-1141 m. The maximum and minimum elevation of the project road is 981m at km 13+300 and 697 m at Km 0+900. Further, 3 seasonal streams (Table 3-34) were identified along road that flows across and drains the water during rainy seasons. Hence, the project area is not prone to flash floods as can be seen in Flood Hazard Map (Figure 3.20).

**Table 3-34: Seasonal Streams along the Project Road**

S.No	Chainage	Side
1	0+750	LHS
2	0+900	LHS
3	0+850	LHS



**Figure 3.20: Flood Hazard Map**  
(Source :- <https://ndmahimachalpradesh.gov.in>.)

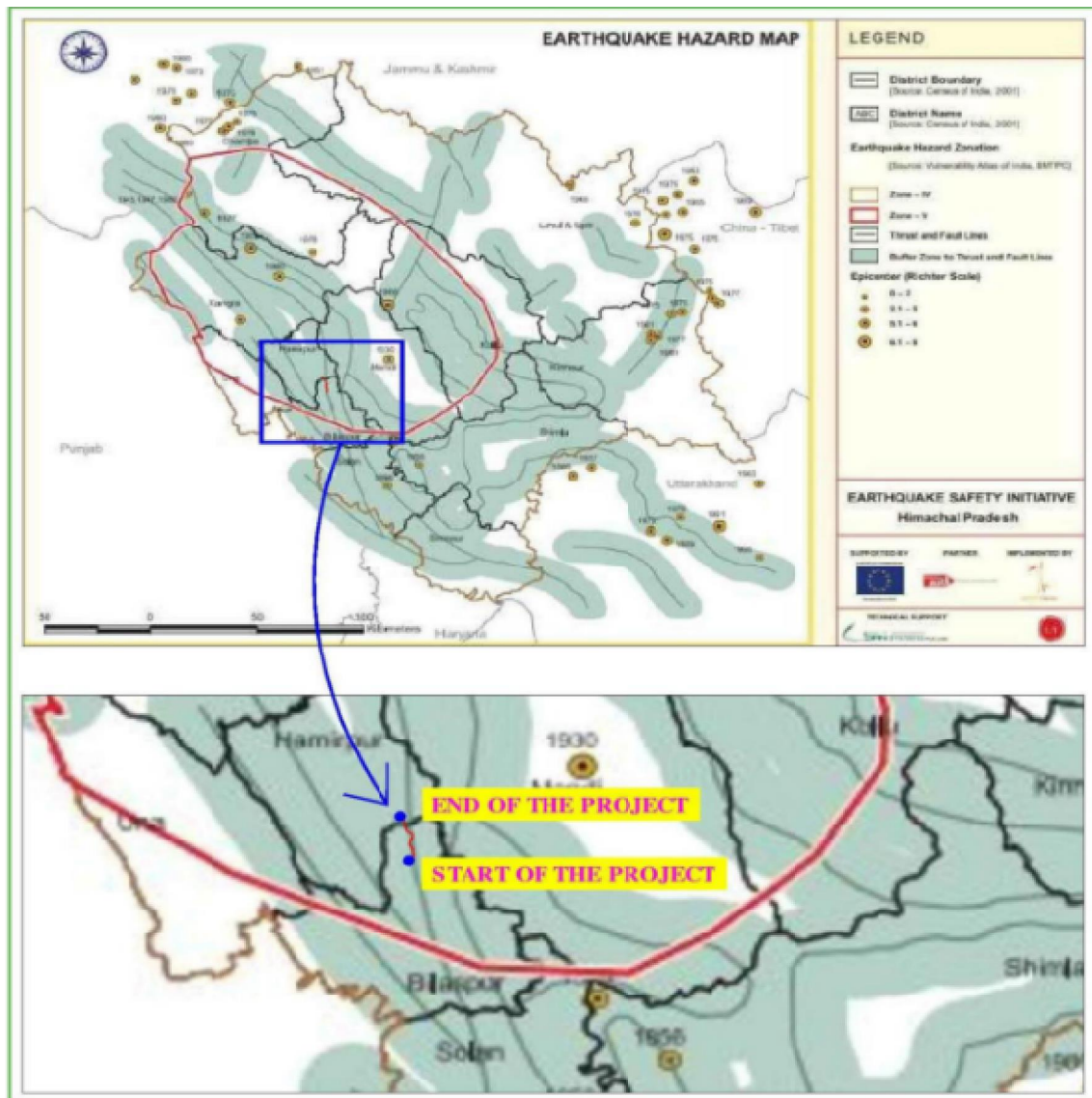
### Earthquake Zones

140. In general, India is divided into 4 seismic zones (II, III, IV, V); Zone II being the least active seismic zone, whereas Zone-V is the highest seismic zone. In Himachal Pradesh, a total of 35 earthquake (table 3-36) events were recorded between 2018-19 with magnitude varying from

2.8 to 4.5 at Rector scale. During these periods, the frequency of earthquake is recorded most at Chamba (14 Nos.) and Kinnaur (7 Nos.) districts. No earthquake reported in project district, though Mandi is closes epicentre (with three events and magnitude range 3.2 ó 4.2 at rector scale) to project roads. Further, as per earthquake hazard map (Figure 3.22) the project road falls under Zone óV, which is at High risk and warrant for earthquake resistant designs for structures.

**Table 3-35: Earthquake Zones of India**

Zone	Intensity
Zone - V	Very High risk - Intensity IX
Zone -IV	High risk - Intensity VIII
Zone - III	Moderate risk - Intensity VII
Zone - II	Low Damage Risk - Intensity VI
Zone - I	Not in Use



**Figure 3.22 Earthquake Hazard Map**  
 (Source: - <https://ndmahimachalpradesh.gov.in>)  
 Table 3-36: List of Earthquake Zones of HP (2018-2019)

S.No	Date	Time (UTC)	Lat (deg. N)	long (deg.E)	depth (km)	Magnitude	District/ Region
1.	2019-12-03	14:08:54	32.7°N	76.2°E	5	3.2	Chamba
2.	2019-10-31	07:14:58	31.5°N	77.0°E	10	3.4	Mandi
3.	2019-10-29	06:01:47	32.7°N	76.4°E	5	3.4	Chamba
4.	2019-10-14	16:53:04	1.2°N	77.8°E	5	3.0	Shimla
5.	2019-09-07	18:35:30	2.9°N	76.1°E	5	3.4	Chamba
6.	2019-07-29	03:33:53	32.8°N	76.4°E	20	4.3	Lahaul-Spiti
7.	2019-07-24	19:17:12	32.6°N	76.1°E	10	4.0	Chamba
8.	2019-07-23	12:11:14	31.8°N	78.4°E	5	3.3	Kinnaur
9.	2019-07-10	14:25:26	31.4°N	77.9°E	10	3.1	Shimla
10.	2019-05-02	23:02:31	31.3°N	77.0°E	10	4.2	Mandi
11.	2019-03-08	06:31:56	31.8°N	78.3°E	10	2.8	Kinnaur
12.	2019-03-01	06:10:15	32.7°N	76.5°E	5	3.3	Chamba
13.	2019-02-22	01:47:20	31.8°N	78.2°E	10	3.5	Kinnaur
14.	2019-02-13	02:05:51	32.2°N	76.4°E	5	3.5	Kangra
15.	2019-02-05	14:03:44	31.7°N	76.8°E	15	3.8	Mandi
16.	2019-02-05	10:22:43	32.3°N	76.4°E	5	3.1	Chamba
17.	2019-02-05	10:21:04	32.3°N	76.4°E	5	3.2	Chamba
18.	2019-01-22	10:34:35	32.5°N	76.4°E	10	3.5	Chamba
19.	2019-01-12	07:01:34	32.7°N	76.0°E	5	3.3	Chamba
20.	2018-11-30	19:22:32	31.5°N	77.6°E	10	3.0	Kullu
21.	2018-09-15	06:41:21	31.8°N	78.5°E	10	3.4	Kinnaur
22.	2018-09-05	19:05:15	32.8°N	76.0°E	10	3.4	Chamba
23.	2018-07-30	19:48:51	32.3°N	76.3°E	10	3.1	Kangra
24.	2018-07-27	08:12:31	32.2°N	76.3°E	10	3.8	Kangra
25.	2018-07-25	13:22:12	32.2°N	76.2°E	10	2.9	Kangra
26.	2018-06-25	19:57:45	32.8°N	76.0°E	10	3.3	Chamba
27.	2018-06-22	21:07:23	32.9°N	76.1°E	5	3.0	Chamba
28.	2018-06-16	22:06:35	31.4°N	77.7°E	5	3.2	Shimla
29.	2018-06-14	10:15:50	32.5°N	76.1°E	5	4.5	Chamba
30.	2018-05-25	07:22:50	31.6°N	78.2°E	10	3.5	Kinnaur
31.	2018-05-24	21:05:22	31.8°N	78.4°E	10	3.6	Kinnaur
32.	2018-05-22	12:35:00	31.1°N	77.8°E	10	3.6	Shimla
33.	2018-05-21	10:51:05	31.6°N	78.4°E	5	4.1	Kinnaur
34.	2018-05-12	03:57:38	32.3°N	76.6°E	05	3.0	Chamba
35.	2018-01-09	12:55:34	32.1°N	75.7°E	10	3.0	Kangra

[http://www.imd.gov.in/pages/earthquake\\_prelim.php](http://www.imd.gov.in/pages/earthquake_prelim.php)

### ***Vulnerability Status of Project***

141. As per state disaster management authority (Fig 3.23), considering various risk due to natural calamities, the overall vulnerability of Bilaspur district is stated as Moderate. However, cognizance of project road traverses in severe to very high landslide and being located in high seismic zone area poses risk during construction - the vulnerability is stated Substantial for project road.



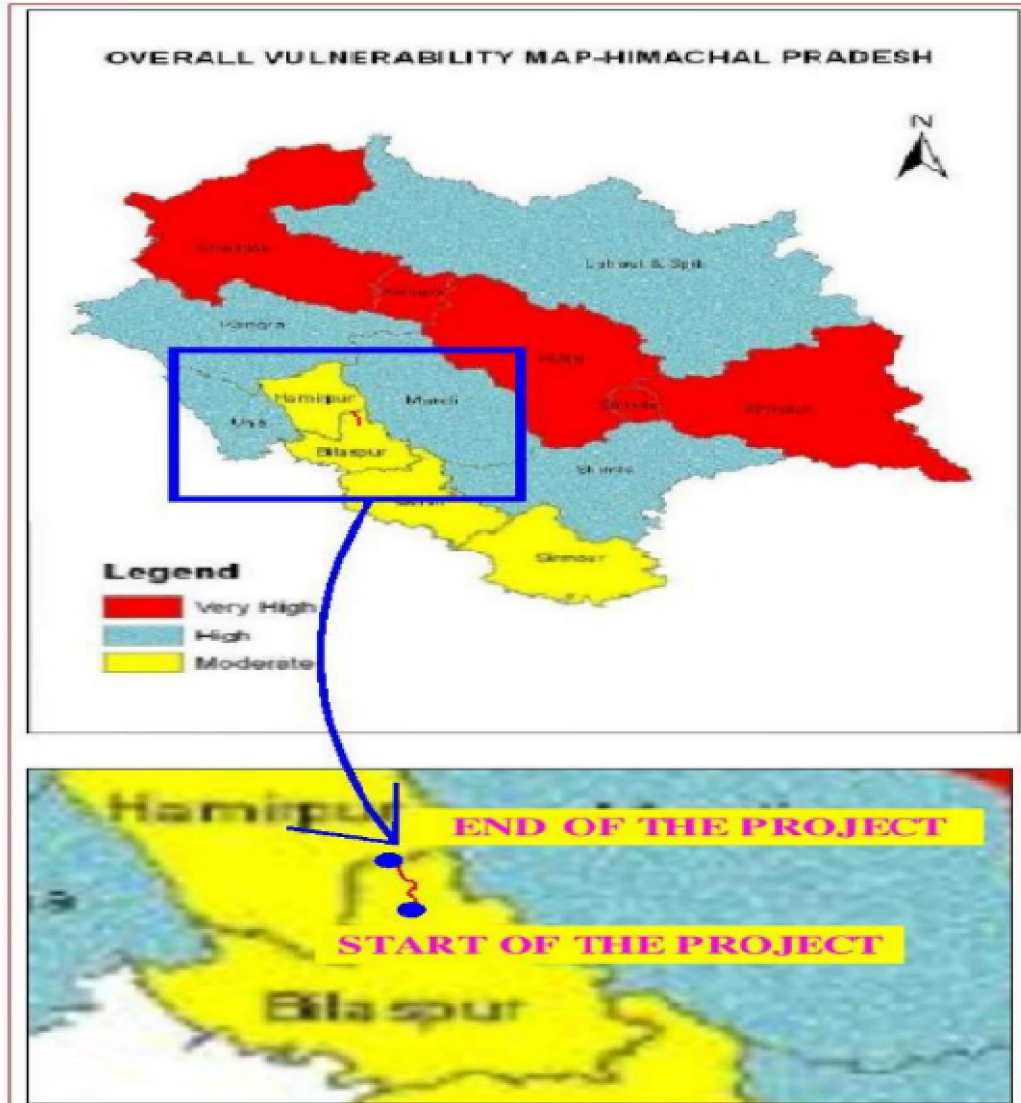


Figure 3.23: Overall Vulnerability Map  
 (Source:- <https://www.hpsdma.nic.in/>)

## CHAPTER 4 – STAKEHOLDER CONSULTATIONS & INFORMATION DISCLOSURE

142. This chapter summarizes public/stakeholder consultations conducted as part of environmental and social impact assessments for the proposed road construction between Dadhol to Ladrour. Consultations were also held with communities at congested locations with impacts on buildings and where major common property resources are getting affected- such as any religious structures etc., besides institutional stakeholders were consulted. Additional consultations with community women, adolescent girls, vulnerable populations (SC, ST etc), local Panchayat members, women Pradhans, Anganwadi workers, teachers and NGO activists were undertaken as part of GBV risk mitigation plan. Appendix 3 presents the list of stakeholders consulted.

143. During the consultation the people were informed about:

- i) HPSRTP, Phase-II, including a background on HPSRTP Phase 1 project;
- ii) The rural and urban design broad cross sections of the roads;
- iii) The people were informed about the ESF of World Bank 2016, GoI land Acquisition Act of 2013, provisions of compensation as per GoHP regulations and the compensation and assistance therein and asked suggestion for improvement so that their suggestions can be incorporated by the project authority for the proposed HPSRTP project II;
- iv) Proposed safety measures for the road;
- v) Likely positive and negative impacts of the road

144. The Consultations elicited from the people the following:

- i) Their views on the project especially the likely adverse impacts;
- ii) Possible mitigation measures in case of adverse impacts;
- iii) Means of better delivery of compensation and assistance;
- iv) The assurance from the project authority not to marginalize people by depriving them from their livelihood.
- v) Provision of infrastructure such as drinking water and toilets.

145. Through public participation, stakeholder's view points and suggestions were captured as an input to the technical design, which were duly considered, and all the suggestions were incorporated in the project design to the extent feasible and /or warranted.

**Table 4.1– Summary of consultations with Affected Parties**

S.No	Summary of Queries, Concerns and suggestions	Responses provided
<b>Queries</b>		
1.	People wanted to widen the road equally from the centerline. They wanted know what compensation will be paid to title holder and non -title holders.	Current designs were explained that considered minimization of impacts
2.	Those losing house wanted to know what alternative would be provided by the project. Most of the people asked for alternative house/site.	Informed about Resettlement Policy Framework and its provisions being prepared by HPRIDC.
3.	The people asked about safety measures in hospital and school zones.	Safety provisions such as speed breakers, signages were explained
4.	Road development will improve the socio-economic conditions of the people. During construction phase also people will be benefitted as they will get jobs.	Preference to local labour based on skill set required in project.

<b>Table 4.1– Summary of consultations with Affected Parties</b>		
<b>S.No</b>	<b>Summary of Queries, Concerns and suggestions</b>	<b>Responses provided</b>
<b>Concerns</b>		
5.	The Road is congested and requires improvement	Noted.
6. 7.	In Dadhol Chowk there are about 15 houses getting affected. The people asked to minimize the impact. .	Avoidance of impacts were explained and principles to be followed were explained.
8.	The temple in the middle of road (Ladrour) must not be damaged, rather should be enhanced by provisions of some sitting arrangements and drainage pipe from water sink. Almost people from 50 different villages come to visit temple.	
9.	There should be no loss to the properties of the people, as adequate width is already available on roadside.	
10.	The people asked the project authority not to impact the temple located at the chowk, as it was considered holy place in the village, and was used for various religious and community purposes.	
11.	The school campus will become prone to an accident during construction and operation phase. Some measures must be provided to avoid that.	Design will include traffic calming measures.
12.	This school (Model School) is very old and has been existing for 60 years. Any property of the School, if damaged must be restored.	The resettlement principles and policies under consideration in the HPSRTP was explained. They were assured all types of losses or impacts would be adequately mitigated
13.	Sometimes, a level difference on black top (bituminous coat) and shoulder become big in due course of time and this also leads to accidents.	Instead of gravel or earthen shoulder, sealed shoulder is proposed.
14.	Participants suggested that every affected religious property (partially or fully) must be modified/ relocated and enhanced properly prior to the commencement of work.	Participants were assured that any religious structure affected or requiring relocation will be done in consultation with communities at identified sites.
15.	They have requested not to disturb the settlements in the build-up area and proposed to take bypasses. As per the social survey there are approximately 500 persons getting affected. The people requested to avoid the widening.	Communities were assured designs would take into consideration impacts, safety and traffic population. There was no clear consensus from the farmers who would be losing their land for the bypass/realignment.
16.	There have been issues raised on the compensation not given to some families for the acquired lands.	Communities were assured that construction activities will commence only after they are paid for the impacted assets
<b>Suggestions</b>		
17.	Provisions for parking are must in the city area.	Parking areas would be considered as part of design depending on availability of space/land
18.	The quality of the material used for road construction should be good and there must be a proper supervision.	Noted.
19.	Drainage must be provided on upgraded road.	Noted.
20.	Bus stops including bus lays must also be provided on improved road and should be disable friendly by way of providing ramp.	It will be considered under common property resources by executing agency ó location though would depend on space available.
21.	There must be a provision of street lights upto 300 m, where a controlled atmospheric system (CAS) is under construction by HPMC (HP Horticulture Produce Marketing & Processing Corporation).	Noted.

<b>Table 4.1– Summary of consultations with Affected Parties</b>		
<b>S.No</b>	<b>Summary of Queries, Concerns and suggestions</b>	<b>Responses provided</b>
22.	Executing agency should take up the structural works (bridges and culverts) in priority during the early phase of the project cycle or otherwise these works mostly gets delayed.	Noted.
23.	Debris can be disposed off in the ground and it can be raised up but decision for the same will be taken by SMC (School Management Committee).	Community will be reach out during construction to identify such area.
24.	Majority of the people living along the project corridor depend on water tank/ hand pump for drinking water and disposal of these will especially affect women folk.	A thoughtful consideration is required by the project authority to relocate/ install required number of water tanks/ well/ hand pumps at identified locations.
25.	Due to acquisition of agricultural land, farmers will get affected; people asked for suitable livelihood support and compensation for these category of affected persons	The resettlement principles and policies under consideration in the HPSRTP was explained. They were assured all types of losses including loss of livelihoods would be adequately mitigated
<b>On specific issues</b>		
26.	The bridge near Dadhol is an accident prone area.	Design will explore road safety measures needed at this location.
27.	Junction at Dadhol must be developed.	Design will explore junction improvement and road safety measures needed at this location.
28.	The Religious Structure at the Dadhol junction attracts pilgrims from 50 villages and requested not to disturb.	Community will be consulted before finalising design at this location.
29.	There is a problem of noise pollution and it needs to ensure that noise barrier be provided to control the same	Noise barrier being considered for such sensitive locations.
30.	Strength of the Model School Bharari is about 400 hundred and in front of the school gate there is a hospital. This has made the junction very prone to an accident. To ensure safe access of the people into school and hospital, it is required that a foot over bridge be provided here.	Design will explore road safety measures needed at this location.
31.	The compensation rates should be as par at market rates.	Compensation for land, structure and other properties shall be paid as per RFCTLARR Act 2013 and Government of Himachal Pradesh Land Acquisition Rules and as per rates determined the GoHP Standing order for private negotiations, and as per World Bank policy and standards
32.	Pedestrian crossing, cattle crossing should be provided at every habitation. Provision for foot over bridges /under pass at the sensitive areas.	It is not possible at every location but as per the design consideration, safety measures, cost considerations it will be provided where it is very necessary. No under-passes/foot over bridge propose.
33.	Additional assistance for employment/ income restoration for locals	Employment in the road construction work as skilled, semi- skilled and unskilled workers to be made available. Preference will be given to locals in road construction work. During the operation stage, as per the HPRIDC, direct and indirect employment will be generated in the rural areas.
34.	Road side drains are not working properly as it has been choked or damaged at some locations. Cross drainage should also be provided.	At every urban location and slopes/hilly region proper drainage system has been recommended.

<b>Table 4.1– Summary of consultations with Affected Parties</b>		
<b>S.No</b>	<b>Summary of Queries, Concerns and suggestions</b>	<b>Responses provided</b>
35.	Lack of public toilets (ladies/toilets) at market places as well as near bus stops	It will be considered under common property resources by executing agency & location though would depend on space available.
36.	People want more consultation during project implementation and want to participate in the project	Public consultation will continue throughout the project cycle.

**Summary of incorporation of key concerns:**

- Compensation and assistances aspects: suitable compensation measures at replacement costs and other support measures are included in the RPF and will be used in the RAP
- Minimization of impacts: Some key measures included: road design has considered two design configurations in view of constraint of right-of-way, to minimise environmental and social impacts. The proposed two type of configurations were: intermediate lane + sealed shoulder on both side + side drain on hill side, and intermediate lane + sealed shoulder on valley side + side drain on hill side. Other measures reduction of the shoulder widths at built up/ village sections where the road width is insufficient for expansion; reducing the width of the corridor of impact, or modifying design based on rural and urban areas
- Replacement of affected community structures: Designs and alignment changes have ensured that assets such as temples have been largely avoided with impacts only to the boundary wall of only one temple.
- Safety concerns: Smoothing of curves and bends for better geometric design; sealed shoulders are provided to the extent possible to facilitate movement of non-motorised traffic; reducing design speed in built up areas; minimized the raising of roads in urban areas to prevent water seepage to the houses adjoining the roads, etc. Additionally, noise barrier is propose at school and hospital locations to reduce noise level during operation.
- Parking aspects: Parking locations have been provided depending on availability of space/land; provision of toilets at key bus shelters.

## CHAPTER 5 – ANALYSIS OF ALTERNATIVES

### INTRODUCTION

146. In accordance with the principle of mitigation hierarchy for management of E&S risks and impacts, analyses of alternatives have been considered to identify and selection of optimal design solution with positive benefits and reduces potential direct negative E&S impacts due to proposed widening/upgradation of Ladrour-Dadhol corridor. The design has considered technical aspects on safety, geometric improvements in view of future traffic projections, but has also co. This chapter focuses on 'With' and 'Without' project scenarios and also minimization alternatives for informed decision making of final road design.

#### 5.1. With and Without Project Alternatives

##### *Without Project Scenario*

147. The road has many roadside settlements and the traffic flow is seriously impacted by severe conflicts between the local and the through traffic. This is further compounded by the various land use conflicts, in terms of uncontrolled development along the road and the encroachments onto the ROW.
148. Both population growth and increase in traffic volumes and the economic development along the corridor would continue to occur and will worsen the already critical situation. The existing unsafe conditions and the adverse environmental consequences in terms of the environmental quality along the road would continue to worsen in the absence of the proposed improvements. Moreover, if it is decided not to proceed with the project, then the attendant reduced socioeconomic development of this remote, relatively poorly connected area cannot be justified. Therefore, the no-action alternative is neither a reasonable nor a prudent course of action for the proposed project, as it would amount to failure to initiate any further improvements and impede economic development.

##### *With Project Scenario*

149. The 'with project scenario' is found to have a positive impact in the long run on social, environmental, economic and financial issues. This scenario includes the widening to intermediate lane with sealed shoulders of the existing corridor as envisaged in the project objectives.
150. The scenario is economically viable and will improve the existing conditions. It, would thereby, contribute to the development goals envisaged by the Government of Himachal Pradesh and enhance the growth potential of the area.
151. To avoid the large-scale acquisition of land and properties, the project envisages the possible laning of the OSR by adopting the Corridor of Impact rather than the whole available/existing ROW.
152. The potential impacts on the various environmental components can be avoided through good environmental practices. Wherever avoidance of negative impact has not been possible, appropriate mitigation and enhancement actions will be worked out to effectively offset the environmental damages inflicted due to the project. A Comparative assessment of the 'with and without' project scenarios along with anticipated benefits with project scenario are presented in Table 5-1.

<b>Table 5-1: "With and Without" Project Scenarios – A Comparative Assessment</b>		
<b>Component</b>	<b>"With" Project Scenario</b>	<b>"Without" Project Scenario</b>

Highway Geometry	Intermediate lane is being developed with geometric improvements	Existing Single lane carriageway with poor geometry
Congestion in Settlements	Improved carriageway separated with footpath with railing in built-up area reduces interaction of pedestrian with through traffic resulting to reduction in vehicular emissions, reduce travel time and vehicle operating cost. This in turn contributes to lowering of GHG emission; and may improve people/public health due to no or low exposure period.	Congestion and frequent vehicle stoppage due to mixing of local, pedestrian and through traffic will increase localized accumulation of vehicular emission with potential impacts on human health and contribute to generation GHG emission.
Felling of road side trees	Felling of both old and young trees. Old and weak trees near the road edge shall be a road hazard and shall be felled. Thrice the number of new young and healthy saplings to be planted as compensation.	No felling of trees. Contribute in maintaining micro-climatic conditions of the area. The old trees may become a safety hazard to the road users with passage of time.
Pedestrian safety	Along the settlement stretches with significant pedestrian traffic, Service road has been provided besides pedestrian (zebra) crossings and pedestrian underpasses.	Pedestrian safety an issue of major concern especially along the settlements and congested sections.
Road Safety Measures	Provision of proper road markings, zebra crossings, service roads, crash barriers and improvement of geometry to reduce accidents.	Accident incidents shall rise with an increased traffic volume.
Environmental Quality	Development of road in urban settlements improves environmental quality within the urban areas due to lowered pollution levels and relieving of congestion. Besides an aggressive tree plantation and provision of enhancement features shall not only provide aesthetics but also improve the quality of air.	Poor due to congestion and high emission levels because of slow movement of traffic. A further deterioration is expected due to Increase in traffic volumes and further congestion.
Drainage	Will be improved due to reconstruction of culverts /bridges/side drains with adequate hydraulics.	These issues remain un-addressed without the project
Road Side Amenities	Appropriate road side amenities to be provided at various locations along the corridor.	Not adequate.
Wayside Facilities	Wayside facilities proposed at several locations, where necessary like rest areas, with appropriate facilities for recreation, motels, road patrol, road public telephones etc.	Not of adequate standards, quality and number.
Environmental Enhancement	Enhancement of landslides/water bodies, community and cultural properties and also water front in an aesthetic manner.	No enhancement measures involved.
Development	Higher potential for development due to improvement in access and consequent increase in connectivity	Development activities will be greatly hampered by the gross inadequacy of infrastructure.
Financial and Economic Analysis	Project financially viable as per the HDM model. The cost of operation and maintenance, VOC and other ancillary cost are moderate to low	The cost of maintenance while catering to the projected higher traffic, accident cost, Vehicle operating cost & travel time cost shall be higher.

## 5.2. Environmental and Social considerations during design

153. Public Consultations were held with the local people, likely project affected population, community leaders and government officials where the negative impacts are likely to be high in order to find out the alternatives to minimize the impact. With the help of the survey and consultations and inputs from the engineering section the mitigation measures have been worked out. Mitigation measures largely focused on settlement areas along the project roads specially villages/towns along the road or zones of maximum potential impacts. The recommendations of the stakeholders have been incorporated in designs, which include the following:

- At built up/ village sections where the road width is insufficient for expansion, design alternatives include options for realignments and for modifying the proposed road designs, such as reduction of the shoulder widths were incorporated. This helped to further minimize impacts on structures and also livelihoods for those residing and operating en-route. This also helped to minimize impacts on existing shrines and worship places;
- Avoided unnecessary displacement by modifying project alignments, reducing the width of the corridor of impact, or modifying design based on rural and urban cross sections.
- Provided access to businesses and residential units that would be otherwise impacted by construction;
- Smoothing of curves and bends for better geometric design. In case where it affects settlements, alignment changes were incorporated.
- Sealed shoulders are provided to the extent possible to facilitate movement of non-motorised traffic.
- Reducing design speed in built up areas;
- Provided speed reductions near schools and hospitals to enhance safety
- Minimized the raising of roads in urban areas to prevent water seepage to the houses adjoining the roads and;

Impact minimization through Design Option and optimum reuse of muck generated is described below:

154. As part of design intervention, road design has considered six design configurations in view of right-of-way constraints, technical requirements and to minimise environmental and social impacts. The fixing of propose road configuration within existing right-of-way either through eccentric or concentric widening schemes avoided need for additional land and minimised social and environmental impacts vis-a-vis cutting of trees in majority of road length.



155. Exception being between km 6.500 to km 6.800, where the right-of way have been encroached on both sides; sub-standard road geometry due to sharp curves, narrow road (single lane); built-up area; traffic congestion induces road safety; 2 schools one on right and another on left side (encroached 3m of RoW); private buildings on right side (Fig 5.1 and Fig 5.3).

156. Government Senior Secondary School at Bharari (Km 6+470) on LHS has encroached 3m wide strip of RoW by constructing boundary cum retaining wall, school utility buildings like drinking water counter, kitchen (mid-day meal scheme), seating arrangement, basketball court and toilet blocks. Consultation with school authorities acknowledged encroaching of right-of-way and has



agreed to allow road construction with condition to reconstruct affected structures, which project has agreed and shall be constructed prior to starting civil work in this section.

**Table 5.3 – Analysis of Alternatives**

Chainage	Option 1 – Following Existing Alignment	Option 2 – Realignment on Left Side (Fig 5.3)
Km. 6+500 to Km. 6+800	<p>The existing RoW is 12 meters encroached on both sides, as a result approx. 6m roadway width available.</p> <ul style="list-style-type: none"> <li>• There exists a strong public resistance and insisting to confine within available roadway to avoid the impact on 8 structures (shops/resident buildings), will need resettling affected people and also involve loss of livelihood</li> <li>• Secondly, the road geometry would not improve and still remain bottleneck; mix flow of fast and slow traffic ó road safety hazard, mainly students and pedestrian ó <b>High Safety Risk even after improvement.</b></li> </ul>	<p>Local public have very less resistance to have restricted RoW in the built-up location, where the impact will be minimum.</p> <ul style="list-style-type: none"> <li>• Shift centerline on Left side towards (by 3-5.5m for 250m) Government Senior Secondary School impacting retaining wall, washroom, water kiosk, and trees ó <b>These shall be</b> compensated for reconstruction of impacted structures along with retaining wall</li> <li>• Avoided impact to all the 8 structures with minimal damage ó no resettlement and loss of livelihood</li> <li>• Improved road geometry with footpath over drain with railing on both sides, wider carriageway, segregation of fast- and slow-moving traffic, safety of students and pedestrian, lesser traffic congestion (Fig 5.2).</li> </ul>
<p><b>Conclusion:</b> The impacts of shifting the centreline on left side though will affect many existing structures of Government School, but these impacts would be mitigated through reconstructing of these affected structures. In addition, the shifting of alignment is likely to improve the road geometry and will result to safer road. Hence, considering technical, economical, environmental and social benefits, <b>the Option 2 has been finalized.</b></p>		

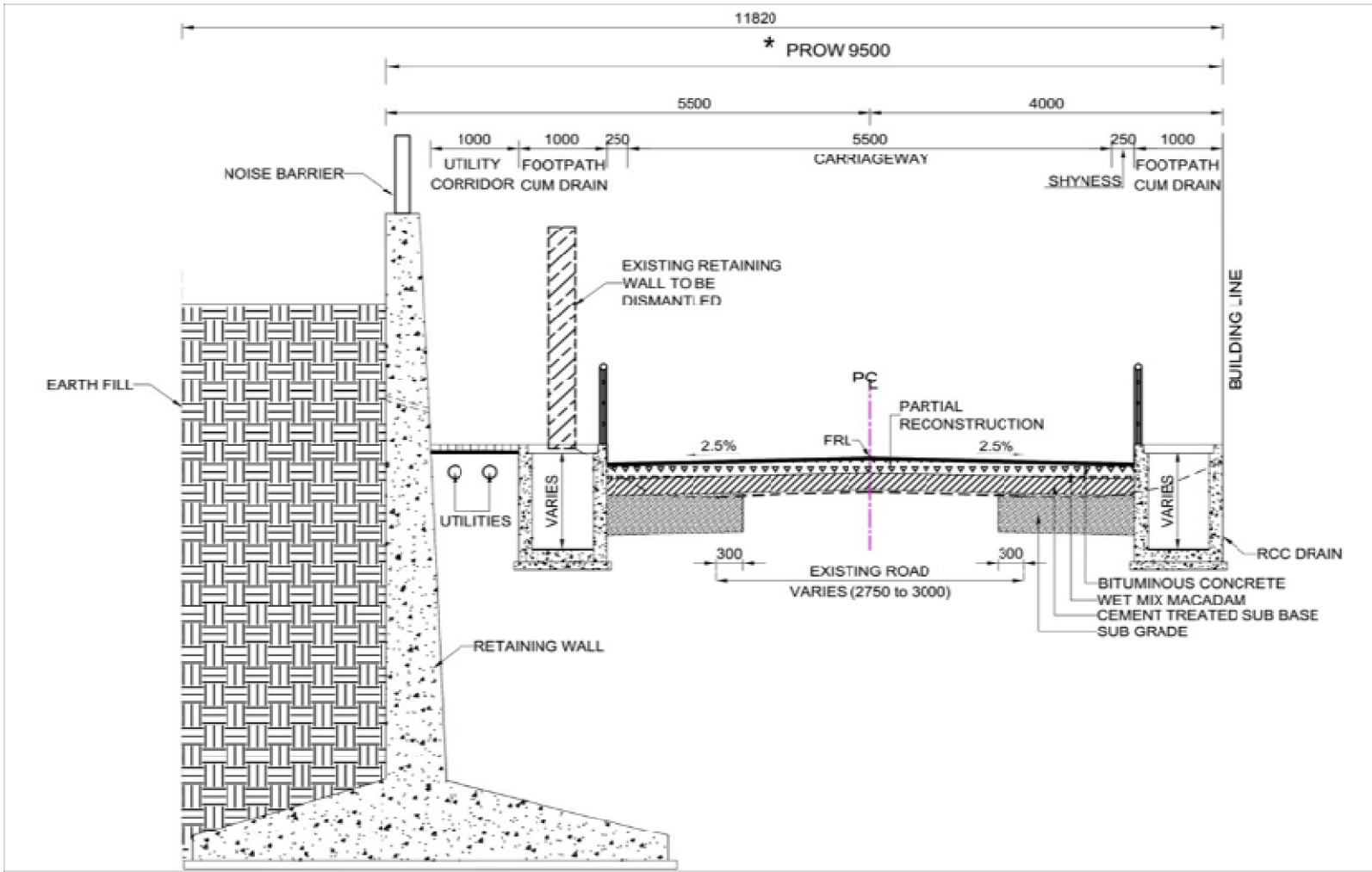


Fig 5.2: Propose cross section between KM 6.500 to KM 6.800



Figure 5-3: Evaluation of Alignments and impacts of Project road near Govt Model School at Bharari (km 6.500 to km 6.800)

## CHAPTER 6 ENVIRONMENT AND SOCIAL RISKS AND IMPACTS AND MITIGATION MEASURES

157. The project will have both positive and adverse social impacts on the project road population. Since the project involves the upgradation of the existing road. The improvement/up-gradation of 13.5 Km of road of HPSRTP project will have direct impact on the village communities and other neighboring villages. Ribbon development / Congestion along the state highways and other roads are an uncontrolled Phenomenon and the project roads are no exception. These account for the most critical areas for this assessment. The assessment has also been done through a participatory process, involving the local communities, the likely PAPs, community leaders, Gram Pradhans, district level authorities, and various government organizations during impact assessment survey. This process provides the means by which public concerns, needs and values has been identified so that views of the likely affected and concerned people are reflected while working out the alternatives. The basic purpose of the assessment of likely loss and impact on assets are as follows:

- i. to understand type, nature and extent of loss due to upgradation and rehabilitation of the project;
- ii. the inventorisation will help in providing the input from environmental and social perspective to find out the alternatives; and
- iii. this will also provide the input to prepare strategic issues while conducting public consultations/Focus Group discussions at the DPR preparation stage
- iv. To adopt a mitigation hierarchy approach to the project's E&S risks i.e. a) anticipate and avoid risks and impacts; b) minimize or reduce risks and impacts to acceptable levels, if not avoidable; c) once risks and impacts have been minimized or reduced, mitigate; and (d) where significant residual impacts remain, compensate for or offset them, where technically<sup>2</sup> and financially<sup>3</sup> feasible;
- v. To help identify differentiated impacts on the disadvantaged or vulnerable and to identify differentiated measures to mitigate such impacts, wherever applicable
- vi. Ensuing sections summarize the environmental and social risks and impacts likely due to the project road by each relevant standard (ESS 2-8), followed by the mitigation measures considered.

6.1 í related to Assessment and Management of E&S risk and impact (ESS 1):

### **Disadvantaged and Vulnerable persons**

158. Project shall define the following as vulnerable groups/persons: Scheduled Caste. ST, family/household headed by women/female, physically challenged, Below Poverty Line (BPL) families; widows; and persons above the age of 65 years irrespective of their status of title (ownership). Vulnerable groups would also include those farmers who (after acquisition of land) become small/marginal farmers. As per Census and socio-economic survey there are 5 Schedule Caste and 1 Schedule Tribe family who shall be affected by the project. As per Census and socio-economic survey there are 5 Schedule Caste and 1 Schedule Tribe family. Needs and concerns of the local people including the disadvantaged group like physically challenged people were considered such as all remodeled bus stops shall have universal access (ramp) with railing for physically challenged persons (in accordance with rights of persons with disabilities act, 2016); provision of public amenities like toilets at bus shelter, drinking water provision of street light in settlement areas, road safety during construction particularly at socially sensitive locations such as hospitals, schools, etc.

159. **Mitigation measures:** These concerns and needs of vulnerable groups will be addressed through a mix of measures that includes additional assistances as part of R&R measures. Mitigation of impacts on such vulnerable persons will be undertaken through provisions and measures in the Resettlement Action Plan. Besides other location specific measures, as stated in the ESMP, will be devised during the construction stage e.g. provision of temporary access to facilitate movement for those physically challenged or any other measures in The Rights of Persons with Disabilities Act, 2016.

## 6.2 ... relating to Labour and working conditions (ESS 2)

160. HPRIDC shall contract agencies to undertake civil works, agencies/firms to support core-functions; primary suppliers of material/equipment and other implementation support partners, and these could be from anywhere in the country or outside. Construction works will require labor force and associated goods and services. Based on the construction package sizes and the project implementation schedule, the estimated construction workforce/manpower is estimated in the Table 6.1.

**Table 6.1: Project work force requirement during construction phase**

Designation	Nos.
Project Managers	2
Dept. Project Managers	4
Specialized Engineers	5
Site Engineers	6
Mechanical Engineers	7
Technicians	15
Supervisors	6
Skilled and unskilled workers (labors)	510
Other supporting staff	5
Total	560

161. The package wise construction contractors are expected to establish construction camp sites, material stack yards, hot mix plants and workforce camps at suitable and pre-determined /approved sites along the respective road corridors and or nearby places. The accommodation for the skilled and unskilled labours will be provided at the work force camps, whereas all other category of construction workforce (supervisors and above rank) will be provided with rented accommodation at nearby settlement areas/towns.

162. In addition, this influx of labor may affect the project area adversely in the terms of additional burden on public infrastructure such as health services, utilities such as water and electricity, housing and social dynamics. Other related issues could be increased risk of spread of communicable diseases, and increased rates of illicit behavior and crime.

163. The estimated land requirement for camp site(s) will be 1.1 hectare (2.5 acres) depending upon land availability. The impacts on this land used for establishing camp sites will be limited to the construction phase and impacts arising due to such change in land use will for limited period (construction phase) will not be significant and transitory in nature, provided the sites are managed and restored to its previous state, after the project completion.

164. During the mobilization period, the contractor will be required to prepare contractor's ESMP, OHS plan, Water and Waste Management Plan, Influx management Plan, Workers camp

management plan, CHS Plan, Transport (or road safety) management Plan, Quarry/borrow area management plan, establishment of GRM for labour and Site restoration Plan among others in accordance with the GoI and/or IFC/WB/EBRD workers Accommodation guidelines. All such plans prepared by contractor will be reviewed and approved by the PMC and HPRIDC, prior to commencement of construction works.

**Project shall comprise the following types of workers:**

165. **Direct workers:** Direct workers will include the project managers and supervisors, who are employees of HPRIDC, deployed for HPSRTP. The estimated number of direct workers is not likely to exceed 30 as per existing institutional arrangements and practices of HPRIDC for all its units comprising project construction unit, technical unit, environmental and social management unit (ESMU), among others.
166. **Contracted workers:** All the work force deployed by the Contractors and the Project Management Consultant (for all packages) under the HPSRTP will be deemed to be contracted workers. The Contractor(s) might further engage multiple subcontractors. All work force of all such sub-contractors will be also deemed to be contracted workers. These will also include Migrant workers as all the required labor will not be fully supplied locally for a number of reasons, such as worker unavailability and lack of technical skills and capacity. In such cases, labor force (total or partial) needs to be brought in from outside the project area. Influx of migrant labor from other states for construction works has been a norm in the state and is likely to continue in this project as well resulting in potential gender-based violence (GBV). Past experience during implementation of Phase I - HPSRP, significant percentage number of migrant workers (more than 60%) from adjoining states of Himachal Pradesh were used and all such migrant workers were sourced through labour contractors.
167. **Migrant Workers:** The migrant workers are that, who are employed for the Project but does not belong to the Project region and are not normally expected to return to their places of residence after work shift hours. The number of migrant workers in any contract package, would depend on decisions made by contractors, based on the locally available workforce and their skills for Project construction requirements. The migrant workers could be at all levels and include unskilled and semiskilled construction labour and could even comprise combination of male and women labour force. The migrant workers are either directly engaged by the contractor or through labour contractors, who supply the work force to as per the needs of the contractors. As workers on infrastructure projects are likely to be predominantly young and male, who are either single or are separated from their family or spouse, and are outside their habitual sphere of social control, the risk of sexual harassment for local women (and co-women workers, if any), is likely to be higher, in particular for younger women and girls, but also boys. In addition, this influx of labor may affect the project area adversely in the terms of additional burden on public infrastructure such as health services, utilities such as water and electricity, housing and social dynamics. Other related issues could be increased risk of spread of communicable diseases, and increased rates of illicit behavior and crime.
168. **Primary supplier workers:** There will be primary suppliers such as those providing goods and materials e.g. provider of aggregate material for road construction, IT services, security services outsourced through by the contractor. Such workers will support the project at different stage.
169. **Community Workers:** Community workers may be employed by the contractor in relation to this Project from local sources particularly for supporting Nature-based solutions/measures (bio-engineering) towards slope stabilization workers. However, a better estimate would be known only at the time of construction.

170. **Potential labor risks:** Following are the potential risks associated with workers/labours engaged in road construction works.

- i. Safety issues, like injuries/accidents/ fatalities leading to even death, while at work;
  - ii. Short terms effects due to exposure to dust and noise levels, while at work
  - iii. Long term effects on life due to exposure to chemical /hazardous wastes
  - iv. Inadequate accommodation facilities at work force camps, including inadequate sanitation and health facilities
  - v. Non-payment of wages by Employer
  - vi. Non-payment of benefits (compensation, bonus, maternity benefits etc.) by Employer
  - vii. Discrimination in Employment (e.g. abrupt termination of the employment, working conditions, wages or benefits etc.)
  - viii. Engagement of child labour
  - ix. Sexual harassment at work
  - x. Forced labour trafficking
  - xi. Security of women work force
  - xii. Inadequate facilities for pregnant women and lactating mothers
  - xiii. Inadequate facilities for the children of the workforce at workforce camp sites
  - xiv. Possibility of Gender based violence as the road shall traverse through sensitive locations such as hospitals, schools, etc. that are near to habitations.
  - xv. Absence or inadequate or in accessible emergency response system for rescue of labour/workforce in situations of natural calamities like earthquake, caving in/landslides, fire outbreak, floods and cloud bursts etc.
  - xvi. Health risks of labour relating to HIV/AIDS and other sexually transmitted diseases
171. In addition, other risks that would be applicable for all types of workers would be as follows:

- xvii. Unclear terms and conditions of employment
- xviii. Discrimination and denial of equal opportunity in hiring and promotions/incentives/training opportunities
- xix. Denial for workers' rights to form workers organizations, etc.
- xx. Absence of a grievance mechanism for labor to seek redressal of their grievances/issues

172. **Mitigation measures:** The borrower ó HPRIDC has a Labor Management Procedures (LMP), which will be applicable for the entire program. The LMP will include the Environmental, Occupational Health & Safety and Social (OHSS) guideline, management system and governance controls and also GRM. Through this guideline and associated standard operating procedures, it is intended to integrate the environmental, social, occupational health and safety principles of Indian national and state regulations as well as the requirements outlined under ESS 2 of the ESF World Bank. It will clearly spell out the requirements relating to provision of terms and conditions of employment; promoting of non-discrimination and equal opportunity; worker's organization.

173. The responsibility to manage these adverse impacts would be clearly reflected in the contractual obligations of the Civil Works Contractor with appropriate mechanisms for addressing non-compliance. The bid documents for construction will incorporate requirements for Environment, Social, Health and Safety (ESHS) including list of applicable labor laws<sup>6</sup> and provisions and the metrics for periodic reporting by contractors. The bidders are required to submit the following as part of their technical bid: ESHS strategy and implementation plan; code of conduct; and declaration of past ESHS performance. The successful Bidder will submit an Environmental, Social, Health and Safety (ESHS) Performance Security @ 2% of accepted contract value.

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<sup>6</sup>Workmen Compensation Act, 1923, Minimum Wages Act, 1948, Payment of Wages Act, 1936, Equal Remuneration Act, 1979, Child Labour (Prohibition & Regulation) Act, 1986, Inter-State Migrant Workmen's (Regulation of Employment & Conditions of Service) Act, 1979, etc.

174. In order to address labor influx, contractor will:
- i. source all unskilled labor from within the project area and its vicinity to minimize labor influx into the project area. Skilled labor force, if unavailable locally, would be brought in from outside the project area either from within or outside the state.
  - ii. develop a Workersø Camp Management Plan that addresses specific aspects of the establishment and operation of workersø camps e.g. cordoning of separate areas for labor camps and material storage;
  - iii. conduct training programs on HIV/AIDS and other communicable diseases
  - iv. develop a complaint handling mechanism at the project level
  - v. provide information to communities in project area and to host communities about the contractorø policies and Worker Code of Conduct (where applicable).
175. In addition to the above & in accordance with the risk assessment carried out, that accorded a risk level of 12.0 (moderate) to the project, a GBV Risk Mitigation Plan has been prepared for the overall project. The Plan will provide a set of measures such as orientation to all categories of labor, communitiesø sensitization, signing of codes of conduct by the project personnel to be undertaken during implementation on a one-time basis or as periodic activity depending on its nature.

### 6.3 ...relating to Resource Efficiency & Pollution Prevention & Management (ESS 3)

#### Impact on Physiography

176. The road is existing for last several decades and the present construction works involves only widening to intermediate lane, following the existing ground profile and without significant alteration of existing vertical profile, except for improvement of geometrics objected to enhance road safety. Therefore, there will be no significant impact on physiography of the region due to road construction.

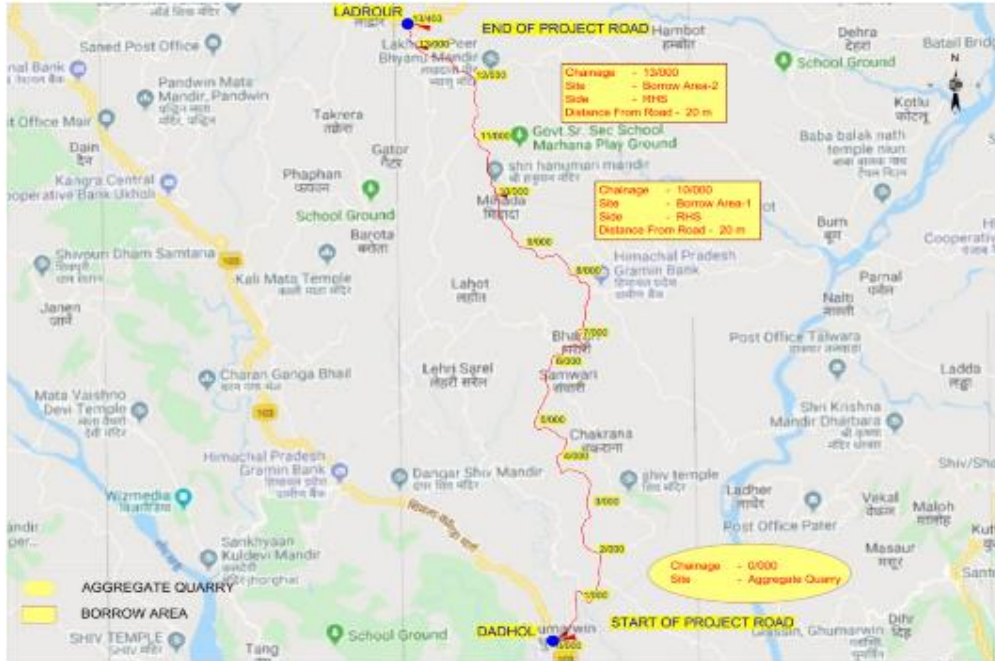
#### Impact on Geology

177. The construction of road will require different materials such as earth, aggregate, boulders, and sand that occurs naturally and whose formation process is slow and takes years. In addition, development till now has stressed these finite natural resources and is creating availability challenge in recent time. Considering these aspects and to minimize construction footprint on natural resources is fundamental design principle for pavement and structures. The various ÷resource efficacyø options during design include optimize usage of material generated from hill cutting in protection works like breast/toe/masonry walls thereby reduce potential impact due to dumping etc., are considered to achieve minimum construction footprint.

**Table 6-2: Borrow Pits along the Project Road**

BA. No.	Chainage (km)	Lead (m)	Side	Ownership Details	Available Quantity
			(LHS/RHS)		
BA-1	10+000	20	RHS	Government	Hill (Adequate)
BA-2	13+000	20	RHS	Government	Hill (Adequate)





**Figure 6-1:- Maps showing potential borrow area details along project road**

178. The demand for construction materials like earth, aggregate, boulders and sand occurring naturally will be sourced from already existing quarry or sources. The likely anticipated short term and localised impacts are slope and stability issues of the excavated hill faces, disrupting or altering sub-surface drainage, contamination of groundwater, soil erosion and deforming landscape.
179. Furthermore, geological formation are long process and these construction materials are finite resources and are already stressed due to various development activities creating availability challenges in recent times. Though these impacts are of low significance, but considering project road being in seismic sensitive geography possess risks and impacts. Considering these aspects and to minimize construction footprint on natural resources is one of fundamental design principle for pavement and structures. The various resource efficacy options during design include optimize usage of material generated from hill cutting in protection works like breast/toe/masonry walls thereby reduce potential impact and risks are still being assessed and will translated into final design to achieve minimum construction footprint.
180. The construction material requirement for the project road widening includes earthwork, stone aggregates, cement, bitumen etc. As per engineering design, the estimated quantity of materials that are required for construction of the project road is listed in Table 6-2.

**Table 6-2 : Estimated Construction Materials Requirement**

S.No	Description	Unit	Quantity
<b>A</b>	<b>Road Works</b>		
1	Earthwork for Excavation	Cum	261204
2	Earthwork from Borrow Area	Cum	7209
3	Aggregates for (Road Work)	MT	37675877
4	Bituminous material	MT	184

<b>B</b>	<b>Bridges</b>		
1	Aggregates for (Bridges)	Cum	10887716
2	Cement	MT	2851
3	Steel	MT	845
4	Concrete (Bridges)	Sqm	8065
5	Sand	MT	5988244
6	Man Power Required	Man Days	152150

#### 181. Mitigation Measures:

- The project's demand for boulders, stone aggregate and sand for road construction will be sourced from authorized/pre-existing quarries; and earth will be borrowed from 3 locations with a lead distance of 0 to 15 Km have been identified for borrowing the earth given in following figure
- The borrowing of earth in an unregulated manner may lead to unstable slopes, erosion, loss of fertility, inundation of water, breeding areas for mosquitos and unhygienic environment. The transportation of earth from borrow and quarry areas in open/uncovered trucks can increase the dust levels and no borrowing of earth shall be permitted along the project road and within existing Right of Way. Borrow areas for importing earth for embankment/sub-grade construction shall be identified and assessed for suitability of material and likely environmental impacts and risks. Uplands shall be given a first choice while finalizing the borrow areas to reduce the foot print of the borrow areas
- Prior to commencing borrowing operations, Engineer shall approve borrow area based on compliance with existing regulations, suitability of earth, written agreement with land owner(s), likely potential environmental risks and safety hazards, and restoration/redevelopment plan. If government/panchayat land(s) have been chosen, then requisite approval/permissions from local self-government bodies shall be obtained prior to commencement of borrowing operations and conditions laid by the local bodies shall be complied thereof.
- The agreement for borrowing soil shall clearly state the lease duration, depth and land area and levels up to which the borrowing of earth shall be carried out, compensation for the agreed lease period, site restoration plan as desired/required by the landowner and any other condition mutually agreed upon between contractor and land owner. The agreement shall include a site restoration plan as agreed upon with the landowner.
- The Engineer shall conduct regular compliance audit during operation of borrow area and ensure prompt restoration of closed borrow area is in accordance with approved borrow area management plan.
- The contractor will ensure trucks are loaded only up to permitted capacities to prevent high emission, vehicle wear and tear, road surface damage due to overloading. All haul roads either paved or unpaved used for transportation of materials shall be subjected to surveillance at regular interval and rectify any type of surface damage till operation of borrow area.
- The contractor will ensure trucks used for transportation of material is covered by tarpaulin and provided tail board, so that en-route spillage and generation of fugitive dust are prevented. All haul roads (paved or unpaved) used for transportation of materials shall be subjected to daily surveillance especially settlement/residential areas for dust levels and carry out regular sprinkling of water to check air quality is compliant with NAAQS till operation of borrow area.

- Trucks in good condition shall only be deployed for operations and shall adhere to pre-determined routes. The contractor will resolve any conflict arising due to contractor activities with community or individual.
- The contractor shall prepare and get the borrow area management plan approved by the Engineer and operation shall strictly adhere to same. The borrow area management plan shall ensure following
  - Identified borrow area is inspected by Engineer. On a typical map record land area, boundary limits, estimated quantity and existing environmental settings, but not limited to topography, drainage, water bodies, settlements, trees, haul road etc. to identify likely environmental risk and safety hazards.
  - Borrow areas shall not be opened in an irregular shape and sizes.
  - Indicate propose slope or any mitigation measures for the finish cut surface of bank/embankment to prevent slide, erosion, or collapse of bank.
  - The bottom of borrow pits shall not be left uneven and finished with a levelled bottom and shall not have deep pits within.
  - The propose depth of cutting shall be limited to a maximum of 1.2 meters below surrounding ground levels. In case excavation warrants for greater depth, such borrow area location shall also include occupational health and safety measures to prevent accidental or safety hazards till completion of restoration.
  - Likely quantity of top soil generation and its preservation.

#### **Impact on Soil**

182. The land within the COI will be directly impact due to removal of topsoil, compaction and spillage of chemical. The compaction of soil due to plying of traffic, stockpiles, temporary facilities is also likely to impact soil structure with potential to impact organism activity, water retention capacity and nutrient retention. There is also possibility of contamination of soil from leakage and spillage during handling and storage of fuels and chemicals.
183. Based on soil quality test, the content of sand, clay and silt is 64.5 %, 19.6 % and 15.9 %, respectively which indicate that soil texture is sandy clay loam class and prone to erosion by water and wind.
184. The land within the COI will be directly impact due to removal of topsoil, compaction and spillage of chemical.
185. The compaction of soil due to plying of traffic, stockpiles, temporary facilities is also likely to impact soil structure with potential to impact organism activity, water retention capacity and nutrient retention. There is also possibility of contamination of soil from leakage and spillage during handling and storage of fuels and chemicals.

#### **Muck Disposal:**

186. The main activities that will generate construction debris and/or spoil are excavation along hill side of road, rock, dismantling of existing pavements, culverts/bridges, drainage and protection works. The estimated excavated materials is 216315 cubic meters, out of this, the project considers to reuse/recycle 10815 cubic meter of rock (5% of excavated material) and 46109 (22 % of excavated material) for the construction of sub grade, sub base and base layers, and back filling of retaining walls, breast walls among others as given in Table 6-3. This approach not only reduce the need for disposal of excavated materials, but also reduces the need to import material for construction purposes.

**Table 6-3 Estimated Quantities of Rock and Earth Work Materials**

S. No	Item	Quantity
<b>I</b>	<b>Quantity from excavation</b>	
a	Excavation in roads	200365.637
b	Excavation in culverts	2580.513
c	Excavation in bridges	721.3184
d	Excavation in drainage and protection works	12647.4
	<b>Quantity of excavated materials</b>	<b>216314.8684</b>
a	Embankment	10822.9586
b	Subgrade	34066
c	Backfill in culverts	611.887
d	Backfill in Bridge	607.9861107
e	Backfill in drainage protection works	0
f	Recovery of rock for reuse	10815.74342
<b>II</b>	<b>Total Quantity of Soil Reused (II) :</b>	<b>56924.57513</b>
<b>III</b>	<b>Excavated Quantity to be disposed (I - II) :</b>	<b>159390.2933</b>

187. The extent of the identified muck disposal sites at 7 locations is 12.1 Ha, which is adequate to dispose the both excess rock cut material. The disposal of debris is likely to have environmental and social impacts and risk due to erosion, slides, clogging of drainage, drying of seasonal streams/spring, damage farmland, loss of soil productivity etc. The chainage wise details of rock/earthwork fill and cut lengths and volume are given in appendix 22.

**Table 6-4:- Locations for establishing debris/muck disposal**

S. No.	Chainage (Km)	Type of Land	Capacity (m3)	Remarks
1	0+900	Govt. Land	14,000	Villagers want this land to be developed for parking or other social activities. L=70m; W=40m; H=5m (approx.)
2	3+350	Pvt Land	3,600	The owner of the land wants to develop land for agricultural purposes. L=30m; W=20m; H=6m (approx.) Owner details :- Shankar Ram & Contact no- 7807454937
3	4+950	Govt Land.	7,200	Villagers want this land to be developed for parking or other social activities. L=30m; W=30m; H=8m (approx.)
4	5+650	Govt Land.	2,400	There exists a Govt Veterinary Hospital and depressions in the premises need to be filled up by debris. Debris disposal will level the surface which further will be used for parking purposes. L=40m; W=30m; H=2m (approx.)
5	5+900	Govt. Land (PWD)	1,920	There exists a PWD's store house on existing land and depressions in the premises needs to be filled up by debris. The leveled surface will be used as parking facility. L=40m; W=8m; H=6m (approx.)
6	10+700	Govt Land (Revenue department)	80,000	Land belongs to revenue department and want to develop and level it for parking and other uses. L=160m; W=50m; H=10m (approx.)

S. No.	Chainage (Km)	Type of Land	Capacity (m3)	Remarks
7	13+100	Govt. Land (PWD)	12,000	The land near to Ladraur Market area is a vacant barren land now. People want it to be developed for parking purpose.
				L=60m; W=20m; H=10m (approx.).
<b>Total</b>			<b>1,21,120</b>	

188. **Mitigation Measures:** These would include:

- Prior to undertaking any site clearance and/or excavation activities, particularly hill cut operations in any segmental operational stretch, the contractor shall prepare a work plan, detailing the type and numbers of equipment required, estimated volume of material to be cut or excavated, details of approved disposal sites, arrangements made for transport of excavated material to the approved disposal sites, dust suppression measures at excavation site and along transportation routes, method of stacking and/or handling the excavated material at the disposal site including rehabilitation plan of the disposal site, health and safety measures and emergency response plan for the entire operation shall be prepared in advance.
- The construction debris from all operational areas shall be regularly scavenged and disposed off at identified disposal sites or those approved by District administration. Since, extent of surplus muck is not at this stage however, the requirement to have a Muck Disposal Plan shall be made mandatory part of contractor's ESMP.
- The adequacy of sites suggested by stakeholders during consultations shall be verified for its suitability from potential environmental and social risk and impacts. Accordingly, the mitigation measures needed shall be prepared for Engineer approval and prior to operating the dump site.
- The Engineer prior to approving contractor's civil work plan shall ascertain preparation and inclusion of Muck Disposal Plan as one of main activity preceding hill cutting and excavation activities. The contractor shall be solely responsible to resolve any type of issues arising or related to dump site amicably with communities or individuals.
- The contractor shall prepare and get the Muck Disposal Plan approved by the Engineer and operation shall strictly adhere to same. The Muck Disposal Plan shall ensure following
  - Identified disposal site is inspected by Engineer. On a contour map record land area, boundary limits and existing environmental settings, but not limited to topography, drainage, water bodies, settlements, trees, haul road etc. to identify likely environmental risk and safety hazards.
  - No dump site shall be located in forest area. In unavoidable condition, identification and approval of such dump site in forest area shall be after complying with conditions set in approval from Forest Department.
  - The likely environmental issues at dump site could include slope stability, blocking drainage, altering waterway, erosion etc. The mitigation measures shall include both engineering and non-engineering measures.

### 6.3.2 Impacts on Water Resources

189. As the project road completely traverse in hilly terrain and exists three seasonal streams and springs at different chainages. The streams are perennial with low to moderate seasonal fluctuation and drain water from hill side, which in absence of adequate cross drainage across the road can cause a tendency for flash floods on the downstream side.

190. The road construction inevitably is likely to alters, to a certain degree, the natural drainage regime by altering natural sheet run-off and stream hydrology. This will occur during

construction from land clearance and construction of the road. In order to minimize the impacts, the following measures are considered. The drainage pattern along the project road with side drain flow direction to the nearest CD structures are given in Appendix -7.

191. **Mitigation Measures:** These would include:

- The construction of 26 pipe culverts and 4 slab culverts connected with side drain on hill sides along the road is suggested for easing the drainage across the road.
- Construction of check dams on the upstream side of three seasonal streams and channelizing the water on the downstream side of with protection measures will control the erosion of soil and subsequently reduce floods on downstream areas.
- In addition, Nature-based solutions/measures (bio-engineering) are also considered at selected locations to minimize the erosion and improve the slope stability.

### 6.3.3 Water Resources Depletion

192. The terrain of project area is hilly and there three streams that are perennial with low to moderate seasonal fluctuation and springs. Such sources are tapped by the irrigation department for further use. The availability of water during summer is limited particularly in lean periods and requires immediate attention to augment the ground water resource. However, none of the areas within Bilaspur district has been notified as over exploited / critical by CGWA/State Ground water authorities as of 2013.

193. The estimated water requirements is 26.7 million litre during project period for civil works like embankment, sub-grades, bituminous work, concrete, dust suppression and daily consumptive use at work force camp, site offices, among others. Since, depth of these bore wells range between 30 to 45m and considering ground water development status of the district, project demand could be meet with by ground water through construction of bore well.

**Table 6-5: Estimated Construction Water Requirement**

S.No.	Activity	Unit	Quantity in litres required/meter length of road	Estimated otal Water Qty requirement (in lakhs)
1	Road/Embankment	Litres/metre	500	68
2	Subgrade/WBM	Litres/metre	250	34
3	Construction of 41 CD Structures	LS@10000 litres per location	410000	5
4	Dust Suppression and camp site management	Litres/metre	250	34
5	On site sanitation & Drinking water	per day	5000	15
6	Camp Site Water Requirement	Litres	1000	3
7	Plantation of saplings/trees	Litres	5400000	54
Total Water Requirement				213
Add 5% for wastage and 20% for Contingency				54
<b>Quantity of Water Requirement</b>				<b>267</b>

194. **Mitigation Measures:** The impacts arising due to sourcing of construction water can be minimized through the following mitigation measures.

- Contractor can explore suitable locations with high water level for installing tube/bore well and abstracting water. However, tube/bore well should be installed after obtaining permission from irrigation and public health department, GoHP.
- identify and development of potential springs and seepage springs along hill sides, where collection chambers or tanks can be constructed to harness the water for meet construction demand. However, springs used by communities should be avoided.
- The Contractor shall consider renovation of existing surface water bodies new surface water bodies at suitable places in the vicinity of the project road for harvesting of water during rainy season. This water can be used for construction purpose and on completion of the construction the same can be handed over to the community for maintenance and use.
- During the pre-Construction stage the contractor should preferably identify local depressions along the alignment in consultation with the local panchayat to be developed as water storage areas.
- The water usage pattern with in the construction camps can be minimized by adopting following best practices:
  - Use buckets for washing purposes instead of using running water;
  - Use of auto shut off taps (without sensors) in labour accommodation;
  - Install water meters with main supply pipes/water tanks/bore well to assess quantity of consumed water.

#### 6.3.4 Impacts on Water Quality

195. Road construction related pollution risks include accidental release of fuel, used oil or chemicals and contamination from poor waste practices that can affect surface and groundwater; contamination from construction machinery working near springs and seasons streams; discharges and disturbance of soil and sediment that drain into surface waters.
196. In addition, camp site, construction sites will generate and average sanitary wastes which need to be treated through septic tank and soak pit disposal arrangements.
197. The details of waste generation during lean, average and peak construction phase is given in Table 6-6. If not treated properly, the liquid waste will potentially cause both surface and ground water contamination through surface run off and or through leaching through surface to groundwater aquifers.

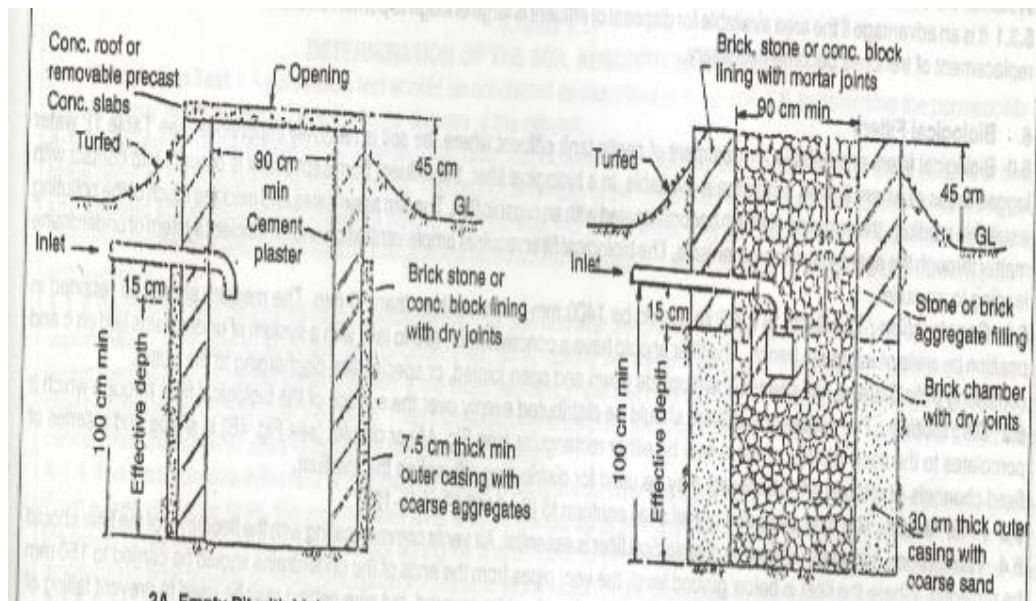
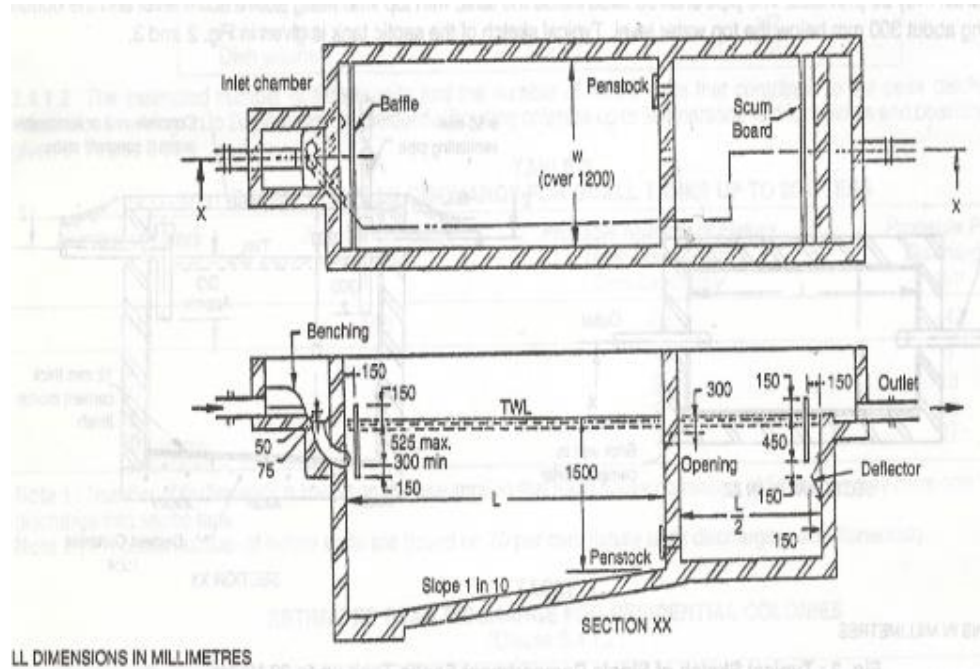
**Table 6-6 : Estimated Sanitary waste during construction phase**

Category	Nos	LPD	Quantity	Peak Sewage generation (80%)	Average	Lean
Supervision staff	50	45	2250	1800	900	324
Non local /Migrant labor at camp site	155	90	13950	11160	5580	2009
<b>Total</b>				<b>12960</b>	<b>6480</b>	<b>2333</b>

198. In particular, the proposed construction works is likely to affect water quality during monsoon period, when all seasonal streams will be flowing. The most commonly associated will be increased suspended solids and turbidity in runoff from land clearance, earthworks and stockpiles where works are undertaken near streams and springs.

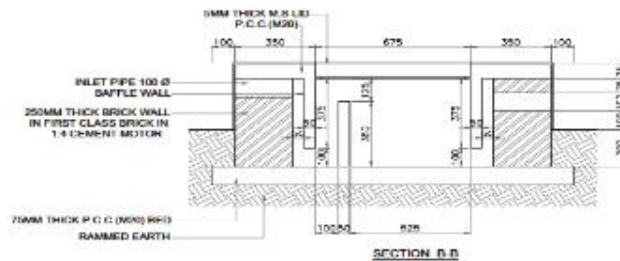
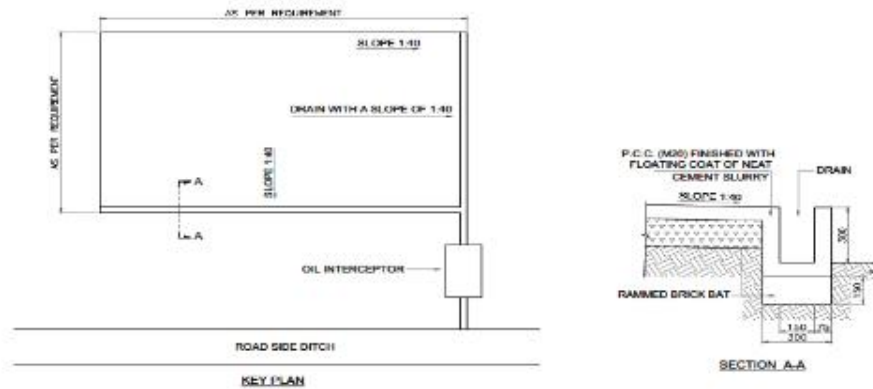
199. **Mitigation Measures:** Key avoidance and mitigation measures to avoid surface water pollution include:

- All toilets and wash areas within the camp site and work force camps shall be provided with septic tanks and soak pit arrangements, of adequate capacity. No wastewater from the camp/work force site shall be discharged directly without any treatment in to any surface water channels or drain, which eventually join surface water bodies.
- The camp sites shall have 4 numbers of septic tank (each 5m Length, 2m Breadth and 1.5 m Clear depth with 0.3 free board) with soak pit arrangement which can serve for work force at peak level as per CPWD specifications as below figures.





- The oil/lube storage shall be under roofed areas with impermeable cement concrete surfaces and provided with separate drainage system with oil separators. No discharge from oil/lube storage areas shall be directly discharged in to any open surface water channel/ streams.
- Oil interceptors shall be provided at repairing area and fuel storage area with separate drainage system. (typical drawing)



- No construction debris and/or spills of construction materials are dumped on to stream waterway. The upstream and downstream side of the cross drainage structure sites are to be cleared on a daily basis to clear off any accidental spills, if any.
- Care shall be taken not to adversely constrict the water way, while planning and constructing cross drainage structures and construction works shall be planned and completed during non-monsoon months.
- After the completion of the construction works, the cross drainage construction site including upstream and downstream up to 100 metres shall be checked for remnant of construction debris/spills and same shall be and cleared off

#### 6.4.1 Physical Environment

## Ambient Air Quality

200. The baseline results of all air quality parameters (PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, NO<sub>2</sub>, HC, CO) monitored at Dadhol and Ladroul locations are below prescribed standards in NAAQS. This can be attributed to overall good pavement condition, less volume of traffic, and absence of polluting sources in project study area.
201. Construction activities can give rise to dust emissions under particular circumstances if not effectively managed. Road construction activities have the potential to affect receptors near to the main construction sites due to dust generated from site preparation, site excavation, hill cutting, construction activities and the tracking out of dust from Heavy Goods Vehicles (HGVs) onto the local road network. Earth works will result in exposed areas of soil which will potentially generate dust when it is windy, with dust potentially being generated when winds blow at all times of day or night, not just during active periods of construction. The level and distribution of dust will vary according to the duration and location of activity, weather conditions, and the effectiveness of suppression measures.
202. Gaseous emission during construction will be from road construction machinery, equipment and plants concrete batching plant, hot mix plant and wet mix macadam plant. The operation of vehicles, equipment and plant will result in emissions of carbon monoxide, sulphur dioxide, and oxides of nitrogen. In particular, all commercial vehicle driven with diesel fuel is often used in India. The greatest impact on air quality due to emissions from vehicles and plant will be in the areas immediately adjacent to site access. Generally, additional vehicle movements generated during the construction phase will have the potential to influence local air quality at sensitive receptors located at close proximity to road and pollutant concentration is likely to reduce with increase distance from road. The impacts will therefore apply mostly within the town/villages, though may also affect some isolated properties where they are located close proximity of construction traffic movements.
203. The GHG emissions per year, at the present traffic, road geometry and pavement conditions is using the International Vehicle Emission (IVE) modelling is estimated at 2143.569 tons of carbon dioxide equivalents (CO<sub>2</sub>) (which includes N<sub>2</sub>O as well as CH<sub>4</sub>). The GHG estimates of the widened project road scenario (as of 2019) is 1283.428 tons of CO<sub>2</sub>, (which includes N<sub>2</sub>O as well as CH<sub>4</sub>.) Shows that the widened project road could reduce GHG emissions by 860.141 tons of CO<sub>2</sub> as given in Table 6.7.

**Table 6-7: Present and Widened Project GHG Emissions (2019)**

Existing Project road at Present Traffic levels (2019)				Widened Project at Present Traffic levels scenario (2019)			Change in emission		
Type of vehicle	CO <sub>2</sub>	N <sub>2</sub> O	CH <sub>4</sub>	CO <sub>2</sub>	N <sub>2</sub> O	CH <sub>4</sub>	Δ CO <sub>2</sub>	Δ N <sub>2</sub> O	Δ CH <sub>4</sub>
Two wheelers	159.31	0	2.99	91.12	0	1.74	-68.19	0	-1.26
Three wheeler	1.8	0	0	1.03	0	0	-0.77	0	0
LMV (4 Wheel)	1215.56	0.02	0.01	694.97	0.01	0.01	-520.59	-0.01	-0.01
Bus	631.88	0.05	0	361.34	0.03	0	-270.54	-0.02	0
Heavy truck	4.15	0	0	4.15	0	0	0	0	0
Light truck	130.76	0.01	0	130.76	0.01	0	0	0	0
Total emission	2143.47	0.08	3.01	1283.37	0.05	1.75	-860.09	-0.03	-1.26
<b>Total emissions (in terms of Co2 Equivalent )</b>	<b>2143.47</b>	<b>0.0238</b>	<b>0.0753</b>	<b>1283.37</b>	<b>0.0149</b>	<b>0.0438</b>	<b>-860.09</b>	<b>-0.0089</b>	<b>-0.0315</b>

Note:- N<sub>2</sub>O and CH<sub>4</sub> is converted into CO<sub>2</sub> Equivalent using 298 kg and 25 kg as multiplication factor respectively.

204. The GHG emissions of the project road at present traffic levels, during construction phase and GHG emissions during the life cycle of project road (upto year 2038) has been estimated using ROADEO and IVE (International Vehicle Emission) models. The construction phase GHG emissions has been estimated using ROADEO toolkit and has estimated 7960 CO<sub>2</sub> e tons. The estimated GHG emissions for each of phases are given in Table 6.8.

**Table 6-8: GHG emission projections up to 2038 with present road and improved project road scenario**

Year	Present Road			After Construction			Change in emission		
	CO <sub>2</sub>	N <sub>2</sub> O	CH <sub>4</sub>	CO <sub>2</sub>	N <sub>2</sub> O	CH <sub>4</sub>	Δ CO <sub>2</sub>	Δ N <sub>2</sub> O	Δ CH <sub>4</sub>
2020	2266.19	0.08	3.19	Construction Stage			Construction Stage		
2021	2500.27	0.09	3.52						
2022	2768.42	0.1	3.89						
2023	3062.32	0.11	4.3						
2024	3399.73	0.12	4.77	2036.19	0.07	2.77	-1363.53	-0.05	-2
2025	3697.36	0.13	5.19	2213.97	0.08	3.01	-1483.4	-0.05	-2.18
2026	4034.01	0.14	5.67	2415.42	0.09	3.29	-1618.59	-0.05	-2.38
2027	4403.83	0.15	6.19	2637.83	0.09	3.59	-1766	-0.06	-2.6
2028	4824.91	0.17	6.78	2888.15	0.1	3.93	-1936.76	-0.07	-2.85
2029	5185.63	0.18	7.29	3104.12	0.11	4.23	-2081.51	-0.07	-3.06
2030	5602.77	0.2	7.87	3355.62	0.12	4.57	-2247.16	-0.08	-3.31
2031	6044.51	0.21	8.49	3619.39	0.13	4.93	-2425.12	-0.08	-3.57
2032	6537.28	0.23	9.18	3913.95	0.14	5.33	-2623.33	-0.09	-3.86
2033	7026.13	0.25	9.88	4209.92	0.15	5.73	-2816.21	-0.1	-4.15
2034	7560.79	0.26	10.62	4527.34	0.16	6.16	-3033.44	-0.1	-4.46
2035	8117.19	0.28	11.4	4860.04	0.17	6.61	-3257.15	-0.11	-4.79
2036	8746.74	0.31	12.29	5236.33	0.19	7.13	-3510.41	-0.12	-5.16
2037	9369.02	0.33	13.17	5609.42	0.2	7.64	-3759.6	-0.13	-5.53
2038	10073.74	0.35	14.14	6032.06	0.22	0.82	-4041.68	-0.14	-13.32
Total	105220.85	3.69	147.84	56659.76	2.02	69.72	-37963.89	-1.29	-63.22
<b>Total in Co2 Equivalents</b>	<b>105220.85</b>	<b>1.10</b>	<b>3.70</b>	<b>56659.76</b>	<b>0.60</b>	<b>1.74</b>	<b>-37963.89</b>	<b>-0.38</b>	<b>-1.58</b>

Note:- N<sub>2</sub>O and CH<sub>4</sub> is converted into Co<sub>2</sub> Equivalent using 298 kg and 25 kg as multiplication factor respectively.

205. The improvement of road will contribute to GHG emission net reduction of 30003.89CO<sub>2</sub> e tons over project life cycle till 2038.

206. For operation stage, Air quality and noise quality modelling was carried out to determine the concentrations of PM10, PM2.5, CO and noise at present traffic levels.

207. Quantitative assessment for predicted level of pollutants concentration has been done using ISC-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 Pasquile-Gifford (P-G) dispersion parameters for estimating horizontal cross wind and vertical dispersion.

208. 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 PM10, PM2.5 and CO and hence only these pollutants are taken into consideration in this study.

Details	Emission factor (g/Mile)		
	PM <sub>10</sub>	PM <sub>2.5</sub>	CO
Year 2019	1.03	1.31	2.11
Year 2038	3.42	6.81	4.35

**PREDICTED INCREMENTAL CONCENTRATIONS**

Details	2019			2038		
	Parameter(µg/m <sup>3</sup> )			Parameter(µg/m <sup>3</sup> )		
	PM <sub>10</sub>	PM <sub>2.5</sub>	CO	PM <sub>10</sub>	PM <sub>2.5</sub>	CO
Maximum Concentrations	4.16	6.65	495	9.14	16.64	825
Dadhol	0.8	1	100	3	3	300
Ladrur	1	5	200	5	10	500

**CUMULATIVE CONCENTRATIONS AT VARIOUS VILLAGES**

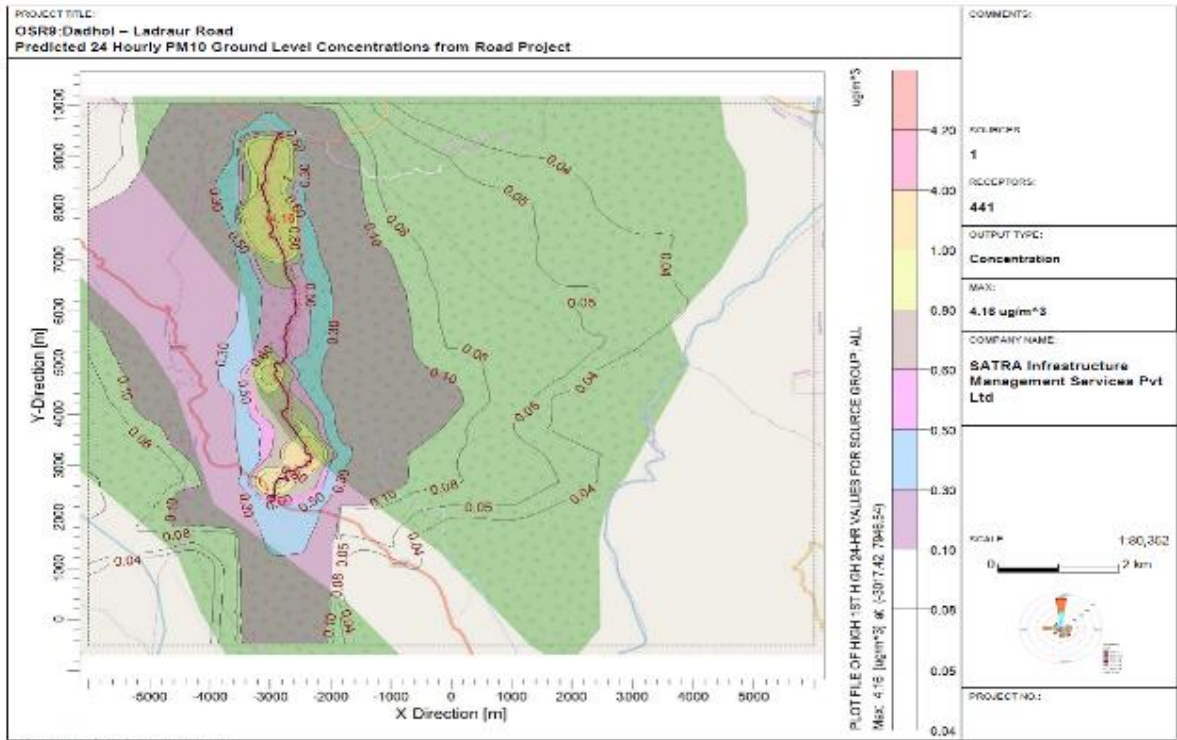
Details	Baseline			Ground Level Concentration			Cumulative		
	2019 Parameter(µg/m <sup>3</sup> )			2019 Parameter (µg/m <sup>3</sup> )			2019 Parameter (µg/m <sup>3</sup> )		
	PM <sub>10</sub>	PM <sub>2.5</sub>	CO	PM <sub>10</sub>	PM <sub>2.5</sub>	CO	PM <sub>10</sub>	PM <sub>2.5</sub>	CO
Dadhol	57.8	19.5	201	0.8	1	100	58.6	20.5	301
Ladrur	58.6	14.5	190	1	5	200	59.6	19.5	390

209. The predicted concentrations of PM10, PM2.5 and CO are found to be well below the NAAQ standards at all of the places. It is already suggested in EMP to go for avenue plantation on either side of the proposed project road. This will further reduce the concentration of PM & CO.

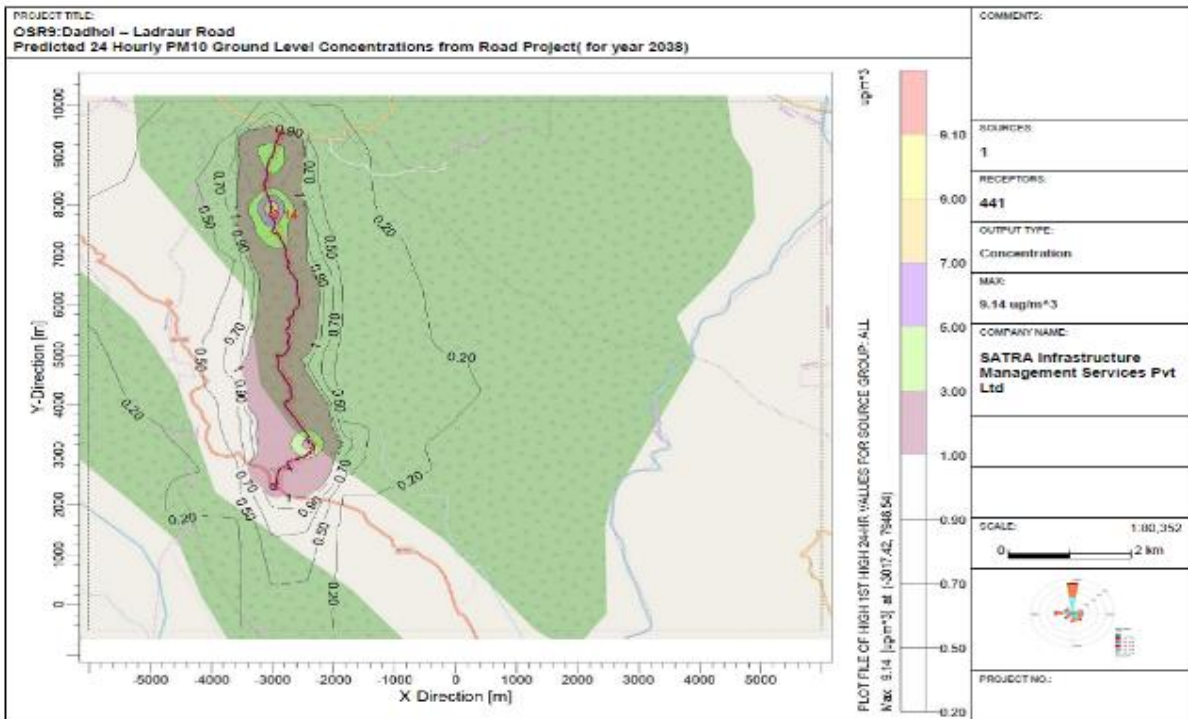
210. In the existing scenario, due to lesser width and higher roughness, the average vehicle speed is low, which results in more exhaust gas emissions. In the post-project scenario, improved road conditions and congestion free traffic movement will reduce emissions.

211. Furthermore, lower growth of traffic and better road conditions with improved average speed, which constitutes about 95% of the total project road length, will not have any significant increase in concentration of PM and CO even after 20 years of operation, subject to regular maintenance of the road condition and maintaining the average speed of traffic.

212. However, in Dadhol ó Ladrour Road (OSR9 ) project, the emissions will increase significantly due to increase in traffic density. The Isopleths of PM10, PM2.5 and CO concentration along the project stretch are given below Figures



**Figure 6-2: Isopleth of Incremental GLC of Particulate Matter (PM10) from OSR9 (Dadhol – Ladrour) Road Project for the year 2019**



**Figure 6-3: Isopleth of Incremental GLC of Particulate Matter (PM10) from OSR9 (Dadhol – Ladrour) Road Project for the year 2038**

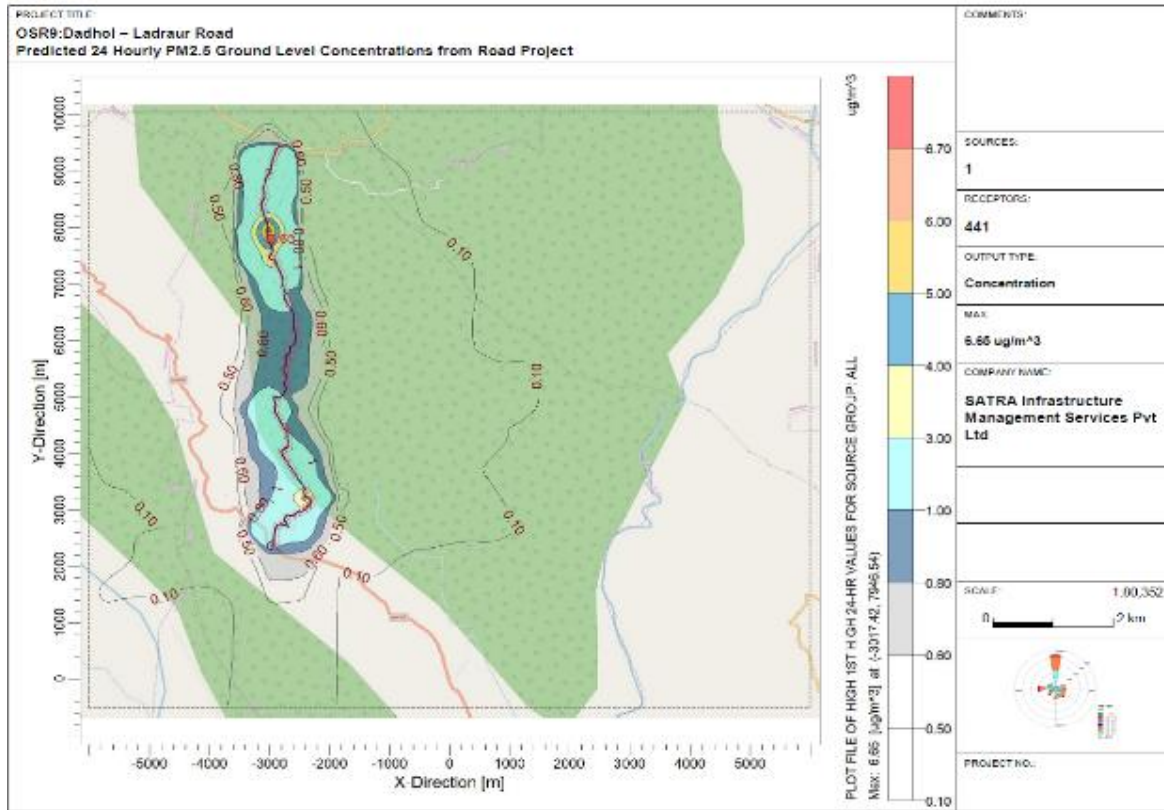


Figure 6-4: Isoleth of Incremental GLC of Particulate Matter (PM2.5) from OSR9 (Dadhol – Ladrou) Road Project for the year 2019

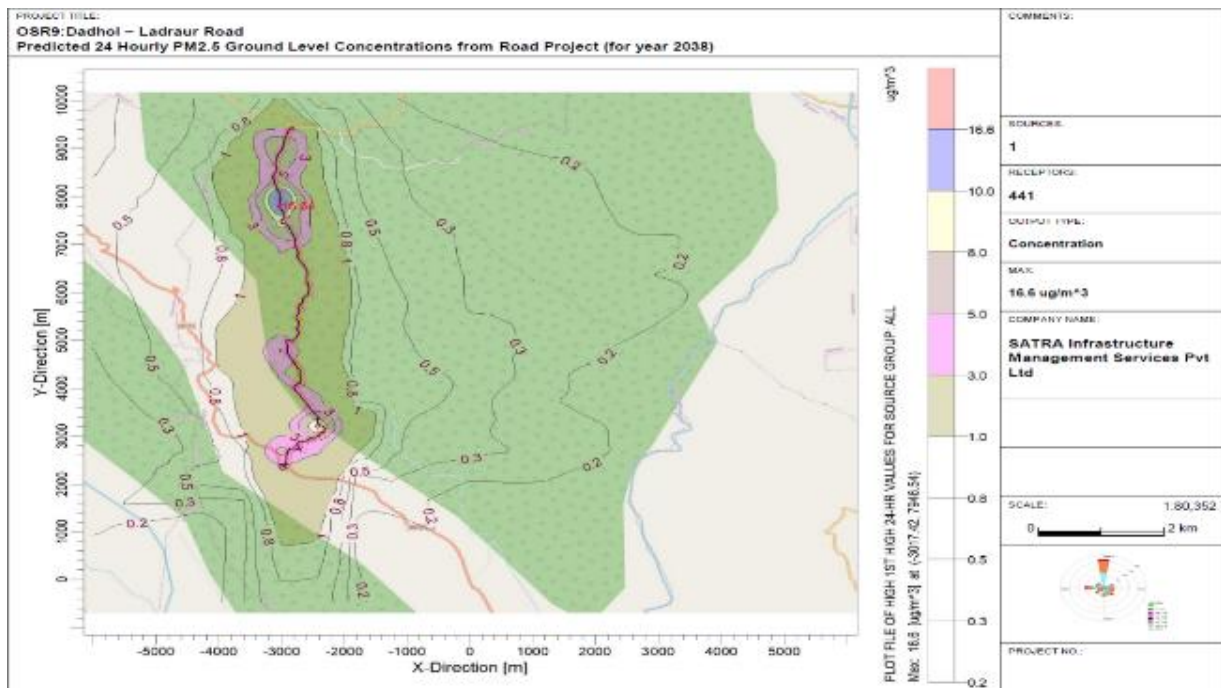


Figure 6-5 : Isoleth of Incremental GLC of Particulate Matter (PM2.5) from OSR9 (Dadhol – Ladrou) Road Project for the year 2038

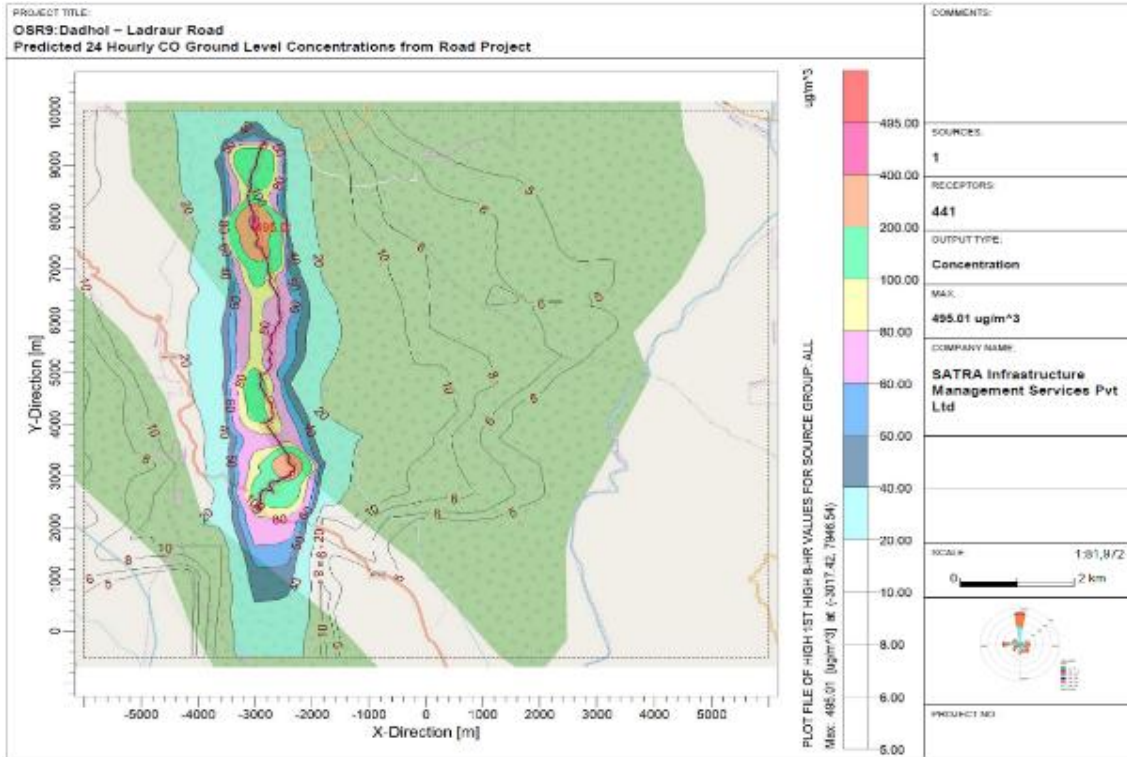


Figure 6-6: Isopleth of Incremental GLC of Carbon Monoxide (CO) from OSR9 (Dadhol – Ladraur Road) Project for the year 2019

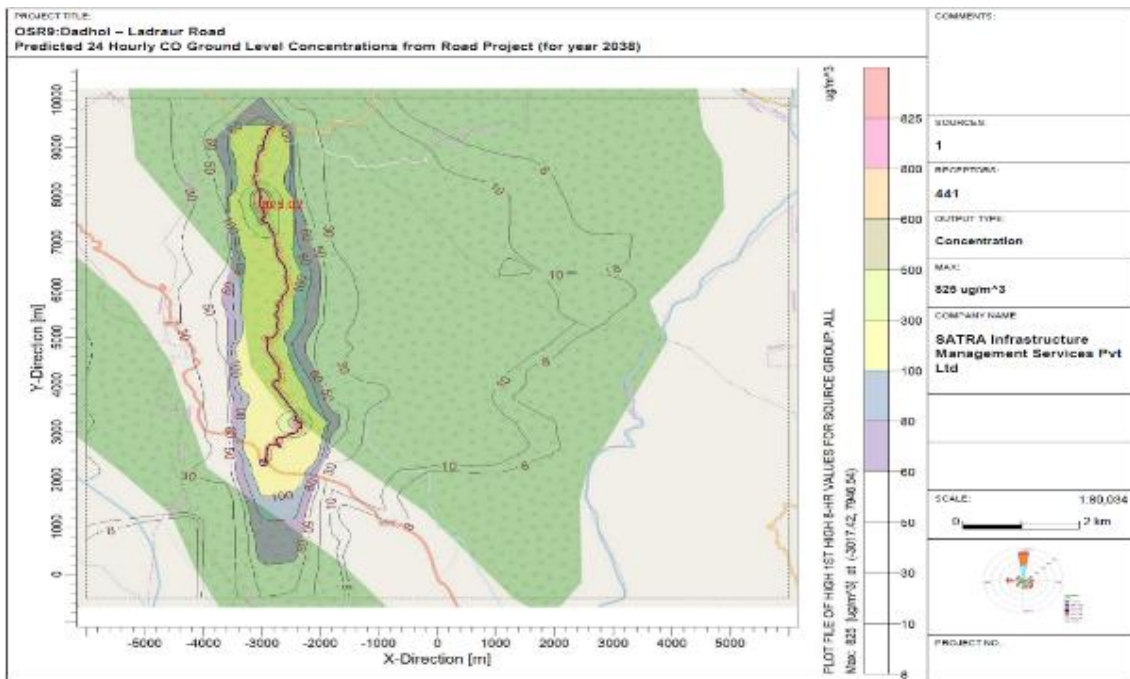


Figure 6-7: Isopleth of Incremental GLC of Carbon Monoxide (CO) from OSR9 (Dadhol – Ladraur Road) Project for the year 2038

213. **Mitigation Measures:** Among the air pollutants, dust levels in term of particulate matter 2.5 and 10, is the most significant most for concern. In order to prevent and control the dust levels, the following measures are to be strictly adhered to:

- The contractor shall do vehicle fitness test at regular interval of 1 year and based on fitness certificate, only fit vehicle shall be deployed during construction. All vehicles and equipment used during construction should be we well maintained, efficient vehicles, having a lower unit emission ratio and higher payload. All vehicles shall be mandatory to have valid Pollution Control Certificates.
- The pollution control equipment in Hot-mix plant shall be kept in working condition at all times. The plant shall not be operated, if the pollution control equipment is not functional.
- The contractor depending on most prevailing wind direction and presence of sensitive receptors at downwind side of material stack yard, shall provide wind barrier at perimeter of all plant site to arrest or blowing of suspended particle.
- The contractor shall obtain and submit to Engineer, all requisite permits (CTO and CTE) from the HPPCB for operation of the Hot Mix Plant, stone crushing operations, batching plants and captive quarry operations.

### Noise and Vibration

214. The principal source of noise during construction of project road would be from operation of equipment, machinery and vehicles. Earth moving machineries e.g. excavators, graders and vibratory rollers has potential to generate high noise levels. These machineries produce noise level of more than 70 dB (A). This can cause disturbance to the settlement, adjacent to the carriageway or within 500 m from the worksite.

215. There are 8 sensitive receptors i.e. schools (3), hospitals (1), religious structures (4 temples) are located along the road and within study area. Noise impacts are anticipated at 4 sensitive receptors, while it is not anticipated at 4 sensitive receptors (3 temples, 1 hospital).

216. Dhwanipro noise model is developed to undertake construction, industrial and traffic noise propagation studies for noise assessment. The model is used to predict the impact of noise on receptors from the noise generation source. It is also used to predict impact due to group noise sources in the industrial complex (multiple sound sources) and traffic.

217. A noise propagation modelling study has been conducted to find out the impact from the noise generated because of the estimated total traffic flow as well as the significance of these impacts. The noise modeling has been done taking into account the design speed at various stretches and the stretches with restricted speeds have also been considered. Dhvani PRO is used for noise modelling and following table presents the results.

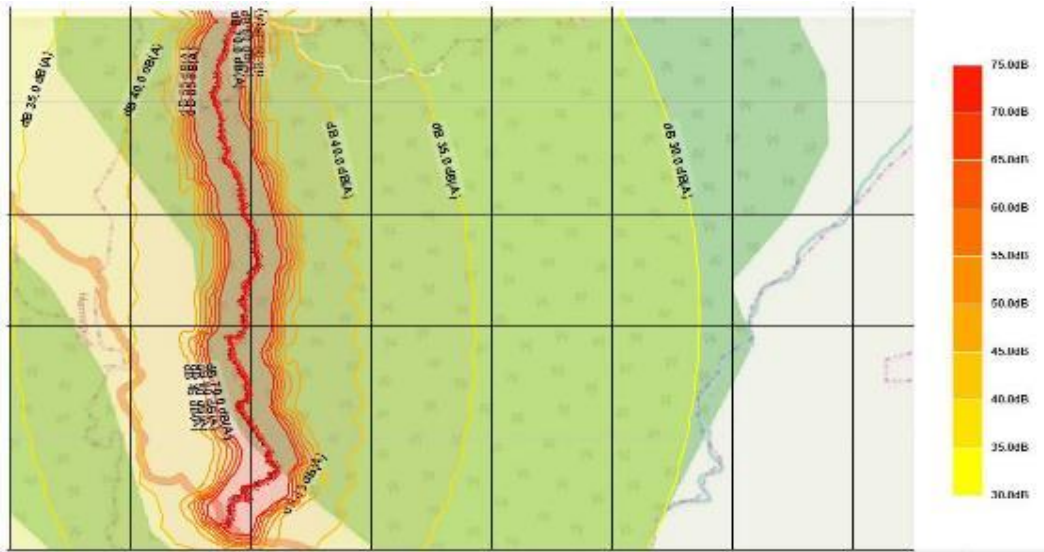
**Table 6-9: Noise level predictions for the locations**

S.No	Name of Locations	Noise Level dB(A)	
		2019	2038
1	Dadhol	58	62.8
2	Ladrour	53	56.7

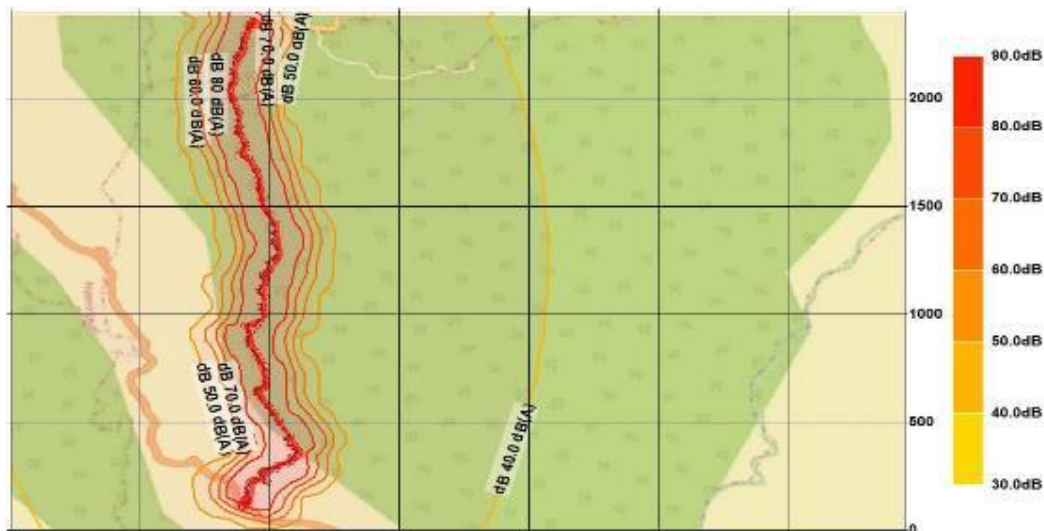
218. The predicted noise levels during both day and night time are below the stipulated limits at road project stretch for all the land uses i.e., commercial, residential/rural and sensitive.



219. The Contour map showing noise levels due to total traffic outcome at the total project stretch has been shown in Figures



**Figure 6-8 :- Contour map showing noise levels due to total traffic outcome of the Dadhol – Ladrou Road Project (OSR9) stretch for the Year 2019**



**Figure 6-9:- Contour map showing noise levels due to total traffic outcome at the Dadhol – Ladrou Road Project (OSR9) stretch for the Year 2038**

220. Mainly the vibration during construction activity like consolidation rolling through use of rollers could cause vibrations to the settlements, which are immediately adjacent RoW. If un controlled, these vibrations, at times could lead to minor cracks or damages to the kutchra or old structures.

221. The noise generated during the construction would cause inconvenience to the population especially within 50m of the alignment after which it would be attenuated to acceptable levels. Since, the

settlement along the road alignment would be sparse the severity of the impact is not expected to be significant.

**Mitigation Measures:** This include

- The DG sets used in the project shall have acoustic enclosures and should conform to the CPCB stipulated standards.
- Regular maintenance of the machinery, equipment and vehicles shall be carried out to minimize the noise levels. All machinery, equipment and vehicles shall have a definite maintenance schedule and maintained by the contractor.
- Night time construction activity shall be prohibited in case settlement/habitations are relocated within 500 m of the construction site.
- In order to limit the ambient noise levels near the sensitive receptors, noise barriers have been recommended at 4 sensitive receptors out of total 8 locations.
- Noise barriers shall be constructed in advance (Prior to commencement of road construction works) at every sensitive receptor like Schools, Hospitals which have been identified for providing the noise control measures.
- During the road construction near the sensitive receptors, appropriate traffic diversions are to be implemented including the deployment of uniformed traffic wardens with reflective hand battens.
- Road construction schedule near sensitive receptors like schools and hospitals shall be informed to the concerned authorities well in advance. All works near sensitive receptors shall be adequately well planned and works shall be completed in shortest possible time, with minimal inconvenience to users of sensitive receptors locations. If warranted, steel barricades shall be used to minimize the inconvenience to the road users as well as occupants of the sensitive receptors.
- Environmental measures such as construction of noise barriers etc shall be constructed for the identified sensitive receptors, well in advance of commencement.
- Along the settlement areas, the use of all rollers shall be regulated through slow pace of operations, use of non-vibratory and small rollers to minimize or avoid cracks or damages to the kutcha or old structures.

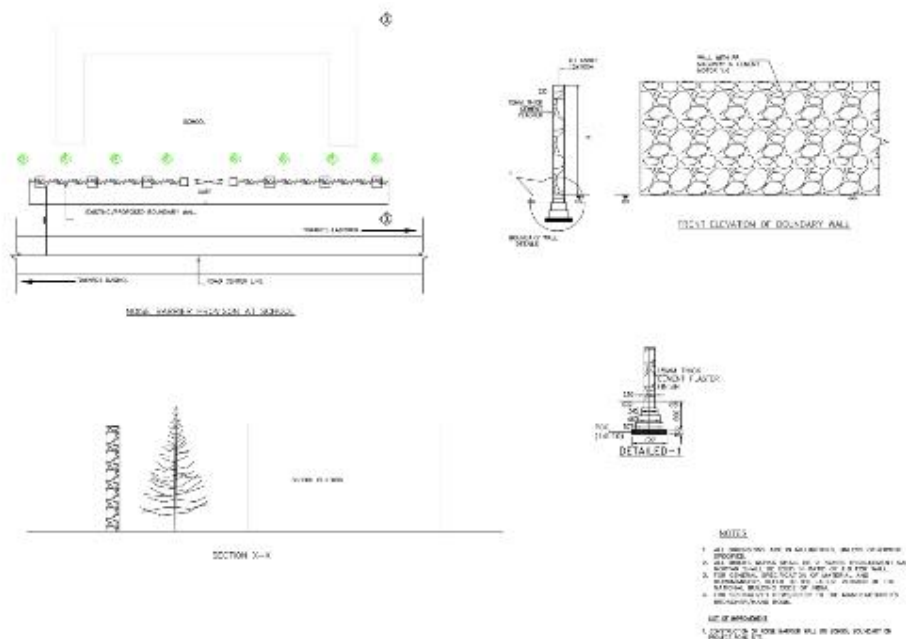
**Table 6-10 : Details of Noise Barrier provided at sensitive receptors**

S.No	Description	Mitigation Measures	Dimensions
1	Govt primary school at Gahar (Km 1+130)	Noise Barrier cum boundary wall	60m long X 5m height X 300 mm thick masonry wall with suitable foundation
2	School near Ladhyani (Km 4+520)	Noise Barrier cum boundary wall	40m long X 3m height X 300 mm thick masonry wall with suitable foundation
3	School at Bharari (Km 6+470) on RHS	Noise Barrier cum boundary wall	50m long X 5m height X 300 mm thick masonry wall with suitable foundation
4	School at Bharari (Km 6+470) on LHS	Re-construction of Retaining wall along with reconstruction of all affected structures at new locations	Retaining wall (450m long X 10m height) and reconstruction of all affected structures at new locations

S.No	Description	Mitigation Measures	Dimensions
5	Hospital (Km 6+640) at Bharari	Noise Barrier cum boundary wall	40m long X 5m height X 300 mm thick masonry wall with suitable foundation

**Table 6.11: Details of Noise Barrier provided at sensitive receptors**

S.No	Description	Chainage	Side	Impacts	Mitigation Measures	Remarks
1	School	20+200	LHS	Yes	Noise Barrier	30 m long, 3m Height, 300mm thickness
2	School	22+450	LHS	Yes	Noise Barrier	30 m long, 3m Height, 300mm thickness
3	School	30+350	LHS	Yes	Noise Barrier	25 m long, 3m Height, 300mm thickness
4	Dispensary	25+780	LHS	Yes	Noise Barrier	20 m long, 3m Height, 300mm thickness



**Figure: Noise Barrier Design**

### Cumulative Impacts

222. As part of ESIA for the project road, an attempt was made to assess the cumulative impacts of other developmental programs within PIA. Review of the available and latest information indicates the following, within 15 km Project influence Area of the road

- No major tourism development projects.
- No major industrial promotion program as per the Himachal industrial investment policy, 2019.

- No scope for any major industries
  - Construction of 64.81 Km of rural roads at 13 different locations in the vicinity of PIA for improving the connectivity of rural habitations to the state road network under PMGSY program.
223. Following are the list of ongoing works under PMGSY in Ghumarwin block (as on 31-03-2019); in the vicinity of PIA

Name of rural road under PMGSY	Length (km)
Dadhol to Jarora	2.06
Junala to Gallian	2.36
Nihari to Kallar	5
Dangar to Barota	6
Bara- Da-Ghat to Salaun	4
Jhandot to Bum	5.72
Kasol to Ghyana	1.5
Ghumarwin to Chuwari	2
Banoa to Kulwari road	9
Gehra to Kuh	4.1
Patta to Morsinghi	11.07
Harlog to Gehra	4
Trauntra to Dabla	8
<b>Total</b>	<b>64.81 km</b>

224. Thus, the only contribution to the impacts is the construction of rural roads at sporadic locations in the vicinity of PIA for improvement of the connectivity, which could trigger increase in traffic levels along the newly constructed and other roads of the regions. The constructional impacts of rural roads on the material extraction and/or other environmental resources are not expected to be significant.
225. The cumulative impacts due to the increased traffic has been already captured during the GHG estimations for the project road upto 2038, which considers increased traffic levels over the years. The GHG emission projections of the improved project road over its life cycle indicate that there will be a net reduction of 30003.89 CO<sub>2</sub> e tons . (refer section 6.41).

## 6.4 ... relating to Community Health and Safety (ESS 4)

### 6.4.1 Occupational Health and Safety

#### Transport and accessibility

226. The project road is 13.5 km length with 15 settlements that are located at every kilometer along the road. The built-up along the road has direct access into project road in addition intersected by major and minor junctions. The road will act as haul road for transporting construction materials along with construction activities will result in blocking of access restrictions across the roads, which will cause nuisance to local road users (road users and pedestrians). Adding to aforementioned impacts, the site setting i.e. narrow roadway width, sharp curves, hilly/mountainous terrain will provide limited option for maneuvering, but will depend on contractor working procedures that is not yet known. During construction stage, there could be need for creating temporary access to Contractor's camps/establishments. Details of the exact locations and numbers would be known only after contractor is mobilized at site.

227. There are 15 settlements en-route this hilly and mountainous corridor with residential/commercial structures and other basic utility services are either at up-hill or down-hill sides, wherein the following potential safety risks and impacts are likely due:
- i. hill cutting, land slides, road excavation, use of vibratory equipment, construction debris handling and disposal etc. during construction.
  - ii. high likelihood of direct exposure to increased construction related traffic and equipment especially at road sections traversing settlement area with limited carriageway/roadway width, and sensitive receptors such as schools, religious place, health centre/hospitals
  - iii. high dust levels from earthworks/hill cutting, high noise and emission level from traffic congestion and idling of vehicles.
  - iv. influx of migrant workers could potentially cause local discomfort or potential conflicts with local people.

**228. Mitigation measures:**

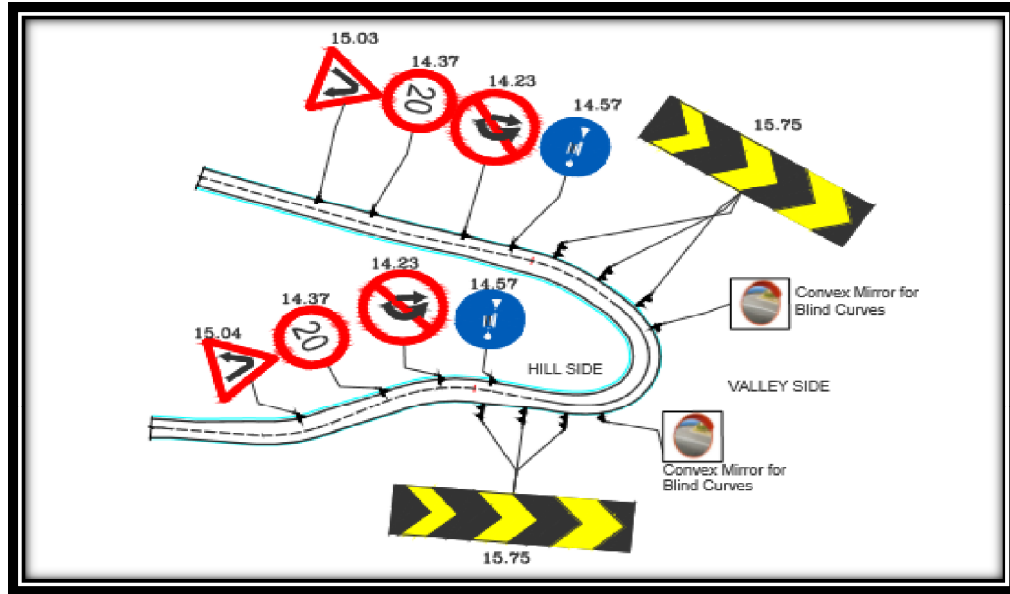
- The ESMP, prepared as part of ESIA includes broad guidelines and considerations required for the preparation of CESMP (guidelines provided in appendices). Management of such impacts will be the responsibility through the contracted construction agency. Prior to starting construction, the contractor will prepare and submit the Contractor ESMP (CESMP) to HPRIDC for review and acceptance prior to commencement of work. The CESMP shall be reviewed, periodically (but not less than every six (6) months), and updated in a timely manner, as required, by the Contractor. The C- ESMP that will include OHS plan, Water and Waste Management Plan, Influx management Plan, Workers camp management plan, CHS Plan, Traffic and road safety management Plan, among others in accordance with the GoI and IFC & WB workers Accommodation guidelines.
- Traffic Calming Measures: At the locations with no adequate scope of either Two-lane or Vision berm, the safety for road users are provided by traffic signage and road markings as per IRC: 99-2019.

At Hairpin Bends: safety precautions are proposed as per Fig. 5.33 of IRC: 99-2018; listed below:

- i. Convex mirrors
- ii. W-Beam Crash Barrier at curve location
- iii. Triple Chevron sign boards
- iv. Speed restrictions ó Speed limit, No overtaking and Blow horn signage
- v. Rumble Strip markings

At Blind Curves: safety precautions are proposed as per Fig. 5.9 of IRC: 99-2018; listed below:

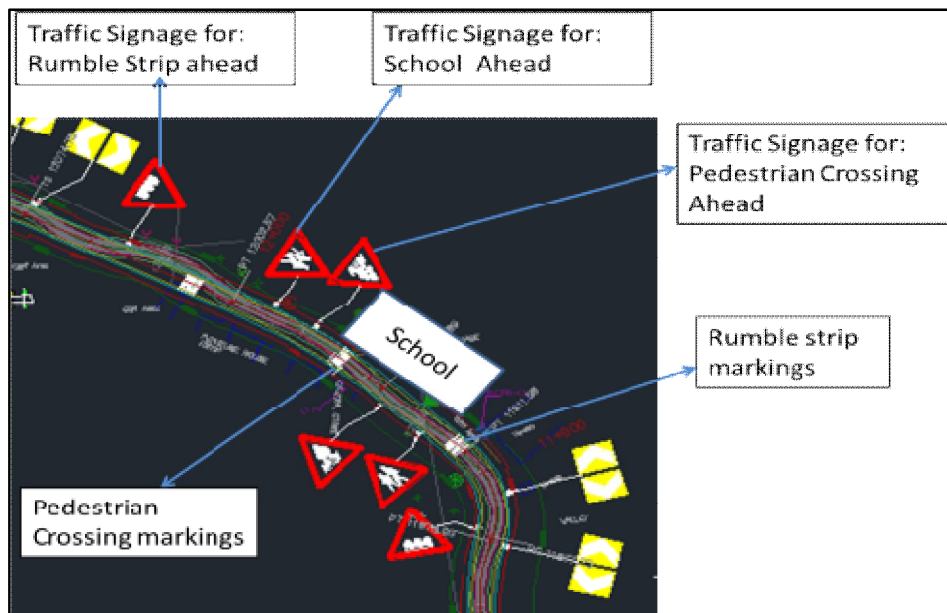
- i. Convex mirrors
- ii. Road Studs along the curve portion
- iii. Triple Chevron sign boards
- iv. Speed restrictions ó Speed limit, No overtaking and Blow horn signage
- v. Rumble Strip markings



**Traffic Calming measures at Blind Curves/Hair Pin Bends**

At School zones, traffic calming measures considered are:

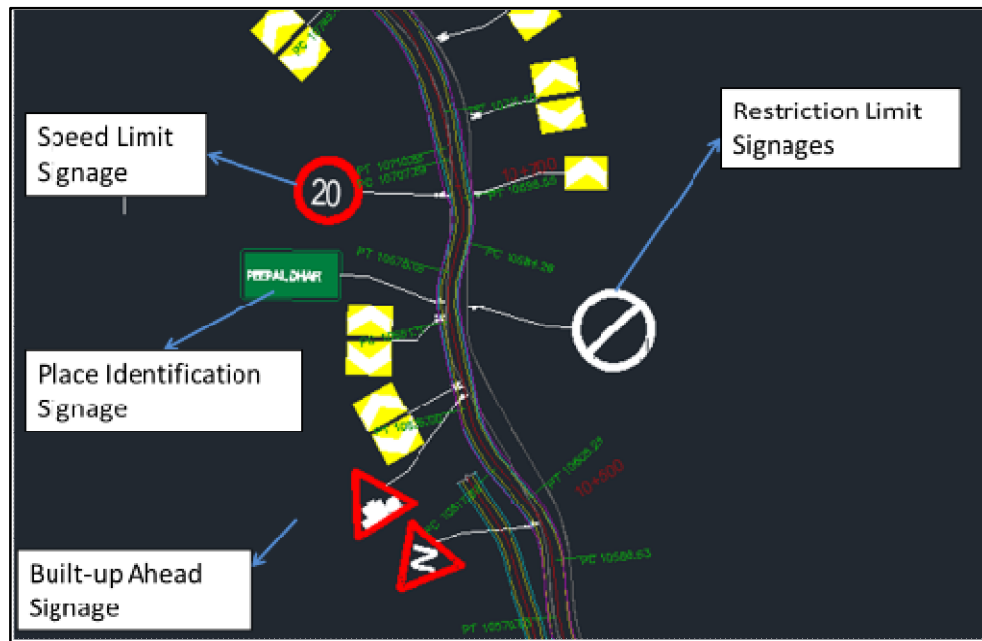
- a. Informatory signage for School zone ahead on either side of traffic directions.
- b. Road Markings of Pedestrian crossing at the school entry gates. Informatory signage for indicating the same.
- c. Rumble strip marking ó 2 sets ahead of Pedestrian crossing markings. Informatory signage for the same.



**Traffic Calming measures at School zones**

At Built-up locations, traffic calming measures are proposed with due importance to both pedestrian and vehicular movements.

- a. Informatory signage for Built-up ahead.
- b. Speed limit signage for Vehicular movements in Built-up areas.
- c. Place Identification signage
- d. Restriction signage for cautioning the road user to abide Traffic rules.



**Traffic Calming measures at School zones**

### Infrastructure and services

229. There are any utility services that are existing along the corridor. This includes 5 transformers, 193 electric, telephone and telephone poles, and one high tension transmission crossing the road. The majority of utilities offset from existing centerline is in range of 3-9m from existing, hence will involve utility shifting. At time of preparation of this report, design is revisited to achieve encumbrance free stretches of road. During construction stage, there is likely to be temporary disruption to services. As the communities are the end users of service provided by these utilities, the adoption of a well-planned approach for utility shifting and coordination with utility department is important to ensure minimal disruption to services.

230. During the construction phase, there will also be a demand for electricity, water and health facilities. Specific details on these demands are not currently known, however it is assumed that contractors will use both the electricity grid and generators on site. Taking cognizance of project area is limited with perennial water sources, so project's additional water demand will stress existing infrastructure and water sources and it is likely to become cause of conflict with community, though during construction phase only.

### Slope Stability and Landslide

231. Landslide is one of the most significant, unpredictable occurrences in hilly roads, which often leads to road blockages, accidents and even could lead to loss of life at times. The project road has 2 locations, with a cumulative length of 390m, which are prone to erosion and landslides. The most notable causes of landslides are due to human interventions like steep hill cutting, de-vegetation, development works along uphill surfaces.

232. **Mitigation Measures:** This include

- Stability of slopes, natural and man-made, is important for a hill road. The majority of road section will involve hill cutting and there is high likelihood of disturbing hill slope, adding to it are other factors like erosion by rainfall and runoff, surcharge etc, which in current road can be minimized by regulating slope cuts along the hill faces. The recommended safe cut slopes, are given in Table 6-12.

**Table 6-12 : Recommended slope cuts**

S.No	Type of Material	Recommended Slope cuts
1	Loose Soil and Vulnerable Geology	2V: 1H
2	Compacted Soil with Slope towards Road	4V: 1H
3	Soft Rock	6V: 1H
4	Hard Rock	8V: 1H

- The landslide impact can be further minimized / mitigated through provision of engineering and non-engineering interventions. Some of engineering measures considered for the project road are breast walls along hill side and retaining walls along valley side. Apart from the engineering measures, nature-based solutions/measures (bio-engineering) are considered, though potential location being identified, to mitigate the impacts of erosion and slope stability along the project road.
- The landslide impact can be further minimized / mitigated through provision of engineering and non-engineering interventions. Some of engineering measures considered for the project road are breast walls along hill side and retaining walls along valley side. Apart from the engineering measures, nature-based solutions/measures (bio-engineering) also have been proposed at some selected locations to mitigate the impacts of erosion and slope stability along the project road. The details of bio-engineering interventions considered for project road is given in Table 6-13.
- Provisions made for the nature-based solutions/measures (bio-engineering) covers areas/locations along the RoW at upstream and downstream of seasonal streams, CD structures, muck/debris disposal sites, areas reclaimed /open areas in RoW, areas of cleared of invasive vegetation among others.

**Table 6-13 : Nature-based solutions/measures (bio-engineering) for slope stability and erosion control for project road**

S.No	Item	Unit	Quantity
1.1	Construction of hedge brush layer	RM	1,500
1.2	Construction of brush layer	RM	900
2	Construction of live palisade	RM	900
3	Construction of live Fascine	RM	900
4.1	Grass slip plantation on slope <45° @ 100 drills/sqm	sqm	3000
4.2	Grass slip plantation on slope 45°-60° @ 100 drills/sqm	sqm	600
4.3	Grass slip plantation on >60° slope @ 100 drills/sqm	sqm	600
4.4	Plantation of large sized stature grass slips at slope of <45° @ 20 slips/sqm	sqm	600
5	Bamboo crib wall	cum	1,200
6	Tree plantation in plains with tree guard	nos	1,000



S.No	Item	Unit	Quantity
7.1	Shrub Plantation in plains with tree guard	nos	2,500
7.2	Agave plantation in slopes	nos	1,500
8.1	Group plantation of shrubs	sqm	1,200
8.2	Hedge Plantation (2 plants/RM)	RM	900
8.3	Hedge Plantation (4 plants/RM)	RM	900
9	Bamboo plantation with Bamboo tree guard	nos	600
10	Construction of Gabion	cum	Under Civil Works
11	Construction of barb wire	RM	Under Civil Works
12.1	Grass seed sowing<40°	sqm	6000
12.2	Grass seed sowing<40° with mulch	sqm	5000
12.3	Grass seed sowing on slope 40-45° with mulch and jute netting	sqm	3500
13	Hydroseeding	sqm	5000

233. In addition, all vacant and low lying areas within the RoW, is proposed to be filled up using the excess excavated material and the top surfaces of all such filled up areas will be treated with nature-based solutions/measures (bio-engineering). The estimate of such areas within the Row is given in Table 6-13.

**Table 6-13 : Areas Identified for filling using Nature-based solutions/measures (bio-engineering)**

Areas within the RoW identified for filling and nature-based solutions/measures (bio-engineering)	Area/Quantity
- Total area (sqm) identified within the RoW	1,24,730
- Total area along LHS (sqm)	60,077
- Total area along RHS (sqm)	64,653
- Average width within ROW along LHS (m)	4.5
- Average width within ROW along RHS (m)	4.8
<b>Volume of Cut to Spoil in ROW with 1m toe wall</b>	
- Total Volume of spoil (cum) for filling	2,190
- Total Volume of spoil LHS (cum) for filling	1,118
- Total Volume of spoil RHS (cum) for filling	1,072
- Cumulative Length for fill of spoil along LHS (km)	0.8
- Cumulative Length for fill of spoil along RHS (km)	0.7

#### **Hazardous and non-hazardous wastes**

234. The Project will generate both solid non-hazardous and hazardous wastes throughout the construction phase. The anticipated non-hazardous wastes types include excavated material, construction material, Municipal Solid Waste, waste waters. While hazardous waste may include used oil, empty drums or replaced parts of the construction machinery, used battery, chemical for concreting like admixture etc. There are potentially a number of risks to human health and the environment that may be associated with the handling, storage and disposal of waste, both on and off-site. Incorrect handling and storage could result in possible cross contamination of air, soil and water resources; as well as direct and indirect effects on human health. Environmental pollution with organic and non-organic waste generated from project activities may occur due to uncontrolled disposal and inadequate management of waste during road construction and operation of the camps for construction workers. Discharge of untreated waste waters can result

in pollution to soils, water bodies and have adverse effects on human health, flora and fauna and surface and groundwater.

235. During the complete construction phase, an estimated 104 used batteries are likely to be discarded, which are to be disposed of in accordance with the battery management rule. The estimated generation of hazardous waste during the construction waste is given table 6-14.

**Table 6-14: Estimated Hazardous waste during Project Construction Phase**

Equipment Type and Capacity	No.	Tank capacity in litres	frequency 6 months	Quantity in litres	Grease and other misc waste(10 %)	Cotton waste(0.4 Kg per service)
Dozer D-50-A15 - 200 Cum/hr Cap.	2	15	4	120	12	3.2
Motor Grader - Engine output above 150 KW Cap.	2	15	4	120	12	3.2
Long arm Hydraulic Excavator - 1.00 Cum	3	15	4	180	18	4.8
Vibratory Roller ( 2 Tandem + 1 Vibro) - Minimum 8-10T static Weight	2	12	4	96	9.6	3.2
Pneumatic Road Roller - 200-300KN Cap.	1	10	4	40	4	1.6
Smooth Wheeled Roller - 8-10T Cap.	2	15	4	120	12	3.2
Tipper - 5.5 Cum Cap.	15	15	4	900	90	24
Water Tanker - 6 KL Cap.	3	15	4	180	18	4.8
Tractor-Trolley - 50HP Cap.	3	10	4	120	12	4.8
Rock Excavator/Ripper - 60 Cum/hr Cap.	1	12	4	48	4.8	1.6
Hot Mix Plant (Batch Type) with electronic controls and vibratory screens - Minimum 60 to 90 TPH	1	15	4	60	6	1.6
WMM Mixing Plant - Minimum 60 TPH	1	15	4	60	6	1.6
Stone Crushing Plant - 175-200 TPH Cap.	1	15	4	60	6	1.6
Paver Finisher Hydrostatic with sensor control - 100 TPH Cap.	1	15	4	60	6	1.6
Paver Finisher Mechanical for WMM Work - 100 TPH Cap.	1	15	4	60	6	1.6
Bitumen Pressure Distributor - 1750 Sqm/Hr Cap.	1	10	4	40	4	1.6
Power Broom - 1250 Sqm/hr Cap.	1	15	4	60	6	1.6
Loader - 1 Cum Bucket	2	15	4	120	12	3.2
Concrete batching and mixing plant - 15 to 20 cum/hr. Cap.	1	15	4	60	6	1.6

Equipment Type and Capacity	No.	Tank capacity in litres	frequency 6 months	Quantity in litres	Grease and other misc waste(10 %)	Cotton waste(0.4 Kg per service)
Mini smooth wheeled roller - 3-5T Cap.	2	12	4	96	9.6	3.2
Air Compressor - 170-250 cfm Cap.	3	10	4	120	12	4.8
Plate Compactor	2	15	4	120	12	3.2
Transit Mixer - 3-4.5 cum per hr Cap.	5	15	4	300	30	8
Cranes 60-80 T ó capacities, with telescopic arm of Min 25 m length	1	15	4	60	6	1.6
	57			3200	320	91

236. During the construction phase, the generation of municipal solid waste is estimated 50kg per day, as shown in following table which is to be stored and disposed off safely.

**Table 6-15: Estimated Solid waste Generation during Project Construction Phase**

Category	Nos	Kg per day	Quantity Kg	Solid Waste (Peak)	Average	Lean
Supervision Staff	50	0.25	12	12	6	2
Non local at camp site /Migrant	155	0.25	38	38	19	7
<b>Total Municipal Solid Waste in Kg during Construction phase</b>			<b>50</b>	<b>50</b>	<b>25</b>	<b>9</b>
Organic Waste (40%)			20			
In organic Waste (60%)			30			

**Mitigation Measures:**

237. The hazardous waste generated at camp sites is to be collected in steel drums and stored in a segregated roofed area and periodically disposed at approved waste disposal facilities by HPSPCB. The nearest such facility is located at Baddi Barotiwala Nalagarh Industrial Area (BBN) in the adjoining Solan District. The discarded batteries shall be disposed only through authorized recyclers from HPSPCB.

238. The camp site shall have compost pits for treating organic waste and separate bins for collecting the inorganic waste, which shall be disposed at nearest municipal disposal sites. The nearest such sites are available at Mandi and Ghumarwin. All workforce camps and camp sites shall be access controlled to prevent the entry of stray animals including wildlife for scavenging of waste.

239. Waste management and the minimization of potential impacts during construction will depend on the implementation of appropriate procedures, protocols and monitoring of materials being delivered, handled and stored prior to disposal. The CEMP will include a Waste Management Plan prepared in accordance with requirements stipulated in (a) The Batteries (Management & Handling ) Rules, 2001 (b) Municipal Solid Wastes (Management and Handling) Rules, 2000,

(c) Hazardous Waste (Management, Handling & Transboundary Movement) Rules, 2016 and (d) Construction and Demolition Waste Management Rules, 2016.

### Hazard and Vulnerability

240. The vulnerability status of the Bilaspur district as a whole is moderate in terms of landslides, floods, and earthquake. However, the impact due to construction of 13.5km long project road itself does not significantly alter the vulnerability status of the district as a whole. Given site investigation observed and identified potential landslide stretches, the risk due natural calamities like earthquake, landslides and even at times landslide triggered due to road construction work cannot be overlooked. Since, such events would have potential health and safety hazard to personal or work force or labor or community in vicinity and may get stranded at operational sites.

241. **Mitigation Measures:** This include

- In order to ensure the safety of work force at operational sites, as well as safety of the personnel at camp site, an Emergency Response Plan shall be prepared and followed, whenever the situation warrants.
- All work force irrespective of levels are to be provided with training to respond in an emergency situation and periodic mock drills will be conducted to ensure the preparedness to respond any emergency situations.
- The communities on regular interval shall be informed appropriate information, as well as changes in emergency preparedness and response activities.

### 6.5 ...on land & assets (ESS 5)

242. The data related to likely loss due to improvement of the road has been collected through detailed Census & socio-economic survey. As confirmed from the survey and verification of ROW along with PWD and revenue officials, there is no private land acquisition involved. The project shall impact 23 Non-Titleholders structures. Of the total 23 impacted permanent structure, 9 structures shall experience minor impacts of less than 10%, 8 structures shall experience impact between 10 to 20%. Only 6 structures shall lose anywhere between 20 to 30%. Also, the project shall result in minor impacts on 17 CPRs (temple, bus stop, ATM kiosks, hand pump and government school and compound wall of government building). Cut-off date for this corridor is start date of the census survey i.e.8th September, 2019.

**Table 6-16 : Likely Impact of the project on structures, CPRs within RoW**

Impact Category	Likely Impact
Non-Titleholder ó Encroachments	
- Residential	102
- Commercial	15
- Residential + Commercial	16
- Others (Cattle Sheds, Sheds)	3
- Squatters	Nil
- Kiosks	Nil
<b>Sub-Total</b>	<b>136</b>
Title holders ó Land losers	Nil
<b>Common Property Resources</b>	

Impact Category	Likely Impact
School	1
Religious	1
Bus Stand/Rain Shelter	NIL
Government Buildings	NIL
Hand Pump	2
<b>Total</b>	<b>4</b>
<b>Estimated Land Acquisition (Dadhol- Ladrour)</b>	Nil
<b>Disadvantaged and Vulnerable Households</b>	
Schedule Caste	5
Schedule Tribe	1
Women headed Household	0
Below Poverty Line	0
<b>Total</b>	<b>6</b>

S.No	Type of Structure	Total
1	Pucca	123
2	Semi-Pucca	6
3	Kutchha	7
<b>Total</b>	<b>0</b>	<b>136</b>

243. During construction stage, the temporary requirements of land either from government sources or from private parties through lease hold basis to tune of 1.1 Ha is anticipated to establish construction camps, material stack yards, hot mix plants & machinery. These requirements will be fulfilled either through government sources or taking the land on lease from the willing parties. While land requirement is being estimated for disposal of surplus earth from hill cutting. The impact at such location would be localized and temporary nature and these can be reversed through mitigation measures.
244. With the development of the road, avenues for economic activities and opportunities will be created with high likelihood of induced ribbon development or urbanization. Such a scenario though will take time but is likely to stress current land use i.e. predominantly forest along project road, to meet with development demand for commercial or residential usages, which might reduce the forest coverage in the state over time.

#### **Mitigation Measures:**

245. Impacts on land and assets arising pre-construction stage activities will require be addressing and mitigating through a mix of measures of compensation, assistance and relocation arrangements. For this purpose, a Resettlement Action Plan will be developed that will contain details of such mitigation provisions. The mitigation provisions includes:1) Fixation of compensation at replacement cost will be paid as per the provisions mentioned in RFCTLARR Act 2013 or through negotiated settlement; 2) Structure replacement cost will be calculated as per the Basic Schedule of Rate and with depreciation;3) Each affected family shall be given a one-time "Resettlement Allowance";4) one time rehabilitation grant for reconstruction of affected assets;5) One time subsistence assistance in cash for displaced families;6) one time transportation allowance for shifting the assets for displaced families;7) Training for skill development. This

assistance includes cost of training and financial assistance for travel/conveyance and food;8) one time cash grant as vulnerability allowance; and 9) Reconstruction of community structure and common property resources, will be done in consultation with community;10) compensation for temporary impact. It will also be prepared keeping in view actions proposed under the Stakeholder Engagement Plan. In addition, in cases of impacts on livelihood, rehabilitation through appropriate skill training/financial counselling would be required as well.

246. Additionally, concerns and needs of vulnerable groups will be addressed through a mix of measures that includes additional assistances as part of R&R measures. Besides other location specific measures, as stated in the ESMP, will be devised during the construction stage such as provision of temporary access to facilitate movement, access ramps at bus shelters for the physically challenged etc.
247. The impacts arising due to construction over land use cannot be completely avoided. It can only be minimized by adopting the following measures:
- i. Waste lands belonging to Government or non-agricultural lands belong to private or community shall be chosen for establishing construction camps material stack yards, hot mix plants & machinery, debris or muck disposal sites. If landfill site or previously used sites are available along the road, the same sites shall be preferred and no new site shall be opened up for all establishment needed during project period.
  - ii. No agricultural land or grazing land or fertile community lands are to be used for project's establishments.
  - iii. Use of forest area for project's temporary establishment shall be avoided. If unavoidable, location and area with less canopy density shall be preferred and shall atleast 500m of distance maintained from high density canopy forest areas. Damages to tree or land diversion in forest area shall be compensate and compensatory afforestation of vacant lands/degraded forest are to be made as per the stipulation of the department of forests, GoHP.

## **6.6 ... relating to Bio-diversity & Living Natural Resources (ESS 6)**

### **Protected Area**

As per field investigations and consultations with forest departments, there is no protected forest area along the project road.

### **Impact on Flora**

248. The site clearance activities for road construction will involve removal of road side vegetation and felling of trees. The biodiversity studies has indicated that although the entire area is rich in biodiversity, the project corridor is relatively less diverse due to human intervention but is interspersed with invasive species like *Ageratum conyzoides*, *Eupatorium adenophorum*, *Lantana camara*, *Parthanium hysterophoros*. The ecological investigations have indicated that there are no rare, endangered and threatened species with in the corridor.
249. In view of the environmental/ecological concerns, the removal of invasive species and replantation of suitable local vegetation types will NOT employ any chemicals.
250. A total of 3614 has been enumerated existing within existing right of way, of which only 75 trees (2%) needs to be cut for road improvement. As per the current procedure of department of forests, GoHP, tree enumeration has to be conducted jointly with the department of forests after the marking of the center line of the proposed road improvement plan. Thus, the number of trees which will be required to be felled for road construction is not known at this stage. While

according to the permissions for tree felling, the forest department will stipulate planting of three saplings for every tree cut and maintenance of the same for five years with 70% survival rate.

251. **Mitigation Measures:** In order to limit the impacts on the flora due to the road construction, the following measures are considered:

- Compensatory Plantation is to be taken up either along the project corridor or at places identified by the department of forests, GoHP in order to compensate for the tree felled. At least 3 saplings shall be planted for every tree felled or as per the stipulation of the mentioned in the permission for tree felling provided by the Department of Forest, Government of Himachal Pradesh. With this compensatory plantation measures, the tree cover lost could be regained in 5 to 7 years and thus the impacts could get mitigated.
- Only local species, which are less water consuming and approved by the forest department shall be used for plantation. Normally, all such afforestation will be undertaken by the department of forest and maintained for three years as a deposit work. Therefore, cost provision for Compensatory Plantation is included in ESMP Budget.
- In order to limit the propagation of invasive species, firstly all such invasive species within the corridor of impact and/or right of way shall be removed/cleared and replanted with local species. The department of forests, GoHP has framed a procedure for removal of invasive species and replanting of local species.
- Normally, all such activities will be undertaken by the department of forest and maintained for three years as a deposit work. Therefore, cost provision for corridor plantation is included in ESMP Budget.

#### **Impacts on Fauna**

252. There is no National Park or wildlife sanctuary within 10km from the project corridor.

253. A total of 23 mammalian species that include Rhesus Macaque, Langur, Red Muntjac, Sambar, wild pig, jungle cat, palm civet, Indian civet, golden jackal etc. were recorded. However, none of the species reported in the project area is under Schedule-I category of Indian Wildlife Protection Act-1972. During primary survey, no such endangered species encountered which comes under the Rare and endangered category of IUCN. Though, during local consultations along the project corridor indicate that they frequently face attacks from monkeys near Ladhiyani village.

254. Mitigation Measures would include the following:

- The camp sites and work force camps shall be access controlled and well-lit to avoid/prevent entry of wild animals.
- The work force shall be oriented not to feed monkeys and to properly collect waste food in dustbins to prevent menace in camp area.
- All work force shall be oriented to keep calm and walk away from the scene, in case, wild animals are sighted either during work hours/night time.
- Work force shall be strictly instructed not to harm / kill and prohibited hunting of wild animals under any circumstances
- The Work force shall be strictly prohibited from entering in to forest areas under any circumstances.
- The Construction camp and work force camp sites shall not be established in the vicinity/nearby forest areas. At least 500m distance shall be kept from such areas under unavoidable circumstances.

- The construction work shall be restricted to day hours only, while working established in the vicinity/nearby forest areas and work shall not be carried out in the late evening hours/night hours /early mornings.

#### **6.7 ... on Tribals/Indigenous Population (ESS 7)**

255. The corridor does not have any schedule V areas. Though it has one (1) impacted tribal household across the 13.5 km corridor, the household has been living in the project area for the last 40 years, speaks Hindi (the local language) that is spoken by all others in the area. Also, it neither has a identity distinct from others in the area, and nor does it follow any separate customary cultural economic social or political institutions from what is followed by the general population in the area. Hence the household is well mainstreamed into the society and does not meet the characteristics outlined in ESS 7<sup>7</sup>.
256. Mitigation measures: Hence no differential provisions will be required to address the impacts on this households. Impacts on these households shall be treated through the provisions outlined in the Resettlement Action Plan.

#### **6.8 ... on impacts on Cultural Heritage (ESS 8)**

257. The alignment of the project road does not have any ancient monuments and/or archaeological site (s), protected under the Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010. Thus, no impacts are foreseen on ancient monuments and archaeological sites due to the construction of road project.
258. The project road has 1 religious structure/shrine, which shall experience minor impact by the proposed road improvement activities. These have been identified through surveys and stakeholder consultations.
259. All fossils, old coins, articles of value of antiquity, structures and other remains or archaeological interest, if any discovered on the site during excavation works shall be the property of the Government and shall be dealt with as per provisions of the relevant legislation.
260. Impacts on religious structures/shrines, will be avoided during construction phase and will be addressed through a Cultural Heritage Management Plan as part of ESMP. The cultural heritage management plan will include:
- a chance finds procedure to be established. It is a project-specific procedure which will be followed if previously unknown cultural heritage is encountered during project activities. It will be included in all contracts relating to construction of the project, including excavations, demolition, movement of earth, flooding or other changes in the physical environment.
  - recognize the need to ensure peoples' continued access to culturally important sites, as well as the need for confidentiality when revealing information about cultural heritage assets that would compromise or jeopardize their safety or integrity
  - fair and equitable sharing of benefits from commercial use of cultural resources and provisions for specific types of cultural heritage based on consultations with stakeholders affected and other interested parties, if any are identified during construction based on chance find procedure
261. The project construction will not directly positively or adversely impact any tourism activities of the region. On the contrary, the project road after its completion may contribute to tourism by improved connectivity and reduction in travel time.

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<sup>7</sup>characteristics as outlined in ESS 7 of Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities



262. As a part of design, adequate consideration was given to minimize the impacts on most of the sensitive receptors. However, in unavoidable circumstances, noise barriers has been considered as a mitigation measure at two schools to attenuate the noise levels due to anticipated increase in the traffic after the upgradation of project road.
263. Further, all the noise barriers are to be constructed prior to the road construction work at the respective location of the sensitive receptors. Location specific traffic diversion plans will be implemented during the road construction near these sensitive receptors and all work will be swiftly completed with minimal inconvenience.

## CHAPTER 7 – ENVIRONMENT AND SOCIAL MANAGEMENT PLAN

264. This section provides description of the various environment and social management measures during Pre-construction, Construction & Operation Phases of the project road have been provided in Table 7.1

### PRE-CONSTRUCTION ACTIVITIES

#### Pre-Construction Activities by Project Implementation Unit (ESMU)

265. Prior to the Contractor mobilization, the PIU will ensure that an encumbrance free road section is handed over to enable the start of construction. The RoW clearance involves 1) Forest land acquisition, if any existence of forest land 2) Removal of trees. 3) Relocation of private/common property resources 4) Compensation of affected families and 5) Shifting of Utilities.

#### Pre-Construction Activities by Contractor

266. The pre-construction stage involves mobilization of the Contractor, the activities undertaken by the Contractor pertaining to the planning of logistics and site preparation necessary for commencing construction activities. The activities includes; 1) Procurement of construction equipment / machinery such as crushers, hot mix plants, batching plants and other construction equipment and machinery 2) Identification and selection of material sources (quarry and borrow material, water, sand etc.) and debris disposal locations 3) Planning traffic diversions and detours, including arrangements for temporary land acquisition for Construction camps. 4) Preparation of C-ESMP which include, OHS plan, Water and Waste Management Plan, Influx management Plan, Workers camp management plan, CHS Plan, Transport (or road safety) management Plan, Quarry/borrow area management plan, establishment of GRM for labour and Site restoration Plan among others in accordance with the GoI and/or IFC /WB/EBRD workers Accommodation guidelines.. All such plans prepared by contractor will be reviewed and approved by the PMC and HPRIDC, prior to commencement of construction works.

### CONSTRUCTION STAGE

#### Construction Stage Activities by the Contractor

267. Construction stage activities require careful management to avoid environmental impacts. Activities that trigger the need for environmental measures to be followed include 1) Implementation of site-specific mitigation/management measures suggested 2) Monitoring the quality of environment along the construction sites (as air, noise, water and soil).

268. There are several other environmental issues that have been addressed as part of good engineering practices, the costs for which have been accounted in the engineering costs. They include improvement of major & minor junctions, roadside drainage, provision of additional cross drainage structures or raising the road height in low-lying stretches, provision of bus stops, provision of landslide/erosion prevention measures etc.

#### Operation Stage

269. Monitoring the environmental attributes during the initial years of operation of the road shall be carried out by the PIU (ESMU) Contractor as laid down in the monitoring plan, under the supervision of the Engineer.

**Table 7-5: Environment and Social Management Plan – Environmental Impacts**

S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures	Responsibility	
			Planning and Execution	Supervision/ Monitoring
<b>PRE-CONSTRUCTION ACTIVITIES BY ESMU (ENVIRONMENT AND SOCIAL MANAGEMENT UNIT OF HPSRTP/HPRIDC)</b>				
1.	Construction Package including both Road and Bridge Components	The project road does not require any prior environmental clearances. Only permission for tree felling will be required from department of forests, GoHP. ESMU shall apply for the tree permissions well in advance and no site clearance or pre-construction activities shall be initiated in stretches, which involve tree felling.	Environment & Social Management Unit (ESMU) for project Road under HPSRTP/HPRIDC	Nodal Environmental Officer under HPSRTP under the guidance of Superintending Engineer of HPSRTP/HPRIDC
2.	Clearance of private structures (encroachments and squatters)	The compensation and removal of private assets within the COI, will be carried out in accordance to resettlement policy framework applicable to HPSRTP and as per the Resettlement Action Plan prepared for this specific corridor. As per the RAP encroachers & squatters will be paid due entitlements (compensation and assistances) and shifted out of COI. Relocation of impacted CPRs shall be carried out as per the RPF provisions.	ESMU, Revenue Dept, Collaborating Agencies	Project Director, HPRIDC
3.	Forest Land Acquisition	No forest identified along the road. In event any parcel of land along road is claimed by Forest Department department as forest land during implementation, then to determine ownership, HPRIDC shall carry out joint verification with forest and revenue departments and address in accordance with existing regulations.	ESMU, Revenue Dept, Collaborating Agencies	Project Director, HPRIDC
4.	Relocation of Community Utilities and Common Property	All community utilities and properties i.e., hand pumps, compound walls for school, govt building & temple will be build/relocated before construction starts in the project road. There will be an impact to two hand pumps, one Govt Building, one religious place and two compound walls due to project activities. HPRIDC will relocated or rebuild all community utilities and properties i.e., hand pumps, compound walls for school, govt building & temple will be build/relocated before construction of road as per provisions listed in the RPF and ESMP The HPRIDC will coordinate with respective user agencies for shifting of utilities	ESMU, Revenue Dept, Collaborating Agencies (PHED for water supply, Education Department for schools)	ESMU (Environment and Social Management Unit)

S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures	Responsibility	
			Planning and Execution	Supervision/Monitoring
		in a timely manner avoiding disruption to construction schedule.		
<b>PRE-CONSTRUCTION ACTIVITIES BY CONTRACTOR OR PROJECT MANAGEMENT CONSULTANTS (PMC)</b>				
5.	Orientation for Contractor and submission of C-ESMP	<p>Contractor is required to be oriented with the requirement of ESMP and ESS requirement of WB. This will include;</p> <ul style="list-style-type: none"> <li>• Obligations under contract to submit and preparation of Contractor Environmental and Social Management Plan</li> <li>• Regulatory compliance requirements</li> <li>• Grievance redress mechanism for both social and environmental issues</li> <li>• Various plans required under C-ESMP related to Occupations Health &amp; safety, traffic and road safety, community health and safety, hazardous and non-hazardous waste, camp site management, emergency response, blasting, borrow area, muck disposal, restoration etc.</li> <li>• Labour management procedures</li> <li>• Community health &amp; safety aspects at workplace and</li> <li>• Reporting requirements etc. under the project.</li> <li>• Stakeholder Engagement Plan</li> </ul> <p>Contractor shall appoint one Environmental Officer, Social-cum-Community Liaison Officer and one Health and Safety Officer, both of whom shall solely be responsible for implementation of all ESMP provisions in close co-ordination/consultation with Environmental and Social Specialist in ESMU, HPRIDC.</p>	Environmental and Social Specialists in PMC	Nodal Environmental and Social officers in ESMU, HPRIDC
6.	Joint Field Verification	The Environmental Specialist of PMC and the Contractor will carry out joint field verification to ascertain any possibilities of saving trees, environmental and community resources, if these activities are to be taken up by the construction Contractor.	Environmental officer and Project Manager of the Contractor	Environment Specialist and Resident Engineer of Project Management Consultant (PMC)
7.	Crushers, Hot-mix Plants and Batching Plants Location	All construction plants will be sited sufficiently away from settlements and agricultural operations or any commercial establishments. Such plants will be located at least 100 m away from forest, water bodies, and sensitive areas like hospital, schools, temples and the nearest dwelling preferably in the downwind	Environmental officer/health & safety officer and Project Manager of the Contractor	Environment Specialist and Resident Engineer of Project Management Consultant (PMC)

S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures	Responsibility	
			Planning and Execution	Supervision/Monitoring
		<p>direction.</p> <p>The Contractor shall submit a detailed layout plan for all such site establishments and approval of Environmental Specialist of PMC shall be necessary prior to the establishment. Site specific protection measures required at such location will be considered to minimise associated environmental and social risk, if the site selection is in rolling terrain.</p> <p>Arrangements to control dust pollution through provision of wind Screens, water sprinklers, and dust extraction systems will have to be provided at pollutant sources in all such sites. For dust suppression, water sprinkling will be done minimum three times a day.</p> <p>Specifications for crushers, hot mix plants and batching plants will comply with the requirements of the relevant emission control legislation.</p> <p>Consent for the Establishment and Operation from HPSPCB shall be obtained by the Contractor before establishment and operation of crushers, hot mix plants and batching plants. A copy of these permissions should be submitted to the PMC and ESMU, HPRIDC.</p> <p>The contractor shall carry out monitoring of these plants as per Monitoring Program in ESMP and will carry out necessary servicing/repair/maintenance to comply with permissible standards for air and noise of GOI and GoHP.</p>		
8.	Other Construction Vehicles, Equipment and Machinery	<p>All vehicles, equipment and machinery to be procured for construction will confirm to the relevant Bureau of India Standard (BIS) norms. The discharge standards promulgated under the Environment Protection Act, 1986 and Motor Vehicles Act, (Amendment) 2019 shall be strictly adhered to.</p> <p>The Contractor shall maintain a record of PUC for all vehicles and machinery used during the contract period which shall be produced EO, ESMU/ PWD's verification whenever required.</p> <p>The contractor shall maintain record and conduct fitness test of all vehicles and machinery at regular interval of one year and fitness certificated shall be submitted to PMC. Only fit vehicles and machinery shall be deployed during construction.</p>	Environmental officer/health & safety officer and Project Manager of the Contractor	Environment Specialist and Resident Engineer of Project Management Consultant (PMC)

S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures	Responsibility																
			Planning and Execution	Supervision/ Monitoring															
		All vehicles and machinery used during construction should be we well maintained, efficient vehicles having a lower emission.																	
<b>IDENTIFICATION AND SELECTION OF MATERIAL SOURCES</b>																			
9.	Borrow Areas	<p>The Contractor shall not open any new borrow area without obtaining Environmental Clearance (EC) from DEIAA as required under EIA notification 2006 as amended for minor minerals. The PMC approval of contractor's propose borrowing of area shall be after ascertaining EC requirements under statutory requirement. No borrow area shall be operated in forest and agriculture land, and near to water bodies.</p> <p>If Borrow area land belongs to Govt, then contractor will obtain a prior approval from respective government department/authorities.</p> <p>The Contractor will not start borrowing earth from selected borrow areas until formal agreement is signed between landowner and Contractor, and Borrow Area management and redevelopment plan is submitted and approved by PMC. The operation of borrow area shall strictly adhere to approved borrow area management and redevelopment plan.</p> <p>Planning of haul roads for accessing borrows areas will be undertaken during this stage. No new haulage route to borrow area shall be developed. Preference shall be using of existing village roads wherever available. The contractor to their convenience may decide on using of identified potential borrow areas locations after complying aforementioned requirements.</p> <p>Following are the identified borrow areas locations and contractor may or may not use based on its requirement and ease.</p> <table border="1"> <thead> <tr> <th>Area</th> <th>Chainage (km)</th> <th>Distance from road</th> <th>Side</th> <th>Land use ty</th> </tr> </thead> <tbody> <tr> <td></td> <td>10+000</td> <td>Roadside</td> <td>RHS</td> <td>Govt. Land</td> </tr> <tr> <td></td> <td>13+000</td> <td>Roadside</td> <td>RHS</td> <td>Govt. Land</td> </tr> </tbody> </table> <p>The environmental Specialist of the PMC will inspect every borrow area locations</p>	Area	Chainage (km)	Distance from road	Side	Land use ty		10+000	Roadside	RHS	Govt. Land		13+000	Roadside	RHS	Govt. Land	Environmental officer/health & safety officer and Project Manager of the Contractor	Environment Specialist and Resident Engineer of Project Management Consultant (PMC)
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S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures	Responsibility	
			Planning and Execution	Supervision/Monitoring
		prior to approval. The PMC should include the 'Request for Inspection' form for approving opening and restoration of borrows area from the environmental angle.		
10.	Quarry	<p>The contractor shall carry out assessment of existing quarries and identify plans to be prepared to comply with provisions in project's ESMP, which will be part of Quarry Management Plan to be submitted for approval of PMC. The PMC should include the 'Request for Inspection' form for approving opening and closing of quarry area from the environmental angle.</p> <p>The contractor's Quarry Management Plan shall include</p> <p>a). Existing Quarry</p> <p>The Contractor's Environmental Officer due diligence report of existing quarries compliance with existing statutory requirements, identify and measures to offset risk to the project.</p> <p>The various plans to comply with project's ESMP such as OHS of workers, fugitive dust control during transportation and at stock piling, stockpile management and any other anticipated risks.</p> <p>b). New quarry</p> <p>The Contractor shall not open any new quarry area without obtaining Environmental Clearance (EC) from DEIAA as required under EIA notification 2006 as amended for minor minerals and The Mines and Minerals (Development and Regulation) Act 1957.</p> <p>The contractor will submit the quarry management plan and conditions for approval of quarry site by Mining Department along with details of locations identified for establishing various requisite temporary establishments for quarry and crusher operations.</p> <p>Consent for the Establishment and Operation from HPSPCB shall be obtained by the Contractor before establishment and operation of crushers, DG Set. A copy of these permissions should be submitted to the PMC and ESMU, HPRIDC.</p> <p>The various plans to comply with project's ESMP such as OHS of workers,</p>	Environmental officer/health & safety officer and Project Manager of the Contractor	Environment Specialist and Resident Engineer of Project Management Consultant (PMC)

S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures	Responsibility	
			Planning and Execution	Supervision/Monitoring
		establishment of workers accommodations, waste management, fugitive dust control during transportation and at stock piling, waste water and sanitary waster from workers camps, storage of fuel, stockpile management and any other anticipated risks will be part of Quarry Management Plan.		
11.	Arrangement for Construction Water	<p>The contractor shall be responsible to arrange 26.7ML of project's water demand in compliance to requisite statutory requirements. In doing so, the contractor shall assess water source availability and will prepare a project's water budget and management plan for approval of PMC.</p> <p>To avoid disruption/disturbance and stressing of other water sources like springs and seasonal streams used by the communities, the contractor shall submit list of fixed water sources identified for extracting water and for PMC approval.</p> <p>To meet daily water requirements of water, Contractor shall prepare and implement the approved water management plan in accordance with the Appendix 3.</p> <p>The Contractor will use ground water as a source of construction water and may set up own bore well facility. Creating of new bore well shall be in compliance with the requirements of the State Ground Water Department for the extraction. The contractor shall submit a copy of the permission to PMC and ESMU.</p> <p>The contractor shall construct water harvesting structure along road to meet demand of water during construction.</p>	Environmental officer/health & safety officer and Project Manager of the Contractor	Environment Specialist and Resident Engineer of Project Management Consultant (PMC)
12.	Labour Requirements	The Contractor preferably will use unskilled labour drawn from local communities to give the maximum benefit to the local community. Contractor to be guided by the LMP.	Environmental officer/health & safety officer and Project Manager of the Contractor	Environment Specialist and Resident Engineer of Project Management Consultant (PMC)
13.	Arrangements for Temporary Land Requirement	The Contractor as per prevalent rules will carry out negotiations with the landowners for obtaining their consent for temporary use of lands for construction camp/ borrow areas/Debris Disposal Area etc.	Environmental officer/health & safety officer and Project Manager of the Contractor	Environment Specialist and Resident Engineer of Project Management Consultant (PMC)
14.	Orientation of	The PMC jointly with ESMU shall identify target audience for capacity building	PMC	ESMU



S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures	Responsibility	
			Planning and Execution	Supervision/Monitoring
	Implementing Agency and Contractors	of project key stakeholders on implementation of project's ESMP. The PMC and ESMU shall organize orientation sessions and regular training sessions during all stages of the Project. This shall include on-site training (general as well as in the specific context of a sub-project). These sessions shall involve staffs of ESMU (involved in the implementation of ESMP), PMC and Contractors.		
<b>CONSTRUCTION STAGE</b>				
15.	Clearing and Grubbing	<p>Vegetation will be removed from the construction zone before commencement of construction. All works will be carried out such that the damage or disruption to flora other than those identified for minimum cutting.</p> <p>Only ground cover/shrubs that impinge directly on the permanent works or necessary temporary works will be removed with prior approval from the Environmental Specialist of PMC.</p> <p>The Contractor, under any circumstances will not cut or damage trees and forest reserves. Trees identified under the project will be cut only after receiving clearance from the Forest Department and after the receipt of ESMU's written permission in this regard.</p>	Environmental officer/health & safety officer and Project Manager of the Contractor	Environment Specialist and Resident Engineer of Project Management Consultant (PMC)
16.	Stripping, Stocking and Preservation of Topsoil	<p>The topsoil from all areas of cutting and all areas to be permanently covered will be stripped off to a specified depth of 150 mm and stored in stockpiles. The contractor will earmark temporarily land area and/or Right of Way for storing topsoil. The locations for stock piling will be pre-identified in consultation and with approval of Environmental Specialist of PMC. The contractor shall take measures to prevent generation of dust from such stockpile areas by covering or retaining soil moisture. In addition to taking erosion preventive measures, stripping activity shall not be planned or scheduled during monsoon period.</p> <p>Such stockpiled topsoil will be utilized for</p> <ul style="list-style-type: none"> <li>• To prepare surface for bioengineering measures.</li> <li>• Covering all disturbed areas including borrow areas</li> <li>• Dressing of slopes of road embankment</li> <li>• Agricultural fields of farmers acquired temporarily land.</li> </ul>	Environmental officer/health & safety officer and Project Manager of the Contractor	Environment Specialist and Resident Engineer of Project Management

S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures	Responsibility	
			Planning and Execution	Supervision/ Monitoring
17.	Construction Camp Locations - Selection, Design and Lay-out	<p>Contractor's Environmental Officer and Health and Safety Officer in consultation and with requisite approvals from Gram panchayat and/or private land owners shall identify suitable lands, which can be used as material stack yards and work camp sites for establishing macadam mix plants, hot mix plants and storage of construction materials by the contractor during construction phase. The contractor submit to PMC the lease agreement with private/community/government owner for setting up campsites at suitable locations along road alignment and shall mandatorily restore to its previous state after completion of road construction works.</p> <p>The contractor shall submit location specific lay-out plan of all temporary establishment with details of facilities proposed for approval of PMC. No temporary establishments shall be operated without consent of PMC.</p> <p>Preferably barren lands or uncultivable lands and those away from human settlements shall be the given preference, while selecting and establishing work camp sites. Also, these shall be at least 500m distance away from forest areas and water bodies. The selected land shall not warrant significant change in land forms or terrain, to make it suitable for establishing work camp sites/store yards. In case, land had been earlier used for establishing work camp site and meets the above requirements, same shall be given preference</p> <p>If private land (s) has been identified, no site clearing operations shall commence without a written lease agreement. The agreement with landowner shall clearly state the lease duration, compensation for the agreed lease period, site restoration plan as desired/required by the landowner and any other condition mutually agreed upon between contractor and landowner. In case agricultural land have been chosen with no alternatives, then topsoil (30-45 cm deep) shall be collected and stored in an access-controlled area and covered with net cloth. Regular sprinkling of water in pressurized fine spray shall be done to prevent blowing away of soil.</p> <p>The contractor shall be responsible to provide any mitigation and management measures to prevent induced impacts from such establishment due to waste water, solid waste, landslide, erosion, clogging of streams, soil and water contamination, spoil dumping etc. Any claims or complaints arising due to contractor actions</p>	Environmental officer/health & safety officer and Project Manager of the Contractor	Environment Specialist and Resident Engineer of Project Management

S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures	Responsibility	
			Planning and Execution	Supervision/ Monitoring
		<p>shall be addressed in amicable way at their own cost.</p> <p>Requisite consent to establish and consent to operate shall be obtained from HPSPCB. All stipulated consent conditions by HPSPCB shall be strictly adhered and complied by contractor.</p> <p>The work camp sites shall be access controlled with fixed entry and exit points.</p> <p>The dust levels at the work camps sites is to be controlled through regular sprinkling of water through similar mobile tankers deployed at operational areas for road construction. Bitumen mix plants, Batch mix plants deployed for road construction shall conform to regulatory norms/requirements. The site shall be cleared from all remnants of construction and debris and site restored to its previous state, prior to handing the site to the owner. The work camp sites shall mandatorily have designated paved areas with shades/roof for storage of used oils/lubes in plastic/HDPE drums, prior to their final disposal in HPSPCB approved disposal locations</p> <p>Provision of one mobile toilet of 2-seater capacity (1 men and 1 women with separate entrances) shall be stationed at a suitable place within 100 metres from each operational area. The mobile toilet shall have at least 1000 litres overhead water storage, well always maintained and in usable condition. Bottom tanks shall be regularly cleaned and overhead tank replenished as per requirement. Work force shall be oriented to use mobile toilets and avoid using public toilets and/or nearby open places/parks.</p> <p>Every operational area shall be provided with one mobile drinking water kiosk having a storage of 300 litres and placed at a suitable place within 100 metres from work site.</p> <p>All work force shall be provided with suitable type of accommodation, if required and local labour or can return to their normal places of residence. Pooled transportation facilities as may be required, shall be provided by contractor. If establishing workforce camps become utmost necessary, then same shall be established at least 500m away from the settlement areas and away from bridge sites and or any other water body. The camp site shall be restored to its previous state or as agreed upon with the landowner prior to establishing the workforce</p>		

S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures	Responsibility	
			Planning and Execution	Supervision/ Monitoring
		<p>camp.</p> <p>The workforce camps shall be provided with all basic facilities like water supply, cooking gas facility, sanitation facilities including provision of mobile toilet (of adequate seating capacity for men and women separately) shall be stationed within the workforce camp. The mobile toilet shall be periodically replenished with fresh water for ablution purposes and waste water shall be emptied through suction tankers and carried to the nearest municipal sewage treatment facilities. Alternatively, septic tank cum soak pit arrangements of adequate capacity shall be provided.</p> <p>No waste water from the camp/work force site shall be discharged directly without any treatment in to any surface water channels or drain, which eventually join surface water bodies.</p> <p>The camp sites shall have 4 numbers of septic tank (each 5m Length, 2m Breadth and 1.5 m Clear depth with 0.3 free board) with soak pit arrangement which can serve for work force at peak level as per CPWD specifications. (See appendix 17)</p>		
18.	Earth / Rock excavation and Disposal of Muck/Construction Debris	<p>The site clearance and/or excavation activities shall be opened up only in segments of 250m stretch at a time and no new stretches shall be opened up unless the clearance and/or excavation activities in previous stretches been satisfactorily completed and clearance given for the opening of next stretch by PMC.</p> <p>Prior to undertaking any site clearance and/or excavation activities, particularly hill side cut and excavation activities in any working stretch, the contractor shall mandatorily prepare an excavation plan with site specific measures/plans to comply with project's ESMP. The contractor through 'Request for Inspection' form will submit 'excavation plan' to PMC for approval in advance before opening of new work zone i.e. 250m for approval of PMC. The excavation plan shall detail estimated volume of material to be cut or excavated, details of approved disposal sites, arrangements made for transport of excavated material to the approved disposal sites, dust suppression measures at excavation site and along transportation routes, method of stacking and/or handling the excavated material at the disposal site, health and safety measures, road safety and traffic management, slope stability and erosion and emergency response etc.</p>	Environmental officer/health & safety officer and Project Manager of the Contractor	Environment Specialist and Resident Engineer of Project Management

S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures	Responsibility													
			Planning and Execution	Supervision/Monitoring												
		<p>The contractor's handling and management of surplus unusable excavation material shall be through a Muck Disposal Plan. The site specific Muck Disposal Plans so prepared shall be reviewed and approved by PMC and shall be mandatory for opening and commencement of excavation or hill side cutting at new work zone or stretch. The site-specific Muck Disposal Plan will contain</p> <p>Agreement with land owner</p> <p>If muck disposal site is in forest land, the contractor with assistance of HPRIDC shall obtain permission/clearance for any damage to forest land.</p> <p>On a contour map record land area, boundary limits, existing and surrounding environmental settings, but not limited to topography, drainage, water bodies, settlements, trees, haul road etc. and identify likely environmental risk and safety hazards.</p> <p>The details of mitigation measures shall include both engineering (toe wall, gabion wall) and non-engineering measures (benching, bio-engineering).</p> <p>Restoration plan of the muck disposal site</p> <p>The construction debris from all operational areas shall be regularly scavenged and disposed off at disposal sites identified under the project or those approved by District administration. Prior to debris collection, a fine spray of water shall be sprinkled with pressurized fine spray to contain/limit dust levels at source. Following are the locations identified for disposal of debris during excavation or demolition process.</p> <p>Following are the locations identified for disposal debris during excavation or demolition process.</p> <table border="1"> <thead> <tr> <th>S. No.</th> <th>Chainage (Km)</th> <th>Type of Land</th> <th>Capacity (m3)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0+900 (RHS)</td> <td>Govt Land</td> <td>14,000 (L=70m; W=40m)</td> </tr> <tr> <td>2</td> <td>3+350 (RHS)</td> <td>Private Land</td> <td>2200 (L=30m; W=15m;)</td> </tr> </tbody> </table>	S. No.	Chainage (Km)	Type of Land	Capacity (m3)	1	0+900 (RHS)	Govt Land	14,000 (L=70m; W=40m)	2	3+350 (RHS)	Private Land	2200 (L=30m; W=15m;)		
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S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures				Responsibility	
						Planning and Execution	Supervision/Monitoring
		3	4+950 (RHS)	Govt Land	4500 (L=30m; W=30m; H=5m)		
		4	5+650 (RHS)	Govt Land	1500 (L=30m; W=25m; H=2m)		
		5	5+900 (RHS)	Govt. Land (PWD)	1200 (L=40m; W=10m; H=3m)		
		6	10+700 (RHS)	Govt Land (Revenue department)	38500 (L=110m; W=50m; H=7m)		
		7	13+100 (RHS)	Govt. Land (PWD)	4200 (L=40m; W=15m; H=7m)		
		<p>Prior to disposal, the contractor based on soil testing shall screened for recovery of good soil, which can be used in the construction of sub grade, shoulders, back filling of retaining/breast/toe walls and rock boulders for gabions and or noise barrier masonry walls. The use of excavated material in the project is agreement with technical specification and standards prescribed for the project and approval by the PMC.</p> <p>The noise levels during excavation shall be reduced by providing silencers and through deployment of well- maintained and relatively newer machinery. All excavation activities shall be undertaken during day time and at normal work pace.</p>					
19.	Accessibility	<p>The Contractor will provide safe and convenient passage for vehicles, pedestrians and livestock to and from roadsides and property accesses connecting the project road, providing temporary connecting road.</p> <p>The Contractor will also ensure that the existing accesses will not be undertaken without providing adequate provisions. After completion of the work damaged accesses will be restored by the Contractor.</p>				Environmental officer/health & safety officer and Project Manager of the Contractor	Environment Specialist and Resident Engineer of Project Management
20.	Planning for Traffic Diversions and Detours	<p>Temporary diversions will be constructed with the approval of the Resident Engineer and Environmental Specialist of PMC. Detailed Traffic Control Plans will be prepared by the Contractor and submitted to Environmental Specialist and Resident Engineer of PMC for approval seven days prior to commencement of</p>				Environmental officer/health & safety officer and Project Manager of the	Environment Specialist and Resident Engineer of Project Management

S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures	Responsibility	
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		<p>works on any section of road. The traffic control plans shall contain details of temporary diversions, traffic safety arrangements for construction under traffic, details of traffic arrangement after cessation of work each day, safety measures for night-time traffic and precaution for transportation of hazardous materials and arrangement of flagmen.</p> <p>The Contractor will ensure that the diversion/detour is always maintained in running condition, particularly during the monsoon to avoid disruption to traffic flow.</p> <p>The Contractor will also inform local community of changes to traffic routes, conditions and pedestrian access arrangements with assistance from PMC and ESMU. The temporary traffic detours will be kept free of dust by sprinkling of water three times a day and as required under specific conditions (depending on weather conditions, construction in the settlement areas and volume of traffic).</p>	Contractor	
<b>PROCUREMENT OF CONSTRUCTION MATERIAL</b>				
21.	Earth from Borrow Areas for Construction	<p>The location, shape and size of the designated borrow areas will be as approved by the Environmental Specialist of PMC and operated in accordance to the IRC recommended practice for borrow pits for road embankments (IRC 10: 1961). The borrowing operations will be carried out as specified in the guidelines (appendix 1) for siting and operation of borrow areas.</p> <p>If unpaved surfaces used for the haulage of borrow materials, passing through the settlement areas or habitations, will be maintained dust free by the Contractor. Sprinkling of water will be carried out twice a day to control dust along such roads during their period of use.</p> <p>During dry seasons (winter and summer) frequency of water sprinkling will be increased in the settlement areas and Environmental Specialist of PMC will decide frequency of sprinkling depending on the local requirements.</p> <p>Contractor will rehabilitate the borrow areas as soon as borrowing of soil is over from a borrow area in accordance with the approved borrow area management and Redevelopment Plan.</p>	Environmental officer/health & safety officer and Project Manager of the Contractor	Environment Specialist and Resident Engineer of Project Management
22.	Quarry Operations	The Contractor shall obtain materials for quarries only after consent of the	Environmental	Environment Specialist

S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures	Responsibility	
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	Crushers	<p>Department of Mining and District Administration. In view of the special situation of excavation of the hill ward side, Contractor will get an opportunity to use the same material for road construction.</p> <p>For the project one quarry has already been identified and is located 15 Km away from Dadhol, which is the beginning of the project road.</p> <p>The Contractor will develop a Comprehensive Quarry Redevelopment plan, as per the HP Mineral Policy 2013/guidelines as provided in appendix-4 and submit a copy to ESMU and PMC prior to opening of the quarry site. The quarry operations will be undertaken within the rules and regulations in force.</p> <p>The establishment of crusher will be done as per the existing guidelines (HP Mineral Policy 2013) for setting up of stone crushing units in Himachal Pradesh.</p>	officer/health & safety officer and Project Manager of the Contractor	and Resident Engineer of Project Management
23.	Blasting	<p>Except authorized by the Engineer, the Contractor will not use explosives. Where the use of explosives is so provided or ordered or authorized, the Contractor will comply with the requirements of the following Sub-Clauses of MoRTH 302 besides the law of the land as applicable.</p> <p>The Contractor will always take every possible precaution and will comply with appropriate laws and regulations relating to the importation, handling, transportation, storage and use of explosives. The contractor will always when engaged in blasting operations, post enough warning flagmen, to the full satisfaction of the Engineer.</p> <p>The Contractor will always make full liaison with and inform well in advance and obtain such permission as is required from all Government Authorities, public bodies and private parties whomsoever concerned or affected or likely to be concerned or affected by blasting operations.</p> <p>Blasting will be carried out only with permission of the Engineer. All the statutory laws, regulations, rules etc., pertaining to acquisition, transport, storage, handling and use of explosives will be strictly followed.</p> <p>Blasting will be carried out during fixed hours (preferably during mid-day) or as permitted by the Engineer. The timing should be made known to all the people within 1000m (200m for pre-splitting) from the blasting site in all directions</p>	Environmental officer/health & safety officer and Project Manager of the Contractor	Environment Specialist and Resident Engineer of Project Management



S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures	Responsibility	
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24.	Transporting Construction Materials and Haul Road Management	<p>Contractor will maintain all roads (existing or built for the project), which are used for transporting construction materials, equipment and machineries as précised. All vehicles delivering fine materials to the site will be covered with tarpaulin to avoid spillage of materials.</p> <p>All existing roads used by vehicles of the Contractor or any of his subcontractor or suppliers of materials and similarly roads, which are part of the works, will be kept clear of all dust/mud or other extraneous materials dropped by such vehicles. Contractor will arrange for regular water sprinkling as necessary for dust suppression of all such roads and surfaces. If a community/village road is to be used as a haulage road then drivers and other involved workers will be sensitized by imparting a training (quarterly) about "How to deal with community". Community will be consulted by Contractor to fix the timings of road usages and should be avoided at peak hours.</p>	Environmental officer/health & safety officer and Project Manager of the Contractor	Environment Specialist and Resident Engineer of Project Management
25.	Water requirement of project	<p>The contractor shall not over depend on any one single source and shall identify multiple sources (at least more than one), to avoid conflict of interest between pre-existing users of water sources and the contractor. Water requirements of project are to be met from only existing tube/dug wells, with prior approval of EMU. Contractor shall have more than one source to avoid over dependence on single source and affect pre-existing users.</p> <p>Project area and entire Bilaspur district is not categorized as over exploited area and therefore contractor can even construct new tube wells specially for the water requirements of the project, if required.</p> <p>Water for construction should not be sourced from any waterbody/source used for drinking purpose, but can be taken from waterbodies, which are neither used for drinking water or domestic purposes. However, before abstracting the water the contractor has to obtain written permission from the panchayat/letter and are from the irrigation and public health department. The Contractor shall consider development of new surface water bodies at suitable places in the vicinity of the project road and or renovation of existing surface water bodies with prior permission of the village panchayat for harvesting of water during rainy season. This water can be used for construction purpose and on completion of the construction the same can be handed over to the community for maintenance and</p>	Environmental officer/health & safety officer and Project Manager of the Contractor	Environment Specialist and Resident Engineer of Project Management

S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures	Responsibility	
			Planning and Execution	Supervision/ Monitoring
		<p>use. During the pre-Construction stage the contractor should preferably identify local depressions along the alignment in consultation with the local panchayat to be developed as water storage areas. The CMU can enter into an agreement with the panchayat for development of this water body and using the water stored on it for construction purpose.</p> <p>The Contractor should identify suitable water sources for meeting the construction water demand including the construction of dedicated tube wells and take prior permissions for sourcing of water from competent authorities like IPH and other local bodies. Overall, as there are no major and perennial surface water bodies along and/or in the vicinity of the project road, the project road construction cannot completely depend on surface water bodies and may have to largely depend on ground water sources. Construction water would not be sourced from any tube wells, without prior permission of the owners or the authorities or local bodies. The permission of IPH shall be obtained in case new tube wells are to be constructed;</p> <p>Adopt use of plasticizers/super plasticizers in concrete production to reduce water consumption. The road construction by itself does not involve any operations, which lead to generation of effluents/emissions that may directly or indirectly impact either surface and/or ground water resources. All other off-site operational areas like camp site, work force camp sites, which are likely to have potential for pollution, are to be provided with on-site mobile sanitary facilities, the effluents/waste discharges of which will be transported to nearest sewage treatment plants through mobile tankers. Alternatively, the camp site and work force camp sites shall be provided with septic tank with soak pit arrangement of adequate capacity. The oil/lube storage will be under roofed areas with impermeable cement concrete surfaces. Thus, the project operations will not have any significant scope for soil or surface and/or ground water contamination. Thus, road construction project will not impact ground water sources.</p> <p>The water usage pattern within the construction camps can be minimized by adopting following best practices:</p> <ul style="list-style-type: none"> <li>• Use buckets for washing purposes instead of using running water;</li> <li>• Use of auto shut off taps (without sensors) in labour accommodation;</li> </ul>		

S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures	Responsibility	
			Planning and Execution	Supervision/ Monitoring
		<ul style="list-style-type: none"> <li>• Install water meters with main supply pipes/water tanks/bore well to assess quantity of consumed water.</li> <li>• Create awareness among the camp site, work force camp sites at all levels.</li> </ul>		
26.	Vulnerability aspects at all Construction and Operation sites	<p>The overall vulnerability of Bilaspur district including the project road is categorized as moderate. In order to ensure safety of work force during any kind of natural calamity (vulnerable situation) like earthquake, landslide, flood, wind, an emergency response plan must be prepared by contractor, which shall be duly approved by CMU.</p> <p>All work force irrespective of levels, are to be provided with training to respond in an emergency and periodic mock drill will be conducted to ensure the preparedness to respond any emergency situations.</p>	Environmental officer/health & safety officer and Project Manager of the Contractor	Environment Specialist and Resident Engineer of Project Management
27.	First Aid Facilities and Documenting Safety at all Construction and Operation sites	<p>All labour shall be provided with safety instructions daily, depending upon the work, for which they are likely to be deployed for the day/shift. Labour shall be provided with PPEs at no cost and ensure that same is always being used by work force, while at work. In case of the damaged or lost PPEs, same shall be replaced without any cost to labour. Labour shall be instructed to report, irrespective of small or major or fatal injury to the supervisory staff and all such incidents shall be documented, and ensure such incidents are not repeated by taking adequate precautions. All Supervisory staff shall be provided with mobile phones for better communication across all operational areas, in case of emergency or otherwise</p> <p>All labour shall be instructed to report, irrespective of small or major or fatal injury to the supervisory staff and all such incidents shall be documented, and ensure such incidents are not repeated by taking adequate precautions. All Supervisory staff shall be provided with mobile phones for better communication across all operational areas, in case of emergency or otherwise</p> <p>The contractor shall make available a standby vehicle for emergency purpose for transportation in case of accident with serious injuries at site. Any accident with fatalities shall be reported promptly to PMC and HPRIDC and will take measures to compensate the affected person in accordance with existing regulation.</p> <p>First aid facilities and free emergency care shall be provided to all workforce,</p>	Environmental officer/health & safety officer and Project Manager of the Contractor	Environment Specialist and Resident Engineer of Project Management

S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures	Responsibility	
			Planning and Execution	Supervision/Monitoring
		<p>irrespective of their rank/level and no cost shall be recovered from them on this account.</p> <p>The contractor shall deploy a medical practitioner at camp site for project duration to attend to health issues/first aids and shall conduct regular health check-up of all staffs and workers employed in project.</p> <p>Further, no wages shall be cut for period of absence as a result of injury ó The contractor shall mandatorily have Contractor All Risk (CAR) policy to cover workers of main contractor and as well as all sub-contractors and third party.</p> <p>All work site shall have first aid kits and details of major/nearby hospitals displayed prominently in local language, in case of emergency and/fatalities to work force and/or public, as a consequence of operations. The supervisory staff shall be provided with wireless communication system (mobile telephones for better communication at operational area and also with other operational area within same substation area, in case of emergency or otherwise. For supervision staff, contractor shall provide rented residential accommodation with water, sanitation and allied facilities for comfortable stay. The project will provide employment opportunities to both skilled and unskilled largely to the local people and also urban poor. All work force sourced from local areas can be expected to return to their places of residence after work shift hours. Pooled transportation facilities wherever required shall be provided to workforce as a welfare measure.</p>		
<b>CONSTRUCTION WORK</b>				
28.	Floods, drainage including storm water management at Operational areas	<p>Provision of enough cross-drainage structures with adequate capacities will reduce both the chances as well as impacts of floods. In case of seasonal streams along project road, ensure construction of check dams on the upstream side of seasonal streams and channelized the water on the downstream side with protection measures to control erosion of soil, which in turn reduce floods on downstream areas.</p> <p>The Contractor shall ensure that no construction materials like earth, stone, or are disposed off in a manner that can block the flow of drainage in and around the operational areas. Ensure that no site clearance soil/debris are dumped into the drain prior to commencement of road construction operations and the drain is to</p>	Environmental officer/health & safety officer and Project Manager of the Contractor	Environment Specialist and Resident Engineer of Project Management

S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures	Responsibility	
			Planning and Execution	Supervision/ Monitoring
		<p>be periodically checked and cleaned throughout the construction phase for deposition of construction debris during construction phase and follow it up with final clean up just prior to opening of the road for traffic and handing over of road.</p> <p>Also, it needs to be ensured that no water logging occurs along road construction operational area during rainy days/ season and in turn affect the adjacent landowners. In case of excess water logging, the same shall be emptied using dewatering pump or any other means as may be required, to ensure adjacent landowners are not unduly affected. The contractor while providing outfall of cross drainage structure shall avoid discharging to private land or agriculture land.</p>		
<b>POLLUTION PREVENTION</b>				
29.	Water Pollution	<p>The Contractor shall provide oil interceptor and take pre-cautionary measures to ensure that no water pollution occurs through surface runoff from construction vehicle parking areas, fuel/lubricants storage sites, vehicle, and machinery/equipment maintenance sites.</p> <p>Contractor shall ensure that all vehicle/machinery and equipment maintenance and refueling shall be carried out in such a manner that spillage of fuel and lubricants do not contaminate soil and groundwater.</p> <p>Areas used for handling of fuel and lubricants, wherever applicable shall be impermeable surfaces and under roof to prevent groundwater and soil contamination in the event of accidental spills.</p> <p>All other off-site operational areas like camp site, work force camp sites, which are likely to have potential for pollution, are to be provided with on-site mobile sanitary facilities, the effluents/waste discharges of which will be transported to nearest sewage treatment plants through mobile tankers. Alternatively, the camp site and work force camp sites shall be provided with septic tank with soak pit arrangement of adequate capacity.</p>	Environmental officer/health & safety officer and Project Manager of the Contractor	Environment Specialist and Resident Engineer of Project Management
30.	Air Pollution	<p>The Contractor will take every precaution to reduce the level of dust from construction plants, construction sites involving earthwork by sprinkling of water, encapsulation of dust source.</p>	Environmental officer/health & safety officer and Project Manager of the	Environment Specialist and Resident Engineer of Project Management

S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures	Responsibility	
			Planning and Execution	Supervision/Monitoring
		<p>The Contractor will procure the construction plants and machinery, which will conform to the pollution control norms specified by the MoEF&amp;CC/CPCB/HPSPCB.</p> <p>The concentration of PM10 matter at 40m from a construction plant should be less than 100 µg/m<sup>3</sup>. The contractor shall conduct environmental monitoring as per frequency in the monitoring plan in ESMP.</p> <p>All tipper trucks, carrying construction debris shall be covered with net cloth and wetted prior to dispatch of every trip, to prevent en-route spills as well as airborne dust during transit.</p> <p>Tipper trucks shall not be overloaded beyond designated capacities and will be provided with tail board, to avoid en-route spills.</p> <p>The dust levels during collection and loading operations of construction debris shall be controlled through periodical sprinkling of water through mobile water tankers of adequate capacity fitted with pressurized fine spray with hose reels and stationed at excavation areas.</p>	Contractor	
31.	Emission from Construction Vehicles, Equipment and Machineries	<p>Contractor will ensure that all vehicles, equipment and machinery used for construction are regularly maintained and confirm that pollution emission levels comply with the relevant requirements of CPCB and/ Motor Vehicles Rules.</p> <p>The Contractor will submit PUC certificates for all vehicles/ equipment/ machinery used for the Project.</p> <p>Environmental monitoring of all plants for emission shall be conducted in frequency mentioned in Environmental Monitoring Plan.</p>	Environmental officer/health & safety officer and Project Manager of the Contractor	Environment Specialist and Resident Engineer of Project Management
32.	Noise Pollution: Noise from Vehicles, Plants and Equipment Construction of Noise barriers at selected sensitive Receptors (Schools and Hospitals)	<p>The Contractor will confirm the following:</p> <p>All Construction plants and equipment used in construction shall strictly conform to the MoEF/CPCB noise standards. All vehicles and equipment used in construction will be fitted with exhaust silencers. Servicing of all construction vehicles and machinery will be done regularly and during routine servicing operations, the effectiveness of exhaust silencers will be checked and if found defective will be replaced.</p>	Environmental officer/health & safety officer and Project Manager of the Contractor	Environment Specialist and Resident Engineer of Project Management

S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures				Responsibility													
						Planning and Execution	Supervision/Monitoring												
		<p>The equipment available in the market should be procured, if the Contractor plans to purchase new equipment. For the old equipment, necessary or possible alterations must be carried out to reduce the noise levels to the possible extent.</p> <p>Maintenance of vehicles, equipment and machinery shall be regular and up to the satisfaction of the Environmental Specialist of PMC to keep noise levels at the minimum.</p> <p>At the construction sites within 150 m of the nearest habitation, noisy construction work such as crushing, operation of DG sets, use of high noise generation equipment will be stopped during the night-time between 10.00 pm to 6.00 am.</p> <p>Noise barrier and structures, which are to be reconstructed as part of vacating the encroached RoW shall be completed prior to the road construction work at the respective location of the sensitive receptor.</p> <p>The details of the locations, where mitigation measures are provided near sensitive receptors is given in below table.</p> <table border="1"> <thead> <tr> <th>Chainage</th> <th>Sensitive Location</th> <th>Specific Measures</th> <th>Responsible Party</th> </tr> </thead> <tbody> <tr> <td>1+130 Km</td> <td>Govt High School Gahar</td> <td>Provision of Noise barrier (RHS); Masonry boundary wall (of 60m length and 3m height) over the edge of the road &amp; 20 nos tree plantation along the wall.  Provision of two pits (having configuration of 2m X 4m X 1.2m) for disposal of solid and liquid wastes within School.</td> <td>Dra HP 01 (A)</td> </tr> <tr> <td>4+520 Km</td> <td>Govt Primary School</td> <td>Provision of Noise barrier (RHS); Masonry boundary wall (of 30m length and 3m height) &amp; 20 nos tree plantation along the wall</td> <td>Dra HP 01</td> </tr> </tbody> </table>				Chainage	Sensitive Location	Specific Measures	Responsible Party	1+130 Km	Govt High School Gahar	Provision of Noise barrier (RHS); Masonry boundary wall (of 60m length and 3m height) over the edge of the road & 20 nos tree plantation along the wall.  Provision of two pits (having configuration of 2m X 4m X 1.2m) for disposal of solid and liquid wastes within School.	Dra HP 01 (A)	4+520 Km	Govt Primary School	Provision of Noise barrier (RHS); Masonry boundary wall (of 30m length and 3m height) & 20 nos tree plantation along the wall	Dra HP 01		
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S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures		Responsibility		
				Planning and Execution	Supervision/Monitoring	
				and access road.	(Appendix-15)	
		6+470 Km	Govt Primary School, Bharari	Provision of Noise barrier (RHS); Masonry boundary wall (of 60m length and 3m height) over the edge of the road & 30 nos tree plantation along the wall.  Provision of two pits (having configuration of 2m X 4m X 1.2m) for disposal of solid and liquid wastes within School.	Drawing no; HP/DAD-LAD/NB-01 (Appendix-15)	
		6+640 Km	Govt Hospital, Bharari	Provision of Noise barrier at Hospital at Bharari (RHS); Masonry wall boundary 40-meter long and 3-meter height.  15 nos trees plantation along the wall and access road.	Drawing no; HP/DAD-LAD/NB-01 (Appendix-15)	
		Ensure no conflicting situation develop/occur with the concerned school authorities as well as local people during the entire road construction phase through a responsive grievance redressal mechanism and conflict management initiatives.				
33.	Waste Management	<p>The Contractor's ESMP will include a Waste Management Plan for Hazardous and Non-Hazardous waste prepared in accordance with requirements stipulated in (a) The Batteries (Management &amp; Handling ) Rules, 2001 (b) Municipal Solid Wastes (Management and Handling) Rules, 2000, (c )Hazardous Waste (Management, Handling &amp; Transboundary Movement) Rules, 2016 and (d) Construction and Demolition Waste Management Rules, 2016. The waste management plan shall be submitted for approval of PMC.</p> <p>The camp site shall have compost pits for treating organic waste and separate bins for collecting the inorganic waste, which shall be disposed at nearest municipal</p>			Environmental officer/health & safety officer and Project Manager of the Contractor	Environment Specialist and Resident Engineer of Project Management



S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures	Responsibility	
			Planning and Execution	Supervision/ Monitoring
		<p>disposal sites. The nearest such sites are available at Mandi and Ghumarwin.</p> <p>The contractor shall collect and store hazardous waste generated at camp sites in steel drums and stored in a segregated roofed area and periodically disposed at approved waste disposal facilities by HPSPCB. The nearest such facility is located at Baddi Barotiwala Nalagarh Industrial Area (BBN) in the adjoining Solan District.</p> <p>The contractor shall also identify HPSPCB authorised recycling agency for handling use oil.</p> <p>The discarded batteries shall be disposed only through authorized recyclers from HPSPCB.</p>		
<b>SAFETY</b>				
34.	Occupational Health and Safety of Labours	<p>The Contractor will comply with all the precautions as required for ensuring the safety of the workmen as per the International Labour Organization (ILO).</p> <p>The Contractor will make sure that during the construction work all relevant provisions of Building and other Construction Workers (regulation of Employment and Conditions of Services) Act, 1996 are adhered to. The Contractor will comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches and safe means of entry and egress.</p> <p>All workforce deployed shall be governed by labour management procedures under HPSRTP and Himachal Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, with regards to safety and welfare measures (including equal wages for men and women) for workers employed at building and other construction sites.</p> <p>The Contractor will not employ any person below the age of 14 years for any work and no woman will be employed on the work of painting with products containing lead in any form.</p> <p>The Contractor will also ensure that no paint containing lead or lead products is used except in the form of paste or ready made paint.</p>	Environmental officer/health & safety officer and Project Manager of the Contractor	Environment Specialist and Resident Engineer of Project Management

S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures	Responsibility	
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		<p>The Contractor will mark <del>hard hat</del> and <del>no smoking</del> and other <del>high risk</del> areas and enforce non-compliance of use of PPE with zero tolerance. These will be reflected in the Construction Safety Plan to be prepared by the Contractor during mobilization and will be approved by PMC and ESMU.</p> <p>To promote and encourage a Safety culture, senior most engineers in Contractors and consultants teams shall wear helmets and safety jackets</p> <p>The contractor shall provide to all work force deployed at work sites</p> <p>Protective footwear, protective goggles and nose masks to the workers employed in asphalt works, concrete works, crusher etc.</p> <p>Welder's protective eye-shields to workers who are engaged in welding works</p> <p>Earplugs to workers exposed to loud noise, and workers working in crushing or compaction</p> <p>Facemasks for use to the workers when paint is applied in the form of spray or a surface having lead paint dry is rubbed and PMC rapped.</p> <p>It shall be made mandatory to wear them at work site. The PPEs shall be provided at no cost to workforce and shall be replaced once in three months. Any damaged/lost PPEs shall be replaced with no cost to workforce. Visitors/officials to work sites are to be provided with PPEs (hard hats and safety shoes) and shall be briefed ongoing operations on that specific time and related safety requirement at work site including safe distances to keep during the site visit.</p> <p>Work force shall be subjected only to standard work shifts/hours. Overtime allowances, if applicable/warranted shall be paid with ceiling limits. Working beyond such ceiling limits shall be discouraged, even if, so desired workforce or contractor.</p>		
35.	Workers Orientation and Sensitization Training	All work force of the Contractor shall be subjected to an orientation program, which familiarize them with work requirements, safety practices at work, safe distances to keep from earth moving equipment, first aid facilities, emergency response, on-site sanitation facilities and practices to be adopted, rights and privileges of workforce among others.	Environmental officer/health & safety officer and Project Manager of the Contractor	Environment Specialist and Resident Engineer of Project Management

S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures	Responsibility	
			Planning and Execution	Supervision/ Monitoring
		Orientation shall also include concern for safety of public around operational areas as well, first aid facilities, emergency care and response shall be provided to all workforce.		
36.	Traffic and Safety	<p>Ensure, traffic diversions are in place, to minimize the inconvenience to the existing road users during the road construction phase. Wherever required, adequate number of uniformed traffic wardens with reflective batons shall be deployed to manage the traffic for the entire construction phase.</p> <p>Road construction schedule near sensitive receptors like schools and hospitals shall be informed to the concerned authorities well in advance. All works near sensitive receptors shall be adequately well planned and works shall be completed in shortest possible time, with minimal inconvenience to users of sensitive receptors locations. If warranted, steel barricades shall be used to minimize the inconvenience to the road users as well as occupants of the sensitive receptors.</p> <p>Adequate traffic diversions near sensitive receptors shall be planned with adequate number of uniformed traffic wardens with reflective batons shall be deployed to manage the traffic, to ensure safety and minimal inconvenience to users of sensitive receptors location.,</p> <p>Environmental measures such as construction of noise barriers etc shall be constructed for the identified sensitive receptors, well in advance of commencement of road construction works.</p> <p>Dust suppression measures like regular sprinkling of water shall be carried out with more precaution near sensitive receptors to ensure dust levels kept to minimum. The construction debris and spills cleared of all construction debris daily near sensitive receptors.</p> <p>While undertaking, road construction works near the natural water bodies and/or water sources along the project road, steel barricades shall be used to completely avoid trespassing of the construction labour and to avoid/prevent spills of the construction waste (solid or liquid) into the water body.</p> <p>Extreme care shall be taken to ensure that no damage occurs to such natural water bodies and/or water sources along the project road due to the road construction works. All work forces shall be specifically oriented to strictly follow these</p>	Environmental officer/health & safety officer and Project Manager of the Contractor	Environment Specialist and Resident Engineer of Project Management

S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures	Responsibility	
			Planning and Execution	Supervision/ Monitoring
		instructions.		
37.	Informatory Signs and Hoardings	<p>The Contractor will provide, erect and maintain Informatory /safety signs, hoardings written in English and local language (Hindi), wherever required or as suggested by the Environmental Specialist of PMC.</p> <p>After construction Information boards shall be erected for the tourism enhancement. These boards should be of international standards.</p>	Health & safety officer and Project Manager of the Contractor	Environment Specialist and Resident Engineer of Project Management
38.	Risk from Electrical Equipment(s)	<p>The Contractor will take all required precautions to prevent danger from electrical equipment and ensure that -</p> <p>No material will be so stacked or placed as to cause danger or inconvenience to any person or the public.</p> <p>All necessary fencing and lights will be provided to protect the public in construction zones.</p> <p>All machines to be used in the construction will conform to the relevant Indian Standards (IS) codes, will be free from patent defect, will be kept in good working order, will be regularly inspected and properly maintained as per IS provision and to the satisfaction of the Environmental Specialist of PMC.</p>	Environmental officer/health & safety officer and Project Manager of the Contractor	Environment Specialist and Resident Engineer of Project Management
<b>CONSTRUCTION STAGE SOCIAL IMPACTS</b>				
39.	Loss of land due to land-slides resulting from hill cutting activities	Assessment of loss -Joint survey with revenue department and others if required (horticulture etc) on a case by case basis and due payment of compensation to land owner as per RPF provisions (in terms of rate determined and valuation done)	RAP Implementation agency, Revenue and ESMU, HPRIDC	ESMU
40.	Cracks in structures or damage due to construction works e.g.hill cutting activities	<p>Advance notice to community on road construction activity. The notice will be served through posters and leaflet. Estimation of loss case by case basis.</p> <p>Process to be followed shall involve:</p> <p>If the structure is partially damaged and after assessment if found unviable for habitation which leads to full demolition of structure, If the structure is partially</p>	RAP Implementation agency Revenue and ESMU, HPRIDC	ESMU

S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures	Responsibility	
			Planning and Execution	Supervision/Monitoring
		<p>damaged and viable.</p> <p>Compensation to structure owner as per RPF provisions if full structure is damaged case by case basis. Estimation will be done as per latest BSR without depreciation. Labor charges etc should be top up for arising the damaged cost. The same amount may be paid to the affected person or the project authority will arrange and pay the agency for rectification of the structure to the satisfaction of the affected person. Each individual case should be documented with photograph etc.</p>		
41.	Disruption to services such as water supply, power supply	<p>Advance 7 days notice through poster and leaflet to the community of disruptions and alternate arrangements.</p> <p>Restore the services within 10 days of effect. Provide alternative source of supply</p>	ESMU, HPRIDC and Contractor	Project Management Consultant
42.	Disruption to access from houses and shops to roads;	<p>7days advance notice through poster and leaflet before start of work.</p> <p>Provide alternative access before disruption</p> <p>Restore permanent access as in where in basis</p>	ESMU, HPRIDC and Contractor	Project Management Consultant
43.	Differential impacts on vulnerable and disadvantaged population	<p>7 days advance notice through poster and leaflet before start of work.</p> <p>Impacted disadvantaged population will be treated case by case basis by provision of temporary access and other assistance as identified</p>	RAP Implementation Agency, ESMU, HPRIDC	Project Management Consultant
44.	Dust emissions during construction leading to impacts on crops and trees	<p>Advance notice to farmers</p> <p>Precautionary measures like water sprinkling during construction at predetermined frequency.</p> <p>Regular monitoring through Health and Safety officer</p> <p>Regular verbal and discussions based communication with the community</p>	ESMU, HPRIDC and Contractor	Project Management Consultant
45.	Likelihood of increased accidents due to road widening	<p>Adequate road signage/road marking/rumble strip/glow sign board to be provided.</p> <p>Road safety educations.</p>	RAP Implementation Agency, ESMU, HPRIDC and	Project Management Consultant

S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures	Responsibility	
			Planning and Execution	Supervision/Monitoring
	(including at social sensitive locations such as schools, hospitals);	Regular consultation with school children and sensitization Community level consultations Prior intimation in school and communities living in the vicinity for safety measures.	Contractor	
46.	Possibility of gender-based violence arising from influx of migrant labor a common practice in Himachal Pradesh; and	To address this the Project has prepared a GBV risk mitigation plan. It shall comprise Code of Conduct for signing by project workers <ul style="list-style-type: none"> <li>• Integrate GBV into existing IEC strategy/materials, GRM, safety talks, tool box meeting and regular trainings.</li> <li>• community consultation and identification of GBV focal points within the community.</li> <li>• Training of labours on occupational health and safety issues.</li> <li>• Mapping of Service Providers for GBV prevention and Response</li> <li>• Identify Hot Spots for GBV within the project include construction work and labour camps alongside local communities, schools, vocational training centers, liquor shops and, migrant labourers residing in rented accommodations within the villages.</li> <li>• These areas need to be clearly identified and closely monitored throughout the project cycle.</li> </ul>	ESMU, HPRIDC and Contractor	Project Management Consultant
47.	Labour Influx from outside the district	Prepare and Implement Labour Influx management Plan by Contractor ó that shall be prepared prior to commencement of civil works Educate Labour supplier contractor in all labour laws, behavioural change communication in labour management through IEC process as part of LMP	ESMU, HPRIDC and Contractor	Project Management Consultant
48.	Likelihood of spread of HIV/AIDS among construction workers and road side community.	Coordinate with State AIDS control society to collect dissemination material. Training to migrant labour and community Making available condoms etc at vending machines at convenient locations Community based meetings, consultations in camp, distribution of leaf let, IEC communication, posters, banners,	ESMU, HPRIDC and Contractor	Project Management Consultant

S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures	Responsibility	
			Planning and Execution	Supervision/ Monitoring
		Programme convergence with State AIDs control society. installation of Condom vending machines at Labour camp		
<b>BIO-DIVERSITY MANAGEMENT</b>				
49.	Bio-diversity Management	<p>In order to limit the impacts on the flora due to the road construction, the following measures are considered:</p> <p>Compensatory Plantation, in lieu of trees felled (at least 3 saplings for every tree cut with 90% survival rate with three years maintenance) is to be taken up either along the project corridor or at places identified by the department of forests, GoHP in order to compensate for the tree felled. With this compensatory plantation measures, the tree cover lost could be regained in 5 to 7 years and thus the impacts could get mitigated. Only local species, which are less water consuming and approved by the forest department shall be used for plantation. Normally, all such afforestation will be undertaken by the department of forest and maintained for three years as a deposit work. Therefore, cost provision for Compensatory Plantation is included in ESMP Budget.</p> <p>In order to limit the propagation of invasive species, firstly all such invasive species within the corridor of impact and/or right of way shall be removed/cleared and replanted with local species. The department of forests, GoHP has framed a procedure for removal of invasive species and replanting of local species. The same is given in Annexure -9 of ESIA report. Normally, all such activities will be undertaken by the department of forest and maintained for three years as a deposit work. Therefore, cost provision for corridor plantation is included in ESMP Budget. As part of the project design, 0.3 Ha of land has been identified within the RoW, which will be used for avenue plantation and/or landscaping to improve the aesthetics of road corridor. In order to limit the impacts on the fauna due to the road construction, the following measures are considered:</p> <ul style="list-style-type: none"> <li>• The camp sites and work force camps shall be access controlled and well-lit to avoid/prevent entry of stray or wild animals.</li> <li>• No pet animals shall be allowed to be raised / kept within the camp sites or work sites, which in turn may attract the wild animals like leopard.</li> <li>• The work force shall be oriented not to feed monkeys</li> </ul>	Environmental officer and Project Manager of the Contractor	Environment Specialist, Bioengineering Expert and Resident Engineer of Project Management

S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures	Responsibility	
			Planning and Execution	Supervision/ Monitoring
		<ul style="list-style-type: none"> <li>All work force shall be oriented to keep calm and walk away from the scene, in case, wild animals are sighted either during work hours/night-time.</li> <li>Work force shall be strictly instructed not to harm / kill wild animals under any circumstances</li> <li>Work force shall be strictly prohibited like hunting of wild animals like wild boar etc., either for consumption or for pleasure.</li> <li>The Work force shall be strictly prohibited from entering into forest areas or private lands under any circumstances.</li> <li>The Construction camp and work force camp sites shall not be established in the vicinity/nearby forest areas. Atleast 500m distance shall be kept from such areas under unavoidable circumstances.</li> <li>The construction work shall be restricted to day hours only and work shall not be carried out in the late evening hours/night hours /early mornings.</li> </ul>		
50.	Ancient and Historical Monuments and Chance Finds	<p>Project road corridor does not have any Ancient and Historical Monuments and therefore no measures are warranted. Hence cultural heritage expert is not required to be deputed by ESMU.</p> <p>All fossils, coins, articles of value of antiquity, structures and other remains or archaeological interest discovered on the site shall be the property of the Government and shall be dealt with as per provisions of the relevant legislation.</p> <p>The Contractor will take reasonable precautions to prevent his workmen or any other persons from removing and damaging any such article or thing. He will, immediately upon discovery thereof and before removal acquaint the Environmental Specialist of PMC of such discovery and carry out the PMC's instructions for dealing with the same, waiting which all work shall be stopped.</p> <p>The PMC will seek direction from the Archaeological Survey of India (ASI) through HPRIDC before instructing the Contractor to recommence the work in the site.</p>	Environmental officer and Project Manager of the Contractor	Environment Specialist and Resident Engineer of Project Management
<b>CONTRACTOR'S DEMOBILIZATION</b>				



S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures	Responsibility	
			Planning and Execution	Supervision/Monitoring
51.	Environmental Conditions	The Contractor will undertake seasonal monitoring of air, water, noise and soil quality through an approved monitoring agency. The parameters to be monitored, frequency and duration of monitoring as well as the locations to be monitored will be as per the Monitoring Plan prepared. National Standard of Air, Noise and Water given in Appendix-8.	Environmental officer and Project Manager of the Contractor	Environment Specialist, and Resident Engineer of Project Management
52.	Continuous Community Participation	The Environmental Specialist of PMC will have continuous interactions with local people around the project area to ensure that the construction activities are not causing undue inconvenience to the locals residing in the vicinity of project site under construction due to noise, dust or disposal of debris etc. The stakeholder's engagement plan will be followed for community participation procedures.	Environmental officer and Project Manager of the Contractor	Environment Specialist, and Resident Engineer of Project Management
53.	Clean-up Operations, Restoration and Rehabilitation	<p>Contractor will prepare "Site Restoration Plans" which will be approved by the Environmental Specialist of PMC. The clean-up and restoration operations are to be implemented by the Contractor prior to demobilization. The Contractor will clear all temporary structures; dispose all garbage, night soils and POL (Petroleum, Oil and Lubricants) wastes as per Comprehensive Waste Management Plan and as approved by PMC.</p> <p>All disposal pits or trenches will be filled in and effectively sealed off. Residual topsoil, if any will be distributed on adjoining/ proximate barren land or areas identified by the Contractor and approved by the Environmental Specialist of PMC in a layer of thickness of 75 mm-150 mm.</p> <p>All construction zones and facilities including culverts, road-side areas, camps, Hot Mix plant sites, Crushers, batching plant sites and any other area used/affected due to the project operations will be left clean and tidy, at the Contractor's expense, to the entire satisfaction to the Environmental Specialist of PMC.</p>	Environmental officer, Health and safety officer and Project Manager of the Contractor	Environment Specialist, and Resident Engineer of Project Management
<b>OTHER SPECIFIC ENHANCEMENT MEASURES</b>				
54.	Specific enhancement measures	There are some site specific enhancement measure provided on project road. These include enhancement of existing community property (crematorium) at km	Environmental officer and Project Manager of the Contractor	Environment Specialist, and Resident Engineer of Project

S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures				Responsibility	
						Planning and Execution	Supervision/Monitoring
		12+500 and provision of 6 toilets units (3 each for male and female).					Management
		Chainage	Feature	Specific Measures	Reference drawing as in ESMP		
		12+500 km	Existing Crematorium	Improvement of access, Construction of water tank and provision of benches proposed as enhancement measures for the roadside crematorium;  Retaining wall with dimensions (L= 15m, a water tank & H=4m and 15 numbers of benches (3-seater).	Drawing no; HP/DAD-LAD/CR-01 (Appendix-15)		
		13+100 km	Market area without toilet facilities	Provision of 6 Toilets (3 male & 3 female) at identified location in Ladrour bazar.	Drawing no; HP/DAD-LAD/TOILET-001 (Appendix-15)		
<b>OPERATION STAGE</b>							
55.	Monitoring Operation Performance	<p>The ESMU will monitor the operational performance of the various mitigation/enhancement measures carried out as a part of the project.</p> <p>The indicators selected for monitoring include the survival rate of trees; utility of enhancement provision made under the project; status of rehabilitation of borrow areas; and effectiveness of noise barriers.</p>				ESMU	ESMU/PWD
56.	Maintenance of Drainage	<p>PWD will ensure that all drains (side drains, median drain and all cross drainages) are periodically cleared especially before monsoon season to facilitate the quick passage of rainwater and avoid flooding.</p>				ESMU	ESMU/PWD

S. No	Project Stage/Activity	Mitigation Management Measures/GIIP Measures	Responsibility	
			Planning and Execution	Supervision/Monitoring
57.	Pollution Monitoring	The periodic monitoring of the ambient air quality, noise level, water (both ground and surface water) quality, soil quality in the selected locations as suggested in pollution monitoring plan through the HPCB or its approved monitoring agency.	Pollution Monitoring Agency	ESMU/PWD
58.	Soil Erosion and Monitoring of Borrow Areas	Visual monitoring and inspection of soil erosion at borrow areas, quarries (if closed and rehabilitated), embankments and other places expected to be affected, will be carried out once in every three months as suggested in monitoring plan.	ESMU	ESMU/PWD
59.	Changes in Land Use Pattern	Necessary hoardings will be erected indicating the availability of ROW and legal charges for encroachment of RoW. Budgetary provisions are to be made to control the ribbon development along project road.	ESMU, Revenue Department and Local Civic Bodies	ESMU/PWD
60.	Public awareness on Noise levels and Health Affects	The public will be advised to construct the noise barriers such as walls, double glazed windows and tree plantation between the roads and their property the public awareness is necessary regarding the human health through the newspapers and consultations and distribution of pamphlets during the operation stage.	ESMU	ESMU/PWD

### Budgetary Costs For Implementation And Supervision for ESMP

270. General measures are akin to Good International Industry Practice (GIIP), considered incidental to works and deemed to be included in the quoted bid price by the contractor. However, certain project road specific mitigation measures and/or environmental enhancement measures, considered as additional requirements that are to be implemented by the contractor against budget provision. The detailed description of the project road specific ESMP measures is given in a separate volume.
271. The mitigation and management measures including the budgetary provisions for project road specific mitigation measures and/or environmental enhancement measures will be integrated in the contract/bidding documents as Mandatory Contractual Obligations.
272. Thus, the contractor is expected to be fully conversant with the road specific mitigation and management measures during project road construction and accordingly make required provisions for implementing the EMP at the bidding stage itself.
273. The total budget for ESMP is sum of budget for implementation of EMP and RAP, which works out to INR 517.957 lakhs (INR 517,95,700)

**Table 7.2-a: ESMP Works to be implemented as per Civil Works BOQ**

S. No	Description	Reference	Amount
1	Disposal of Excess debris Material with an average lead of 2.5 Km	Bill no 2.09 of Civil Works BOQ	Cost included under Civil Works
2	Construction of cross drainages structure including erosion control measures downstream of the culvert locations	Bill No 5 (culverts) & 6 (bridge) of Civil works BOQ	Cost included under Civil Works
3	providing surface line drain on roadsides to channelize the water into nearby cross drainage structures	Bill No 7.02 to 7.06 of Civil works BOQ	Cost included under Civil Works
4	Providing protection measures (retaining & breasts walls) to restrain the soil to slopes	Bill No 7.15 to 7.21 of Civil works BOQ	Cost included under Civil Works
5	Provision of Gabion Walls to retain debris at 7 identified debris disposal sites	Bill no 7.22 of Civil Works BOQ	Cost included under Civil Works
6	Provision of traffic safeguards measures on the road (information/caution boards, chevrons etc.)	Bill No 8.02 of Civil works BOQ	Cost included under Civil Works
7	Traffic and Safety Management During Construction	Bill No 9.06 of Civil works BOQ	Cost included under Civil Works

**Table 7-6-b : Budgetary Provisions for Specific Environmental Impact Mitigation / Enhancement Measures (additional Requirements to be implemented by Contractor against budget)**

S.No	Description	Amount in Lakhs
1	Management of Excess Debris (56251 cum) Disposal on site.	Included in Civil Cost
2	Provision of Noise Barriers and other enhancement measures at Sensitive receptors (at km 1+130, 4+520, 6+470, 6+640)	14.49

S.No	Description	Amount in Lakhs
3	Provisions of enhancement measures for Community property (Crematorium) at Km 12+500 including 25 precast cement concrete benches and 6000 litres water tank	10.86
4	Provision of Toilets at specified location (13+100 Km Ladrour Market) with septic tank and soak pit disposal arrangement	9
5	Nature-based solutions/measures (bio-engineering) tree Interventions at selected locations along the project road including Muck Disposal Sides and reclaimed vacant areas within RoW Vacant low lying	177
6	Clearance/Removal of Invasive Species like Lantana and Sea Ruthenium etc. form the road corridor and Plantation of Indigenous local vegetation and Maintenance and upkeep for 70% survival rate for 6 months (16 km both sides up to width of 1.5 m)	48.6
7	Provision of plantation and maintenance ( tree guard) of 1500 Avenue trees along roadside and in RoW	27
8	Provision for Environmental Monitoring (Ambient air quality, Noise levels, Water quality and Soil) as per CPCB Standard Procedures	25.92
9	Provision for Compensatory Afforestation in lieu of Tree felling for road construction	Cost shall be paid by HPRIDC to forest Department of GoHP
10	Provisions of Environmental specialist (full time), EHS Officer (fulltime), Bio-Engineering Specialist (intermittent input), Horticultural specialist (intermittent input) and Training sessions for implementation of EMP	To be included by PMC
11	Land acquisition and Resettlement & Rehabilitation Cost	Covered in RAP Budget
12	Relocation and construction of hand pumps, water storage tanks, OHTs, open wells & water taps as per directions of the Engineer.	Covered in Utility Shifting Budget
13	Cost for institutional strengthening, capacity building and training by HPRIDC	To be provided by HPRIDC
14	Resettlement Action Plan as per Entitlements including implementation, monitoring	Refer to RAP
15	Contingencies 10%	47.087
<b>Grand Total For ESMP Implementation</b>		<b>517.957</b>

274. Budget for addressing pre-construction social impacts is provided as part of the Resettlement Action Plan. Actions relating to GBV actions are included in the GBV Plan that has been prepared for the overall project.

#### **INSTITUTIONAL ARRANGEMENTS FOR ESMP IMPLEMENTATION**

275. Institutional arrangements are intended to achieve certain level of quality in the project during implementation of various project components by the Government of Himachal Pradesh (GoHP) as specified by the various conditions of loan agreement between the World Bank and the GoHP. These are basically to meet the World Bank ESS (Environment and Social Standards) that in turn will make sure that the country laws (Indian laws and regulations) are not violated during the pre-construction, construction and Operational (defect liability period) stages of the project.

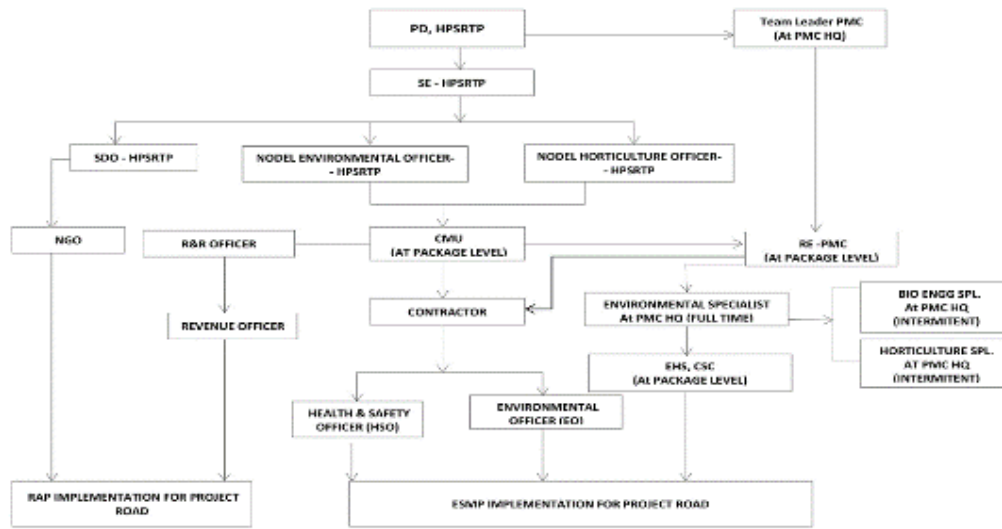
276. ESMU is headed by the Chief Engineer, who will be responsible for the successful implementation of the Project. The Chief Engineer is also the Project Director in the ESMU set

up for the implementation of the project. The Project Director (PD) will be assisted by Superintendent Engineer of ESMU, who further will have support from Construction Management Unit (CMU) at site and Experts (Nodal Environmental Officer, Social Development officer, Horticulture Officer) at the head office. The Nodal Environmental officer at the HQ will coordinate with CMU for the implementation of the Environmental Management Plan at ESMU headquarters. Roles and responsibilities of ESMU in HPRIDC is given below in table 7-3.

**Table 7-3: Roles and responsibilities of the staff in ESMU of HPRIDC**

Position	Roles & Responsibilities
Project Director	Chief Engineer-cum-Project Director will be overall in-charge of the Road and other Projects in HPRIDC. He is responsible to the Board and the State Government for efficiently carrying out of all preparatory studies, works in his administration and accounts pertaining to all such studies and works
Superintendent Engineer	Superintending Engineer (Planning & Design) will be assisting the Chief Engineer-cum-Project Director in efficient functioning of the Project Implementation Unit of HPRIDC.
Nodal Environmental Officer, ESMU	Nodal Environment Officer will be directly responsible to the CE-cum-PD for the efficient discharging of duties. He will deal with matters pertaining to integration of EA/EMPs into project design, construction management during project implementation, reporting and documentation etc. He will interact with CMUs for collecting information on environment management. He will be assisted by Junior Engineer.
Social Development officer	Social Development Officer will be directly responsible to the CE-cum-PD for the efficient discharging of duties. He will be overall responsible for coordinating with Land Acquisition Officers (LAOs), Public Works and Revenue Departments for land acquisition for upgrading works. He will coordinate the activities of NGOs on board and RRO of CMUs for implementation of Resettlement Action Plans (RAPs) and R & R assistance.
Horticulture Specialist	Nodal Forest Officer will be directly responsible to the CE-cum-PD for the efficient discharging of duties. He will be responsible for regulatory clearances, plantation works including compensatory afforestation, biodiversity management and coordination with the concerned departments/agencies.

277. For PMC, Environment and Social Specialists (full time) at PMC, Head Quarter (HQ) will look after the ESMP implementation and report to Resident Engineer on site. Bio-Engineering Expert and Horticulture Development Officers at PMC, HQ will have intermittent input and will visit sites as per requirements. At site PMC will have an EHS officer to implement EMP.
278. For Contractor, Project manager will be assisted by one Environmental Officer and one Health and Safety officer who will coordinate with PMC and ESMU staff for implementation of EMP.
279. ESMU will hire a NGO or any other agency for the implementation of RAP on site. The agency will support Social development officer, ESMU and will coordinate with R&R and Revenue officer posted in CMU at site.



Note: NGO, R&R officer and Revenue Officer to be Appointed by SE - HPSRTP

**Figure 7.1: Institutional arrangements for implementation of ESMP**

### Training and Capacity Building

280. Establishment of adequate implementation capacity to launch and carry out the components of resettlement must be completed before the start of civil works. To enhance capabilities, ESMU staff can be sent on exposure visits to other projects with good resettlement programmes as well as sponsored for training courses in Resettlement and Rehabilitation (R&R). The training would also cover techniques of conducting participatory rural appraisal for micro planning, conducting census and socio-economic surveys, dissemination of information, community consultation and conducting of monitoring and evaluation.

### Grievance Redress Mechanism

281. A grievance redress mechanism shall be developed for potential use by external stakeholders. The aim of the grievance redress mechanism is to achieve mutually agreed resolution of grievances raised by such stakeholders. The grievance redress mechanism described hereunder is distinct from the grievance redress mechanism, to be used by the Project’s workforce. Key definitions are as follows:

- “ **Complaint:** an expression of dissatisfaction that is related to an impact caused by a project activity, which has affected an individual or group. Adversely, the interest of an individual or group and the individual or group wants a proponent or operator (or contractor) to address and resolve it (e.g. problems related to dust deposition, noise or vibration). A complaint is normally of a less serious nature than a grievance; and
- “ **Grievance:** a claim raised by an **individual** or group whose livelihood, health and safety, cultural norms and heritage are considered to have been adversely affected (harmed) by a project activity which, if not addressed effectively, may pose a risk to HPRIDC operations (through stakeholder actions such as access road blockages) and the livelihood, well-being or quality of life of the claimant(s).

282. A grievance redress mechanism (GRM) to uphold the Project’s social and environmental safeguards performance is designed to address concerns and complaints promptly and transparently with no impacts (cost, discrimination) for any reports made by project affected people (PAPs). The grievance redress mechanisms described hereunder include both complaints and grievances (hereinafter referred to only as ‘grievances’). Grievances raised by stakeholders

need to be managed through a transparent process, readily acceptable to all segments of affected communities and other stakeholders, at no cost and without retribution. The GRM works within existing legal and cultural frameworks, providing an additional opportunity to resolve grievances at the local, project level. The key objectives of the GRM are:

- “ Record, categorize and prioritize the grievances;
- “ Settle the grievances via consultation with all stakeholders (and inform those stakeholders of the solutions)
- “ Forward any unresolved cases to the relevant authority.

283. The types of grievances stakeholders may raise include, but are not limited to:

- “ Non-payment, or inadequate compensation and/or due R&R assistances; wrong measurement of parcel
- “ Construction related impacts ó cracks, damages to structures; dust damaging crops/trees
- “ Health and safety risks;
- “ Negative impacts on the environment;
- “ Negative impacts on communities, which may include, but not be limited to financial loss, physical harm and nuisance from construction or operational activities;
- “ Impacts arising from migrant labor on local communities

284. As the GRM works within existing legal and cultural frameworks, it is recognized that the GRM will comprise project level and Himachal Pradesh judiciary level redress mechanisms. Most Project related grievances could be minor and site-specific. Most grievances are to be received directly on site by the designated site representative of HPRIDC that will endeavor to resolve them satisfactorily on site. The designated site representative will inform the Head of Construction Management Unit (CMU) of these complaints and their outcomes, and of others not satisfactorily resolved that the Project Contact Person (PCP) should take over. The PCP will log these in the Complaints Register. The PCPs will, on receipt of each complaint, note the date, time, name and contact details of the complainant, and the nature of the complaint in the Complaints Register. The PCP will inform the complainant of when to expect a response. S/he will then endeavor to address it to the best of his/her abilities, as soon as possible. Should the PCP not be able to resolve the complaint to the satisfaction of the affected persons, he/she will then refer the complaint directly to the HPRIDC Project Director (PD).

285. Complaints referred to the PD will require him/her to take earnest action to resolve them at the earliest time possible. It would be desirable that the aggrieved party is consulted and be informed of the course of action being taken, and when a result may be expected. Reporting back to the complainant will be undertaken within a period of two weeks from the date that the complaint was received. If the complaint is not resolved to the satisfaction of the aggrieved party, it will then be referred by the State level Grievance Redress Committee (SGRC). The SGRC will be required to address the concern within 1 month.

286. Should measures taken by the SGRC, fail to satisfy the complainant, the aggrieved party is free to take his/her grievance to the Court of Law **at his/her own cost**, and the Court's decision will be final and shall be binding on all parties. It is possible that for land issues, the complainant may prefer to take his/her issue to the Court of Law for a final pronouncement/resolution. It is vital that appropriate signage for GRM is erected at the sites of all works providing the public with updated Project information and summarizing the GRM process, including contact details of the relevant Project Contact Person (PCP). Anyone shall be able to lodge a complaint and the methods (forms, in person, telephone, forms written in Hindi/local language) should not inhibit lodgment of any complaint.

287. The Complaints Register shall be maintained by the CMU and maintained by the department, who will log the: i) details and nature of the complaint; ii) the complainant name and their contact details; iii) date; iv) corrective actions taken in response to the complaint. This information will be included in HPRIDC's progress reports to the World Bank. The project level



process can only act within its appropriate level of authority and where appropriate, complaints will be referred on to the relevant authority such as those indicated.

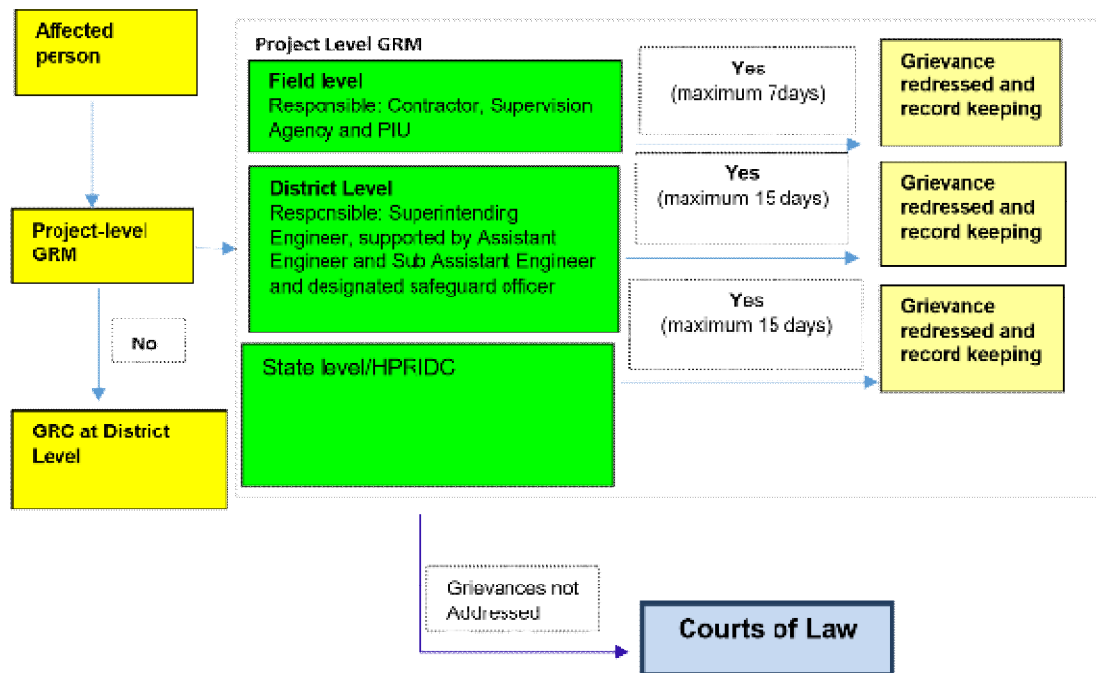
288. The Grievance Redress Committee (GRC) will be formed at each Project district comprising of following members ó

- ˆ District Social Welfare Officer
- ˆ Executive Engineer, CMU
- ˆ Resettlement and Rehabilitation Officer, SDU/CMU
- ˆ NGO representative
- ˆ PAP representative, and
- ˆ Representative from Land and Revenue Department (only cases related to land)

289. In addition, there is proposed to be one District level Committee (DLC) will be formed to meet at periodic interval to review the progress of land acquisition and facilitate implementation in the district. District Level Committee would comprise of the following members:

- ˆ Deputy Commissioner (Chairman)
- ˆ Land Acquisition Officer
- ˆ Executive Engineer (PWD)
- ˆ NGO Representative
- ˆ Chairman of Block Samiti

290. To resolve the land and structure related issues, an arbitrator shall be appointed by the HPRIDC in order to settle the dispute. Cases not resolved at GRC level would be brought for arbitration. A time period of two months would be available for arbitration. In case at this level the dispute is also not resolved, the aggrieved person may take recourse to the civil court.



**Figure7.2: Grievance Redress Mechanism/Process**

291. Details on contact information for grievances, inquiries, and further feedback.

Description	Contact details
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Company:	Himachal Pradesh State Road & Other Infrastructure Development Corporation
To:	Chief Engineer-cum-Project Director
Address:	HP State Roads Project, Nirman Bhawan, Nigam Vihar, Shimla ó 171 002
E-mail:	pdsrp-hp@nic.in
Website:	<a href="http://www.himachalservices.nic.in/hpride">http://www.himachalservices.nic.in/hpride</a>
Telephone:	Tel: 0177 ó 2627602, 2620663
Fax:	0177 ó 2620663

292. Notifications regarding constitution of committees by HPRIDC would be done prior to project negotiations. Prior to commencement of construction, these details would be notified by pasting notices at the prominent community locations and also in the villages en-route. Additionally, these details would also be displayed in the micro-plans (prepared for provision of R&R assistances) that would be displayed in the project affected villages.



<b>Dadhol Ladrour – List of impacted Common Property Resources</b>				
<b>S.No</b>	<b>Str. No.</b>	<b>Chainage</b>	<b>Type</b>	<b>Extent Area %</b>
1	LCPR-1	0/010	Temple	10.11
2	RCPR-34	9/161	HAND PUMP	18.15
3	RCPR-43	11/982	HAND PUMP	2.28
4	LCPR-11A	6/768	SCHOOL COMPOUND WALL	16.23