Himachal Pradesh State Roads Transformation Program

(Funded by World Bank)

Baddi-Sai-Ramshahr (Km 11.00 to KM 45)

Environment and Social Impact Assessment

(Draft)

HIMACHAL PRADESH ROAD & OTHER INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.
(Government of Himachal Pradesh Undertaking)
(An ISO 9001:2008 QMS & ISO 14001:2004 EMS conforming company)

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ABBREVIATIONS AND ACRONYMS

CGWB	Central Ground Water Board
COI	Corridor of Impact
CPCB	Central Pollution Control Board
CRRI	Central Road Research Institute
DoE	Department of Environment
DC	District Commissioner
ESIA	Environmental and Social Impact Assessment
ESF	Environment and Social Framework
ESS	Environment and Social Standard
EMP	Environmental Management Plan
ESCP	Environment and Social Commitment Plan
FPIC	Free Prior and Informed Consultation
FGDs	Focus Group Discussions
GDP	Gross Domestic Product
GoI	Government of India
GoHP	Government of Himachal Pradesh
GRC	Grievances Redress Committee
GRM	Grievances Redress Management
HPPWD	Himachal Pradesh Public Works Department
HPRIDP	Himachal Pradesh Road and Other Infrastructure Development Corporation
HPSRTP	Himachal Pradesh State Road Transformation Project/
IRC	Indian Road Congress
LMP	Labour Management Procedure
MDRs	Major District Roads
MoEF	Ministry of Environment and Forests
MSL	Mean Sea Level
MW	Mega Watt
NGO	Non-Government Organization
NH	National Highway
NOx	Oxides of Nitrogen
NSDP	Net State Domestic Product
PAP	Project Affected Person
PIU	Project Implementation Unit
PMC	Project Management Consultant
RAP	Resettlement Action Plan
RFCTLARR Act	Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement
RoW	Right of Way
SEP	Stakeholder Engagement Plan
SEIAA	State Environmental Impact Assessment Agency
SGWB	State Ground Water Board
SH	State Highway
SO2	Sulphur Dioxide
SC	Schedule Caste
ST	Schedule Tribe
WB	The World Bank

Executive Summary

1.0 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. 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 HP's Transport and Logistics Institutions, and Resilience; Component 2 - Improving fruit belts stimulating HP's 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 90.95 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– Baddi to Sai to Ramshahr

3. The sub-project road– Baddi to Sai to Ramshahr (Chainage 11+ 500 to Chainage Km 44+726) is one of the four priority corridors proposed for upgradation. It traverses 31 major settlements en-route this hilly and mountainous corridor, including major settlements such as Baddi, Sai, Taller and Ramshahr village. These locations do not have any schedule V areas or tribal households. The proposed improvement/widening scheme of project road comprises concentric widening, eccentric widening and as well as geometric improvements at necessary locations taking into account locations with blind spots and areas prone to landslides. Design improvement in the project road is done taking into consideration of lane configuration, widening scheme, speed, embankment height and the rural but mountainous setting of the road. There are no associated facilities in this proposed project section. Also, as no other multi-lateral or bi-lateral financing institutions are involved in this project in any of the upgradation or maintenance corridors, hence there is no requirement for a Common Approach.

3.0 Purpose and Scope of ESIA

This ESIA is based on detailed designs dated October 8, 2019. Based on this ESIA the design team is updating the designs [to reduce the proposed right of way to minimum required keeping in view safety considerations, geometric improvements, vehicular population, hill cutting with a view to minimize impacts on land, assets including structures, forest areas and trees] prior to formal WB appraisal."

4. The overall project risk was categorized as 'High' as per the internal Environment and Social Risk Classification of the World Bank and hence the ESIA was prepared by an independent ESA consultants. The purpose was to: i) identify, evaluate and manage the environment and social risks and impacts of the project in a manner consistent with the ESSs; ii) 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.

5. The scope of the ESIA is to: i) assess the existing baseline status of the environment with in 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

6. 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.

5.0 Environment and Social Baseline

7. The baseline environmental & social profile of project influence area covers 15 km radius of the project as well as Solan district as a whole. The environmental profile includes 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. The project road is located on hilly terrain with hill and valley on both sides of centerline. It passes along forest areas and agricultural lands. A total 5km (approx.) of road length at five locations is aligned adjacent to existing forest. Enumeration of trees number of trees with in a RoW on each side of the road was conducted and numbers of trees were found to be 1766. The terrain of project area is hilly and there are no perennial surface water sources/bodies other than seasonal streams and springs. There are no National Park, Wildlife Sanctuary, Biosphere Reserve and any other notified sensitive area within the 15 Km radius of project road. Communities largely depend on the piped water supply provided by Irrigation and Public Health Department, GoHP, besides on springs, locally calls 'Chasma'. In Solan district, millets are the most dominant agricultural crop, which can also be seen in cultivable lands along the project road. No notified/protected Archaeological or Historical monuments exists within corridor of impact. Ramshahr fort, which has a historical value but not protected by state/Central Govt is situated at 3 km away from project road end point. A total of 17 common property resources like hand pumps, religious places, educational institutes, bus stops along the project road have been identified.

8. The total population of Solan district is around 5.80 lakhs and constitutes 8.5% of the state population. Out of the total population of the district 82.39 per cent lives in rural areas while 17.60 per cent lives in urban areas. The sex ratio of the study area is 879 females per every 1000 males. As road designs are being revised, at present survey has been carried out 22 families whose structures have been impacted. All of the households are staying along the roadside from a long time since more than 10 years. Analysis on literacy level of the affected household shows that all of them are literates except around a negligible percent 18.18 percent is illiterates. The average household size for the project affected population is 5.1. Occupation wise, most of them are engaged into commercial activity of trade/business (45.45%), Agriculture (18.18),, Agri labour (4.55%) and and retired persons (9.09%). The incidence of service (Govt. & Private) Employees and Others is around 13.64 percent and 9.09 percent respectively. . The income levels of majority of the households fall under higher middle income category earning 1 lakh to 2.5 lakh per annum 18.18 percent. The incidence of lower-income families is about 63.64 percent who earn less than 1 lakh rupees per annum. About 18.18 percent of them are middle income families who are earning Rs. 2.5 lakh to 5 lakh per annum. . The expenditure pattern for the affected household's shows that a majority of them are having an average monthly expenditure between < 6000 per month. .

9. The sex ratio in the study area is 982 females per thousand males, which is lower the district sex ratio of 1007. Women in this region also have a good literacy rate of 47.73% compared to male population. From the affected population, it has been observed the males consists 50.44% and females are 49.56% reflects female population is more or less equal. 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. There are about 3.33% of women members are involved in other activities, 23.33% women are involved in collection of water, 3.33% are engaged as an agricultural labours. 10.0% are helping their family members in trade and business. Only 3.33% women are worked in service and worked as allied activities.

6.0 Stakeholder Consultations

10. 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 with institutional stakeholders. Stakeholders consulted included: Gram Panchayat, Gurudwara; BBNIA (Baddi- Barotiwala-Nalagarh Industrial Association), Gullarwala. Key queries and concerns were relating to: about the road cross sections and how much of the land on either side of the roads will be acquired; wanted to know what safety measures will be adopted by the project in villages and built up area; and compensation and assistance package. They were apprehensive that an improved road will lead to vehicles moving at greater speeds, leading to accidents in the village; apprehensive about the timely payment of assistance and compensation; replacement cost of the structure. Landslide prone areas were a major concern and communities wanted the project to address this issue; roadside water sources (seasonal stream or springs) must be protected from any damages; market property should not be damaged for execution of the project. 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.

11. Institutional stakeholders 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.

7.0 Analysis of Alternatives

12. Lane configuration is being done in keeping in view safety considerations, geometric improvements and vehicular population. However, vide analysis of alternatives that were considered as part of the Mitigation Hierarchy, the preliminary/draft designs are being revised again to reduce impacts on land, assets and forest area including trees. Stretch or location wise details wherein alternatives have been considered to avoid/minimize impacts will be known once the designs are finalized.

8.0 E&S Risks and Impacts

13. 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.

14. E&S risks and impacts on Disadvantaged and Vulnerable persons: Project shall define vulnerable persons as: those 'Below Poverty Line' category as identified by the concerned State Govt. level, SC, ST, disabled, handicapped, orphans, destitute persons and woman heading the household are also recognized as vulnerable persons.

15. E&S risks on labor and working conditions: 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, Migrant Workers and Community Workers would be involved. Risks include: 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.

16. 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 of physical, biological, social, and cultural environment. 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 muck disposal; slope stability and erosion (25 locations); blocking or filling of springs and seasonal streams (27 number); construction water demand (680 KLD); stressing water sources used by community (absence of perennial water sources and low groundwater level); emission from construction vehicles, equipment and plants; dust from earth works, hill cutting, stack yard, transportation of materials;, noise pollution (9 sensitive locations) 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. The design optimisation is still being done and options are being analyse to minimise project's footprint on social and environment including GHG calculation, resource efficiency etc.

17. E&S risks and impacts relating to Community Health and Safety: 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, 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.

18. E&S risks and impacts on land & assets (ESS 5): Categories of impact include: i) land; and ii) Structure (Private, Encroachments) - Residential, commercial and Squatters (residential, commercial and Residential –cum- commercial); and ii) Common Property resources (School, College, religious spots, bus shelter/bus stand, borewell and Hand pump. There is no Land required from private partiesfor the up-gradation of road . The total numbers of families surveyed are those structures are impacted i.e. 22 comprising 8 Titleholders and 15Non-Titleholders. 17 CPR are under the proposed impact zone within the corridor.

19. 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 1766 trees existing within right. The species recorded along the road corridor were distributed more frequently. While, Monitor lizard (*Varanus bengalensis*) and Common peafowl (*Pavo Cristatus*) are reported along the road, which are are listed under Schedule-I (part III) of Wildlife Protection Act-1972. In addition, an incident of leopard movement is reported during consultation. The extent of impact is not known at this stage while preparing the report and would need an assessment.

20. E&S risks and impacts relating to Cultural Heritage: The alignment of the project road does not have any ancient monuments and/or archaeological site(s). However, 3 religious' structures/shrines are expected to be partially impacted by the proposed road improvement activities. Extent of impact including on access on these structures, could vary depending on the final designs during preparation and potential modifications during construction stage.

21. Mitigation measures have been proposed based on current designs and these would be further revised based on the final road designs.

9.0 Key issues/findings and inputs to ESCP

22. Majority of stakeholders consulted indicated that the benefits of the project outweigh adverse impacts. 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

23. 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 land is 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.

24. Key measures and timeframes required for the project to meet the requirements of the ESSs are as follows: i) 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; ii) HPRIDC to provide draft consolidated ESIA; iii) Disclose Draft Consolidated Environment and Social Impact Assessment (ESIA) for the road corridor on Department website and WB portal; iv) Disclose Draft Stakeholder Engagement Plan; v) HPRIDC to disclose approved RPF on its website and HPRIDC to develop and include the project grievance mechanism in SEP and vi) disclosure of the approved ESCP; vii) HPRIDC to prepare a Resettlement Policy Framework for the overall project including rehabilitation and maintenance corridors These actions would need to be completed before the Project Appraisal **in December 2019.** The following actions: i) Disclose draft ESMP (EMP, RAP, TDP, GBV Plan); ii) would need to be completed prior to project **negotiations in January 2020**.

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 90.95 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 – Baddi to Sai to Ramshahr

5. Under the project the following four corridors are being taken up for upgradation. Details are provided in Table 1

Table 1.1 – Roads proposed for upgradation under HPSRTP II

S.No	Name of the Road	District	Length (in Km)
1	Barotiwala – Baddi – Sai – Ramshahr	Solan	44.950
2	Dadhol – Ladrour	Bilaspur	14.500
3	Mandi – Rewalsar – Kalkhar	Mandi	28.000
4	Raghunathpura-Mandi-Harpura- Bharari	Bilaspur	3.500

6. The Sub-project road proposed for upgradation – Baddi to Sai to Ramshahr (Chainage 11+ 500 to Chainage Km 44+726). The latitude of the project road at Barotiwala and Ramshahr are 30.9226°N to 31.0892°N respectively and Longitude is 76.8317°E to 76.7957°E respectively. The altitude of project corridor from Barotiwala to Ramshahr ranges between 425-1000 mtrs above mean sea level. It traverses through Barotiwala Baddi Nalagarh area of Solan district, which is also famously known as BBN belt. There are 31 major settlements en-route this hilly and mountainous corridor, including major settlements such as Baddi, Sai, Taller and Ramshahr village. These locations do not have any schedule V areas or tribal households that meet the characteristics outlined in ESS 7[1].

7. The length of settlements along the stretch is less than 15% of the length of the road. The current road a mix of two lane and intermediate lanes and comprises 8 number minor junctions and 1 major junctions. In terms of current condition of road, it indicates severe cracking, ravelling, patching & potholes, surface bad and undulations, besides locations requiring geometric improvements.

8. The proposed improvement/widening scheme of project road comprises concentric widening, eccentric widening and as well as geometric improvements at necessary locations taking into account locations with blind spots and areas prone to landslides. Design improvement in the project road is done taking into consideration of lane configuration, widening scheme, speed, embankment height and the rural but mountainous setting of the road. The existing substandard geometry in rural area has been eliminated. In addition, reconstruction, retaining with minor and extension are required in minor bridges, major bridges, pipe, slab and box culverts, etc. Project shall remodel 16 bus stops (also locally known as rain shelters) that lie en-route.

9. Pre-construction stage of the project are likely to involve adverse impacts on land – private/government/forest, 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

[1] characteristics as outlined in ESS 7 – Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities

up labor camps with separate but temporary facilities for housing, water & power supply and construction material storage facilities.

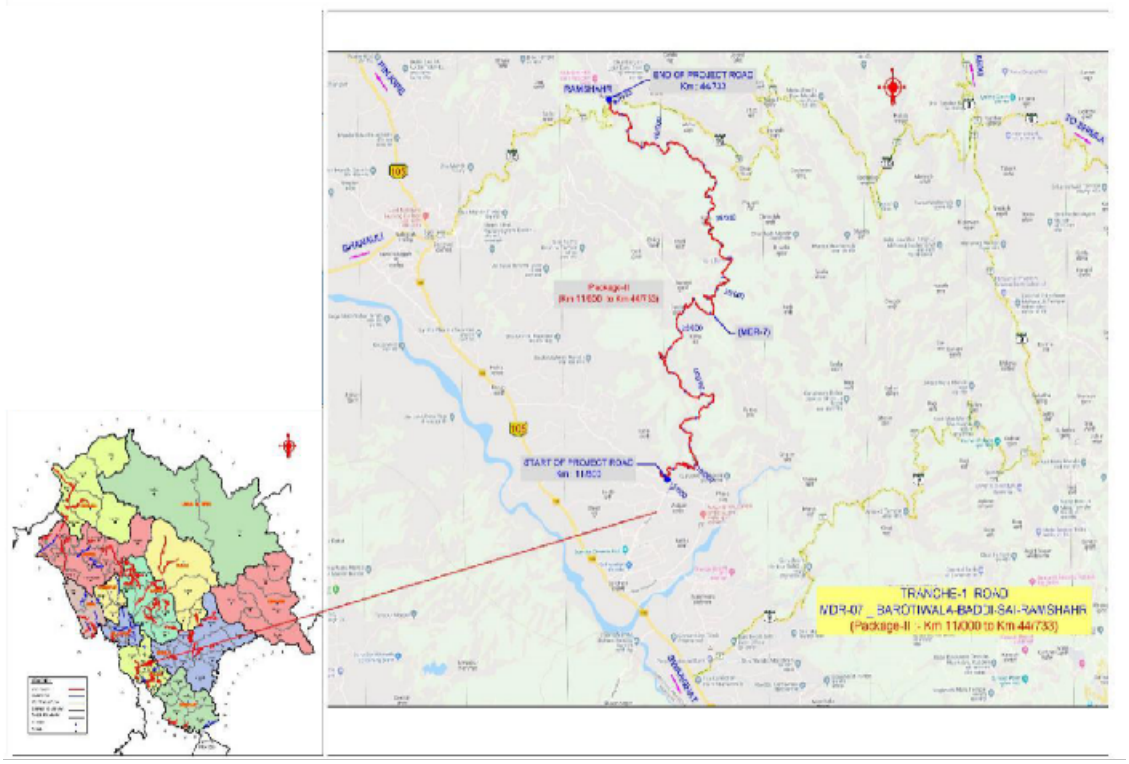


Figure 1.1: Map indicating Baddi - Sai - Ramshahr corridor

10. Besides, the project will also have access roads leading to the labor camps and identified spots/locations needed for disposal of material, etc. 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.

11. 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[2]: 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 including Police Department that are associated with activities under other components of the project such as Road Safety.
12. There are no associated facilities in this proposed project section. Also, as no other multi-lateral or bi-lateral financing institutions are involved in this project in any of the upgradation or maintenance corridors, hence there is no requirement for a Common Approach.

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

13. Based on a thorough consideration of the afore-mentioned details, the following plans need to be prepared to meet the requirements of ESS.

Table 1.2 – Plan documents to meet relevant ESS requirements

ESS 1	EMP and ESMP
ESS 2	Labour Management Procedure for HPRIDC[3]
ESS 3	Waste Management Plan & Pollution Prevention Management Plan
ESS 4	Emergency Response Plan & GBV Mitigation Plan
ESS 5	Resettlement Action Plan
ESS 6	Bio-diversity Management Plan (To be determined[4])
ESS 7	Indigenous-Peoples
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

14. In light of the afore-mentioned impacts the overall project was categorized as **High Risk** as per the internal Environment and Social Risk Classification of the Bank. Hence for the preparation of the Environment and Social Assessment of all the roads and subsequent follow on mitigation, HPRIDC contracted a separate independent agency – Messrs, Deccan Consulting Engineers Private Limited.

15. 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[2] and financially[3] 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

1.4 Scope of the ESIA

16. 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 with in Corridor of Impact and Project Influence Area;

[3] Labor Management Procedure shall be applied by HPRIDC for all upgradation and maintenance roads

[4] Settlements en-route have reported Leopard movement; details are being gathered to confirm the same and shall be used to prepare Biodiversity Management Plan, if required.

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 finally

vii. 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.

1.5 Approach and Methodology

17. 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 collected within 50 metre wide land strip i.e. 25 metre on each side of the centre line of the road has been considered as the direct corridor of impact.

    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.

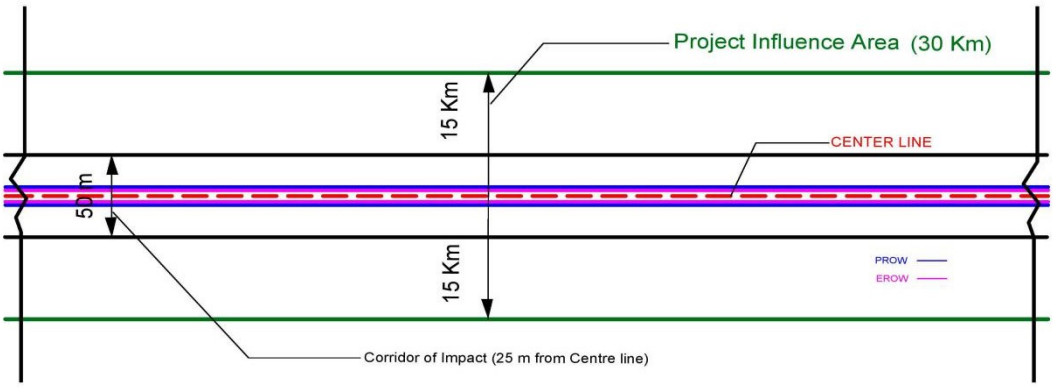


Figure 1.2: Corridor of Impact and Project Influence Area

18. 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.

19. 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.

20. 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.

21. 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.

22. 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 1.3 – Tools of Consultations

Tools of Consultation	Stakeholders	Purpose
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.); Neighboring 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); Village panchayat members/ local NGO's and Community Organization Community workers, Sarpanch, ANMs etc.	Social impact (Land/EROW, Structure, CPR) Social Concern (Road Safety, accident spots, critical Junctions) 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) Social Concern (Road Safety, accident spots, critical Junctions)

23. 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.

24. 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 bio-engineering measures 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.

25. 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.

26. 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 documents are available in project files/records and annexed in appendices 18, 19, 20 and 21 respectively.

CHAPTER 2 – LEGAL AND INSTITUTIONAL FRAMEWORK

27. 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 – the implementing agency.

2.1 Applicable Regulations of GOI/GoHP

28. 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.	Yes (applicable for construction & operation phase)
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 major 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 25th 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 with in 300km of project road)
4	The Forest (Conservation) Act. 1980	To check deforestation by restricting diversion of forest areas into non-forest uses.	Yes (The Project road requires diversion of forest land of **1.5 Ha** for non-forest purpose i.e, project road widening / upgradation.) As per MoEF&CC stipulations, if the diversion of forest land is less than 5 Ha, the department of forests under state Govt is empowered to accord the required clearance/permissions after

Table 2.1 Summary of Applicable E&S Regulations of GOI/GoHP			
S.No.	**Act / Rules**	**Key provisions and purpose**	**Applicability to Project Road**
			duly following the established procedure.
5	MoEF&CC circular (1998) on linear Plantation on roadside, canals and railway lines modifying the applicability of provisions of forest (Conversation) 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 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)	For opening new quarry.	Yes (During construction only, if any new quarries are opened, contractor shall avail the

Table 2.1 Summary of Applicable E&S Regulations of GOI/GoHP			
S.No.	**Act / Rules**	**Key provisions and purpose**	**Applicability to Project Road**
	Act 1957		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 (There exists one Ramshahr fort which is not protected and is located at a distance of 3km from end point)
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	No
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.)
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)

Table 2.1 Summary of Applicable E&S Regulations of GOI/GoHP			
S.No.	**Act / Rules**	**Key provisions and purpose**	**Applicability to Project Road**
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 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 ne 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.

Table 2.1 Summary of Applicable E&S Regulations of GOI/GoHP			
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 is likely to generate more than 20MT waste per day and/or 300 MT in a month, a project specific waste management plan will be required as per the stipulations under this rule. 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

Table 2.1 Summary of Applicable E&S Regulations of GOI/GoHP			
S.No.	**Act / Rules**	**Key provisions and purpose**	**Applicability to Project Road**
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 Rehabilitation and Resettlement Act, 2013."	Either of the options would be used for acquiring land under the project
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, breasts 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	Applicable to all roads in HP specifically to address the issue of encroachments

Table 2.1 Summary of Applicable E&S Regulations of GOI/GoHP			
S.No.	**Act / Rules**	**Key provisions and purpose**	**Applicability to Project Road**
		infrastructure; iii) raise any permanent, temporary or movable structure on or fro m road infrastructure;	
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

29. Section below discusses the relevance of ESF Policy, each of the ten standards (ESS1 to 10) and associated Directive; their requirements are tabulated in Table 2.2. Additionally, it also discusses the relevance and requirements relating to other guidance notes of World Bank.

Table 2.2 World Bank ESF Policy

World Bank ESS Policy, Standards, Directive	Objectives	Requirements	Relevance & Extent of Relevance to the sub-project/project
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
ESS-1 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
ESS-2 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	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	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

World Bank ESS Policy, Standards, Directive	Objectives	Requirements	Relevance & Extent of Relevance to the sub-project/project
	project workers with accessible means to raise workplace concerns.	(EHSG).	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 this Project from local sources particularly for supporting bio-engineering solutions towards slope stabilization workers.
ESS-3 Resource-Efficiency-and-Pollution-Prevention-and-Management	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.	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.	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. With respect to Pollution Management, based on past road project experiences, the project will develop, as part of the ESA process, prevention and

World Bank ESS Policy, Standards, Directive	Objectives	Requirements	Relevance & Extent of Relevance to the sub-project/project
			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) generated during project implementation period.
ESS-4 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	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

World Bank ESS Policy, Standards, Directive	Objectives	Requirements	Relevance & Extent of Relevance to the sub-project/project
	manner that avoids or minimizes risks to the project-affected communities.		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.
ESS-5 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 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.	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 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.	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 displacement too is very likely.

World Bank ESS Policy, Standards, Directive	Objectives	Requirements	Relevance & Extent of Relevance to the sub-project/project
ESS-6 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.
ESS-7 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 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,	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 consent in three circumstances.	Not relevant to this sub-project road. Though it has 25 tribal households might be impacted across the 34 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
	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.		
ESS-8 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 3 religious structures/shrines of local importance.
ESS-9 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	Not relevant as there is no financial intermediary involved.

World Bank ESS Policy, Standards, Directive	Objectives	Requirements	Relevance & Extent of Relevance to the sub-project/project
		FI subprojects.	
ESS-10 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	Applies to Bank in addressing E&S aspects of this project

World Bank ESS Policy, Standards, Directive	Objectives	Requirements	Relevance & Extent of Relevance to the sub-project/project
		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.	
Bank Directive Addressing Risks and Impacts on Disadvantaged or Vulnerable Individuals or Groups	This Directive establishes directions for Bank staff regarding due diligence obligations relating to the identification of, and mitigation of risks and impacts on, individuals or groups who, because of their particular circumstances, may be disadvantaged or vulnerable	It requires the Bank task team to support the borrower in establishing arrangements for the undertaking and preparation of the environmental and social assessment 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.	Applies to Bank in addressing E&S risks and impacts on disadvantaged and vulnerable persons or groups that are 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

2.3 Comparative Analysis of key national, state and Bank policies

30. A comparison between RFCTLARR Act, HP Private Negotiations order and guidelines, 2018, and World Bank's ESF that provides gap-filling measures reflected in the entitlement matrix is presented as Appendix-4. These are summarized below:

- The Act, like provisions of ESS, require SIAs for projects involving land acquisition with elaborate process of consultation at every notification stage. It also expands compensation coverage of the principal act by requiring that the value of structure, trees, plants, or standing crops damaged must also be included and the solatium being 100 percent of all amounts inclusive. The Act similar to World Bank, requires compensation to be paid, prior to project taking possession of any land and provide R&R support including transitional support and moving allowances.

- Act in its computation of compensation for structures takes depreciation into account and is not explicit about providing replacement cost of structures, though presumably the provision of 100% solatium will help arrive at replacement cost of structures or higher. GoHP standing order and guidelines for establishing the compensation amount upto the threshold as would have been determined under the Act, 2013

- Cut-off date for determining the compensation and entitlements and assistance to all those who are affected by the project irrespective of the ownership of titles. According to the RFCTLARR Act, the cut-off date for assistance to those depending on affected private lands is three years preceding the acquisition and for the titleholders it is the date of notification under the said Act. To bring this RPF in line with World Bank requirements, RPF mandates that while in the case of land acquisition, the date of issue of public notice of intended acquisition under Section 3(a) under the Act will be treated as the cut-off date for title holders. In case of non-titleholders such as squatters and encroachers, cut-off date will be the start date of the census survey. In case of all affected non-title holders, suitable compensation (ex-gratia payments) for loss of assets and R&R assistance is proposed in the entitlement matrix. GoHP standing order does not have any provisions for non-titleholders

- Also similar to provisions laid down in RFCTLARR Act 2013, World Bank ESS requires consultation with PAPs during planning and implementation of resettlement action plan, Tribal Development Plan and public disclosure of drafts.

- In GoHP standing order, land compensation under private negotiations, the latest circle rate is considered and multiplied with 1 or 2 times in urban or rural areas respectively and 100% solatium is added to arrive at the final compensation upto the threshold as would have been determined under the Act, 2013. However, there could be gaps in asset valuation and resettlement assistance. There is also a gap in case of those who loose land, the lump sum payment of INR 5,00,000 towards livelihood loss is not extended.

31. 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 Comparison of National Environmental Framework and ESF, 2018

32. The National Environmental Policy and Regulatory Framework and ESF, 2018 of World Bank have been compared and gaps if any are summarized in the Table 2-3.

Table 2-3: Comparison of National Environmental Policy and Regulations and ESF, 2018

S.No	ESF, 2018	Description	Equivalent National Environmental Policy and Regulations	Gaps
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
2	ESS-2	Labor-and-Working-Conditions	National Labour Act, 1970, 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	None at policy level. Broadly both cover all aspects.
3	ESS-3 and EHS Guidelines of IFC	Resource-Efficiency-and-Pollution-Prevention-and-Management	Environmental protection Act, 1986 and subsequent amendments Air (Prevention and Control of Pollution) Act, 1981; Water (Prevention and Control of Pollution) Act, 1974, for Pollution-Prevention-and-Management; The Noise Pollution (Regulation And Control) Rules, 2000 National Resource Efficiency Policy, 2019 (Draft)	Gap exists for Resource efficiency as the policy is in draft stage and yet to take off. Gaps exist between National Air quality standards, Water pollution limits and respective interim targets and guideline values of EHS Guidelines.
4	ESS-4	Community-Health-and-Safety	No Specific regulations for Community Health but safety regulations at work place are available	Gaps exist for Community-Health-and-Safety

S.No	ESF, 2018	Description	Equivalent National Environmental Policy and Regulations	Gaps
5	ESS-5	Land-Acquisition-Restrictions-on-Land-Use-and-Involuntary-Resettlement	The Himachal Pradesh Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (Social Impact Assessment and Consent) Rules 2015, Acquisition of Land by Private Negotiation and Upkeep of Land2017-PWD/ GoHP, January 2018 Record/General Guidelines and Instruction (Standing Order No .28)(PBW(B)F(5)40	None at policy level. Broadly both cover all aspects.
6	ESS-6	Biodiversity-Conservation	Biological Diversity Act, 2002	None at policy level. Broadly both cover all aspects.
7	ESS-7	Indigenous-Peoples	Not applicable	
8	ESS-8	Cultural-Heritage	Ancient Monuments and Archaeological Sites and Remains Act, 1958 and The Himachal Pradesh Ancient and Historical Monuments and Archaeological Sites and Remains Act, 1976	None at policy level. Broadly both cover all aspects.
9	ESS-9	Financial-Intermediaries	Not applicable	
10	ESS-10	Stakeholder-Engagement-and-Information-Disclosure	Environmental Impact Assessment Notification-2006, 14th Sep-2006, as amended in 2009 and 2013	None at policy level. Broadly both cover all aspects. However, Environmental Impact Assessment Notification-2006 is not applicable to the project road
11	EHS Guidelines for Construction Materials Extraction, April, 2007, IFC		National Resource Efficiency Policy, 2019 (Draft)	Gap exists for Resource efficiency including materials extraction as the policy is in draft stage and yet to take off.

2.5 Institutional Framework

33. 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.

34. 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:
    a) 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;
    b) 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.;
    c) act as a special purpose vehicle for resource mobilization on behalf of the State Government for all infrastructure projects

35. 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.

36. HPRIDC has acquired some experience from the implementation of HPSRP – I. It has built capacity and has procurement, financial management, contract administration and support staff necessary for the implementation of the proposed project.

37. HPRIDC will engage Environment and Social Safeguards officers and Project Management Consultant (PMC), which will be responsible for quality assurance and monitoring

38. 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 has been included at HPRIDC website: *http://admis.hp.nic.in/himachal/.* 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

39. 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.

40. There is no specific GRM to receive and redress complaints from project affected persons.

CHAPTER 3 BASELINE DATA

41. The baseline environmental profile of project influence area covering 15 km radius of the project as well as Solan district as a whole has been described in the following sections. The environmental profile includes 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.

42. 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 Solan 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 – 2016.
Landslide locations/Slope stability	Physical inspections of the project road	Primary investigations of the project road during August – 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 Solan 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 – 2016. Primary investigations of the project road during August – 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 Solan 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 – 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).

Environmental Attribute	Source of data / Information	Date and Year of the Data
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-2019).
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.	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 – 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 – 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 – September 2019.

3.1 Land Environment

Physiography

43. The project road entirely traverses within Baddi and Nalagarh Tehsils of Solan district, which is bounded by Bilaspur district in north-west and Mandi district in the north, Shimla and Sirmour districts in east and south-east respectively.

44. The Solan district comprises 6 Tehsils (Arki, Baddi, Kandaghat, Kasauli, Nalagarh and Solan) and 2 sub-tehsils (Krishangarh and Ramshahr). Important towns in the district are Solan, Nalagarh, Kasauli, Subathu, Dagshai, Arki, Kandaghat, Parwanoo etc. The alignment of project in Tehsil map is shown in Figure 3.1.

Source:- https://www.mapsofindia.com/maps/himachalpradesh/tehsil/solan.html

Figure 3.1: Tehsils of Solan District

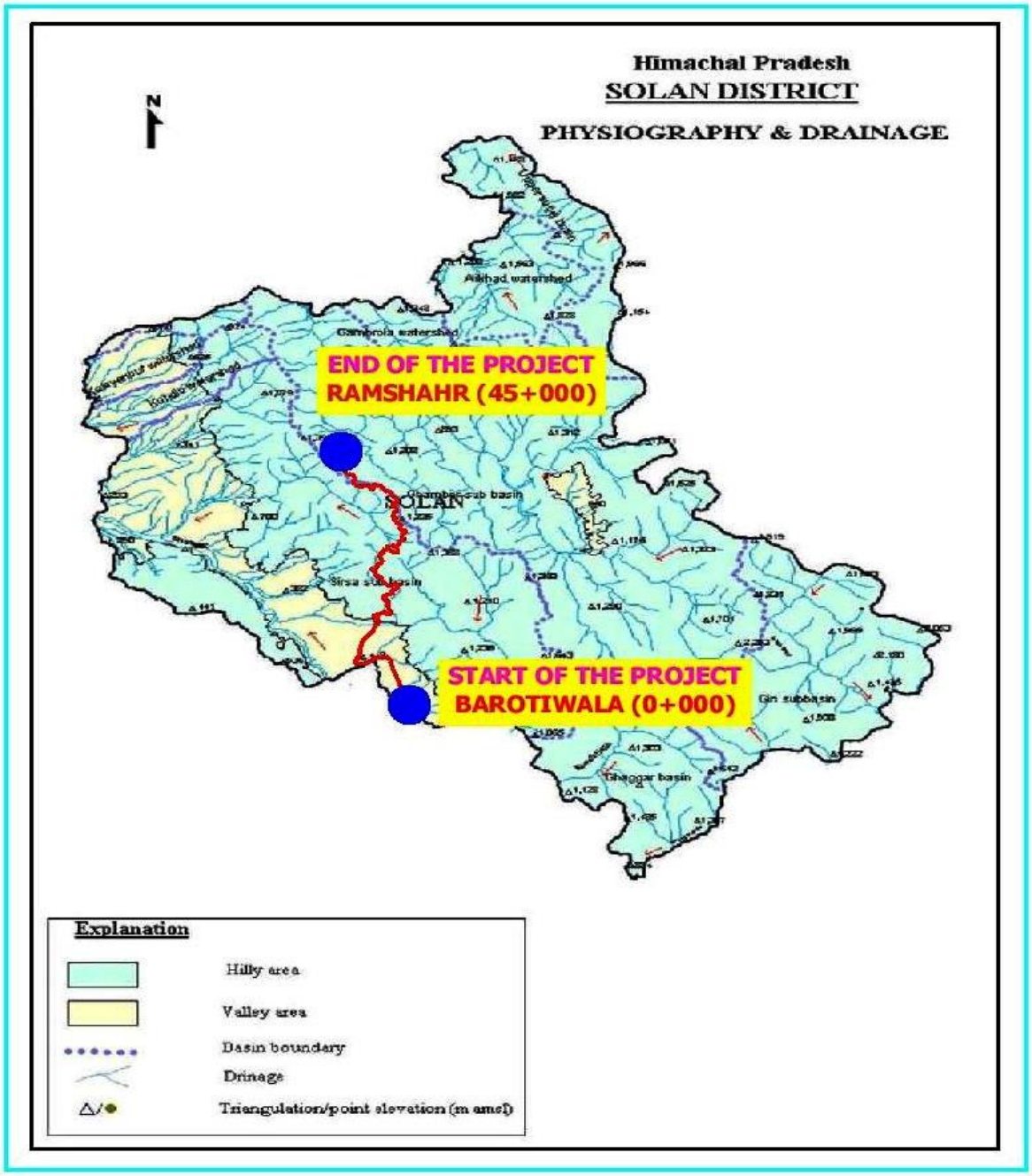


Figure 3.2: Physiography & Drainage Pattern of Solan District
(Source:- Central Ground Water Board, Government of India Ministry of Water Resources)

45. The project road traverses through 2 sub-basins namely Sirsa and Ghamber of Sutlej basin. Himachal Pradesh is drained by 5 river basins, out of which Sutlej is one of the major basins. The project road traverses largely in the terrain of hilly region as shown in Figure 3.2

Elevation

46. As per 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 1011m at km 26+900 and 420 m at Km 5+000. The elevation profile of Solan district showing the project road is given in Figure 3.3.

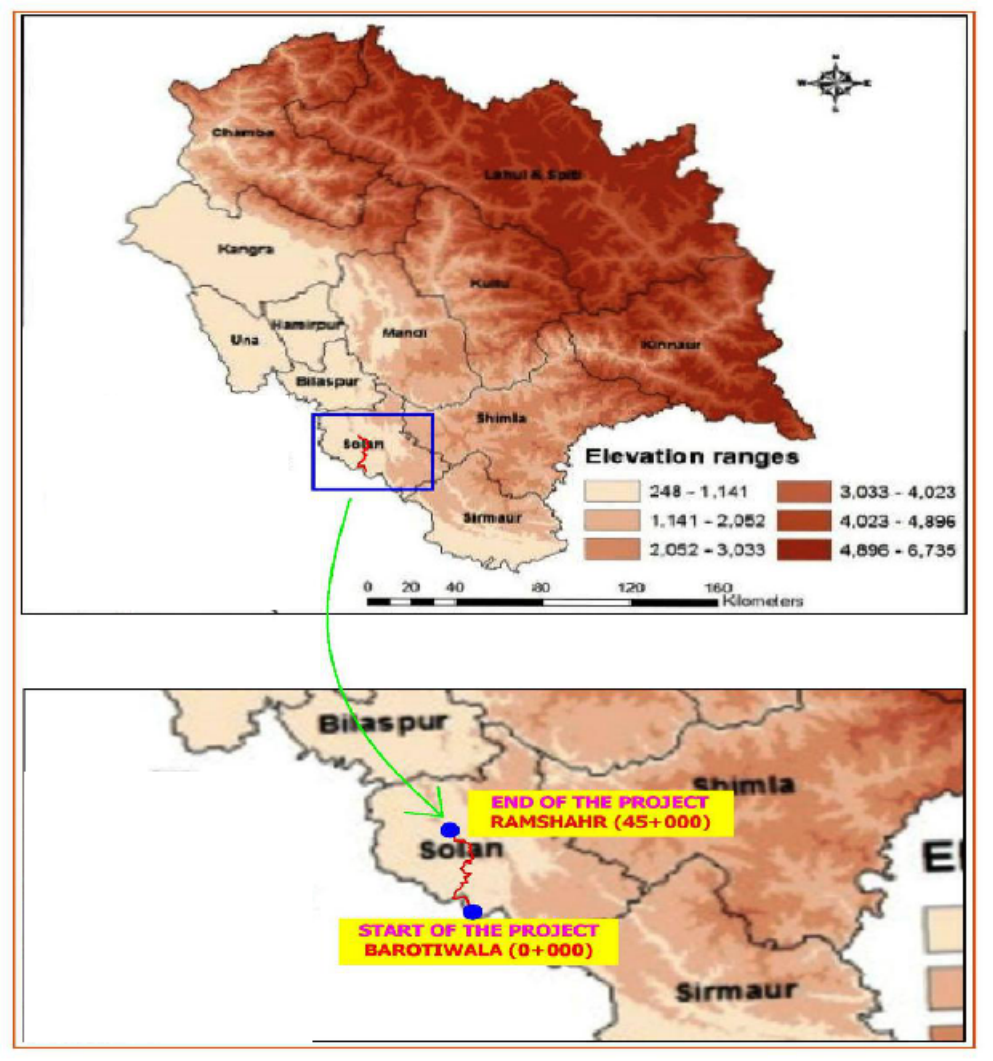


Figure 3.3: Elevation Profile of project road within Solan District
(Source:- https://www.researchgate.net/figure/Elevation-map-of-Himachal-Pradesh-state-of-India_fig1_275337696)

Geo-morphology And Soils

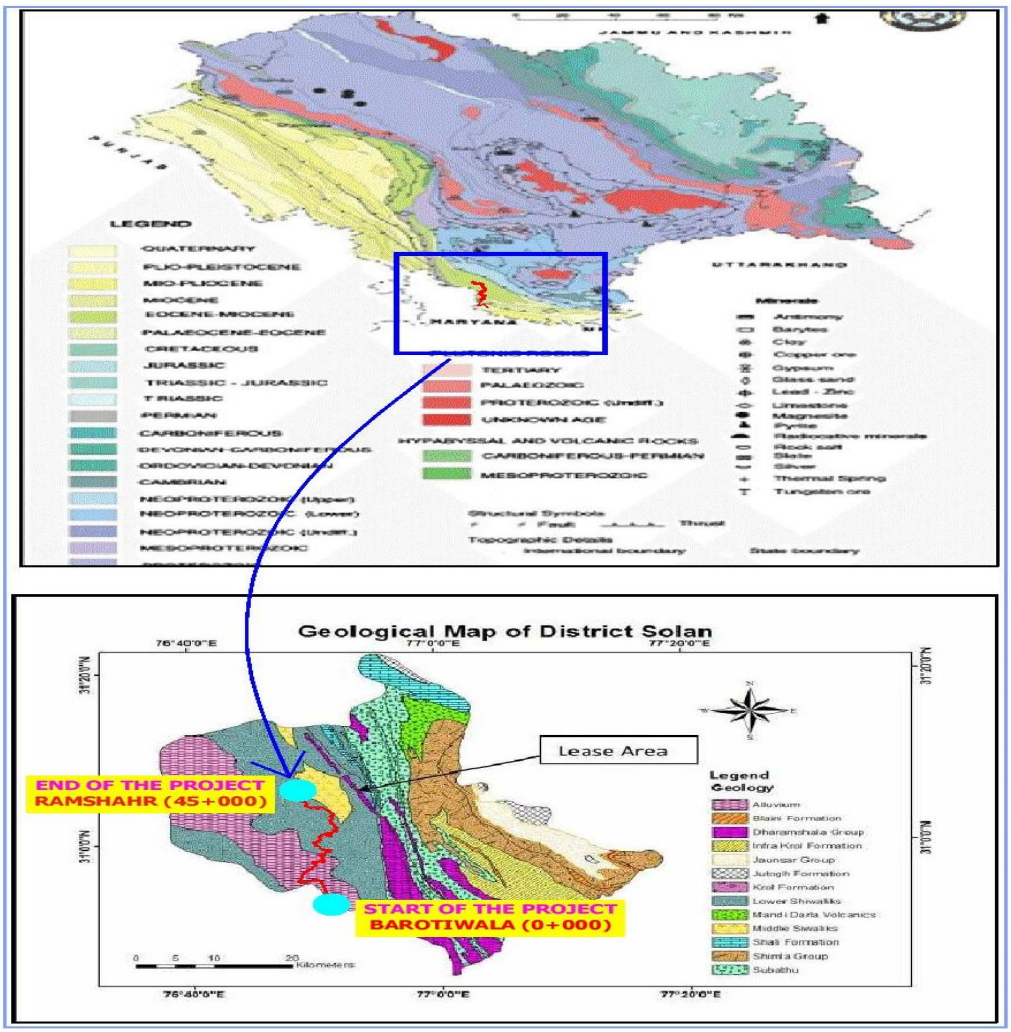
47. Solan district presents an intricate mosaic of high mountain ranges, hills and valleys with altitude ranging from 300 to 3000 m above MSL. The altitude of the hill ranges is higher in northern parts, whereas south-western part of the district is represented by low denuded hill ranges of Siwalik. In the areas underlain by high hill ranges of Himalayas, the valleys are narrow and deep with steep slopes trending in NW-SE direction. The terrain is moderate to highly dissect with steep slopes. Project road

majorly falls under Lower Siwaliks region and a small stretch falls in alluvium region. The geomorphology of solan district showing the project road is given in Figure 3..

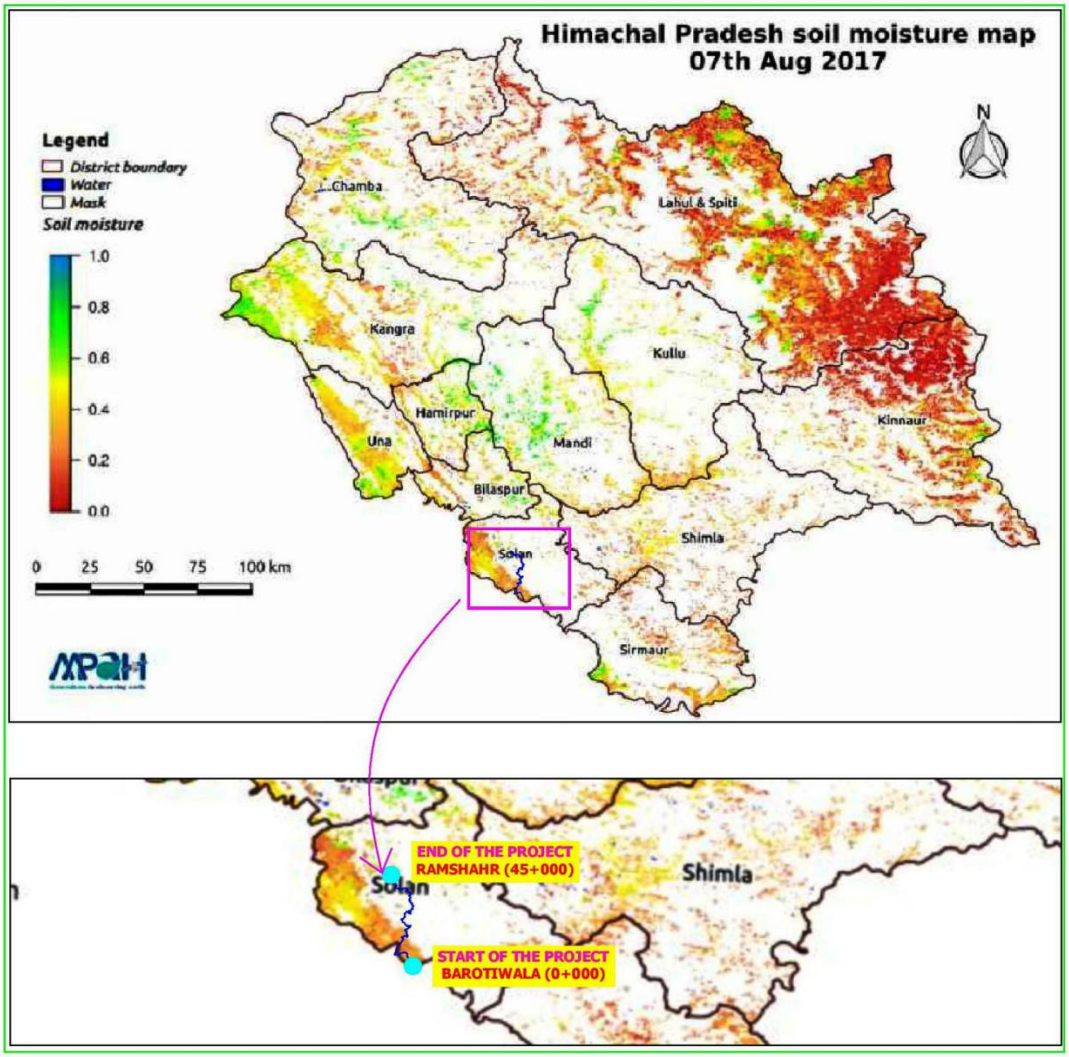
Soil Moisture and Fertility Levels

48. Soil is generally sandy loam in valley areas of the district and in rest of the hilly and mountainous areas, soil is skeletal. Soil depth is generally shallow, except in areas having good vegetative cover. It is generally dry, shallow and deficient in organic matter. Landslides are the common features in mountainous terrain.

49. Soils are rich in nutrients and thus are fertile. The project road has soil moisture in the range of 0.2-0.4. The soil moisture of solan district showing the project road is given in Figure 3.4. Also, the soil fertility along the adjoining areas of project corridor is reported to have medium fertility level. The soil fertility of Solan district showing the project road is given in Figure 3.5.



Source:- Geological website of Solan district.
Figure 3.4: Geology Map of Solan District



Source:- http://www.aapahinnovations.com/soil-moisture-map-state-himachal-pradesh/
Figure 3.5: Soil Moisture of Solan District

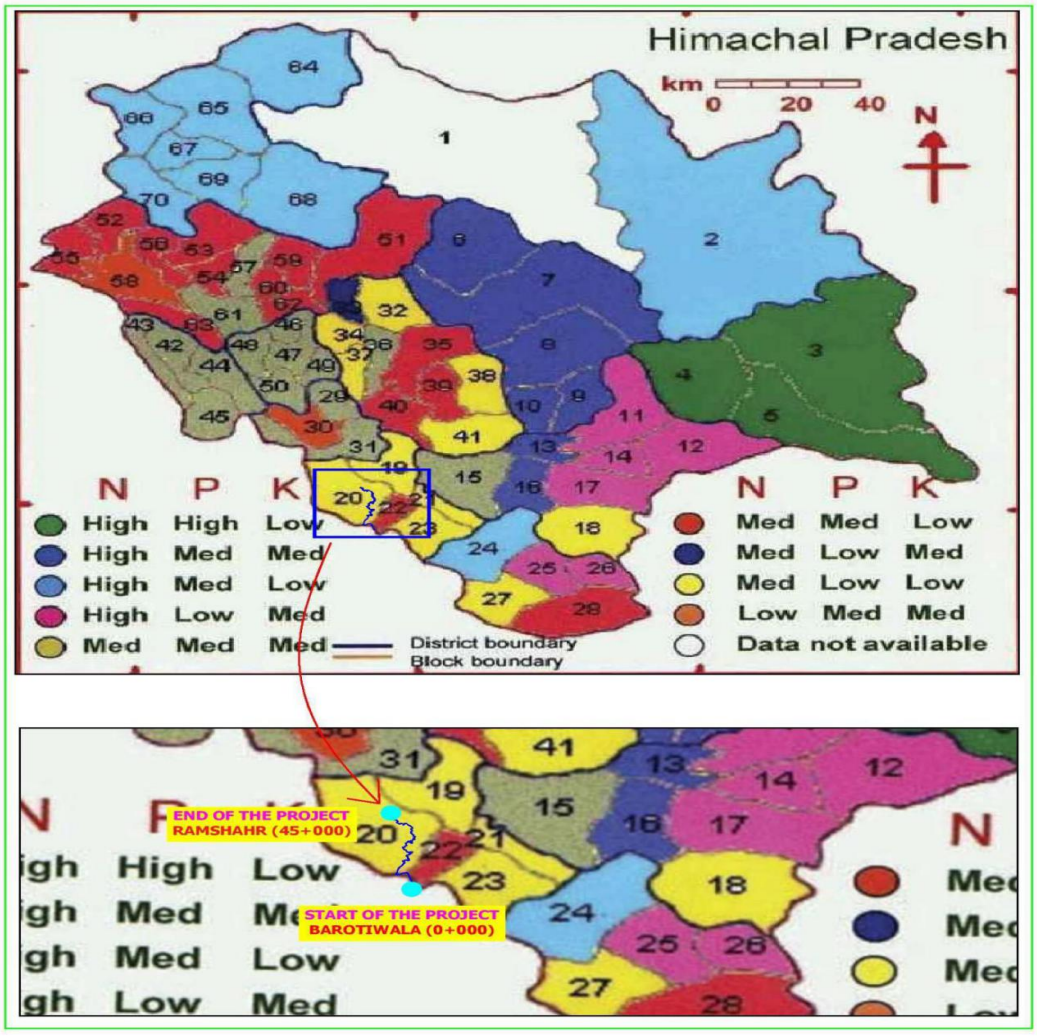
Soil Monitoring Data

50. The soil quality along the project corridor was tested at one location namely Talli village. The test results of the soil quality are given Table 3.2. The soil fertility (NPK value) of Solan district as a whole is given in Figure 3.6.

Table 3- 2: Soil Test Results along Project road

S.No	Parameters	Units	S1 (Talli village)
1	PH (1:2 Soil Water Extract)	--	8.02
2	Electrical Conductivity (micro mhos) (1:2 soil Water Extract)	µS	176
3	Bulk Density	g/cc	1.10
4	Phospates as P	Kg/Ha	4.8
5	Potassium as K	Kg/Ha	89.0
6	Nitrogen as N	Kg/Ha	296

S.No	Parameters	Units	S1 (Talli village)
7	Total Organic Carbon	%	0.52
8	Copper as Cu (mg/ Kg)	mg/kg	19.63
9	Zink as Zn (mg/ Kg)	mg/kg	102.3
10	Nickel as Ni (mg/ Kg)	mg/kg	0.21
11	Chromium as Cr (mg/ Kg)	mg/kg	3.22
13	Lead as Pb	mg/kg	9.63
14	Cadmium as Cd	mg/kg	< 0.50
15	CEC	meq/100gr	1.33
16	SAR	meq/100gr	0.59
17	Type of Soil	--	Sandy Loam
	a) Sand	%	67.8
	b) Silt	%	12.3
	c) Clay	%	19.9



Source:- http://www.aapahinnovations.com/soil-moisture-map-state-himachal-pradesh/
Figure 3.6: Soil Fertility of Solan District

Land Use

51. The project road traverses majorly along agricultural and forest lands. The land use map of Himachal Pradesh along with the project road is shown in Figure 3.7.

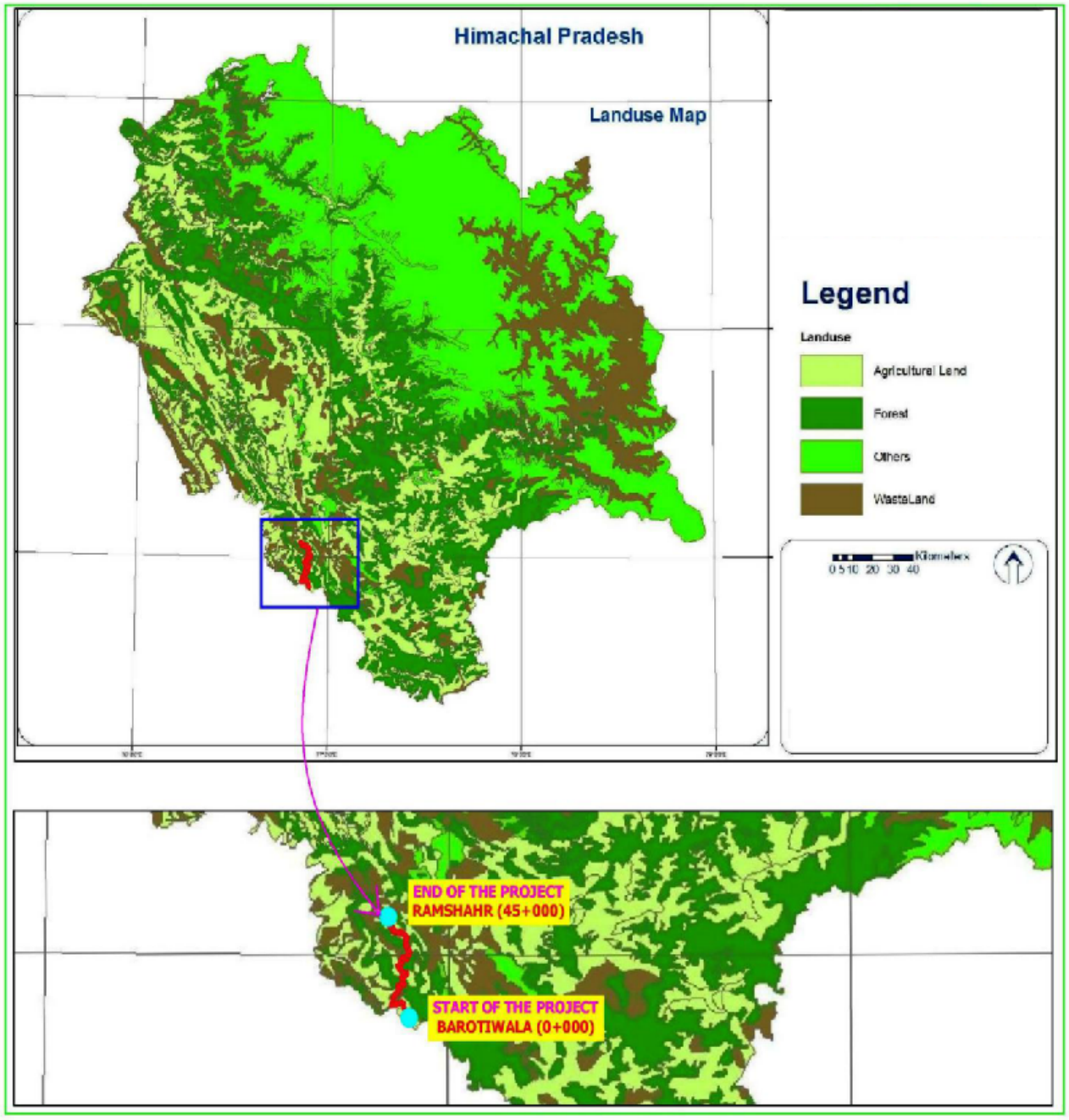


Figure 3.7: Land use Map of Solan District (Source:- Forest department of Himachal Pradesh)

Land Use / Land Cover of Project Corridor

52. Using the 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.

53. The land use / land cover with in the Project Influence Area (15km) is given in Figure 3.8. The Built –up land occupies about 20.28 Sq km, Forest Plantation land occupies 392.05 Sq km, Water bodies around 12.35 Sq km, Agriculture Crop Land 120.41 Sq km, Forest Land around 157.99 Sq km, Industrial Land occupy around 23.53 Sq km, Barren land around 99.34 Sq km.

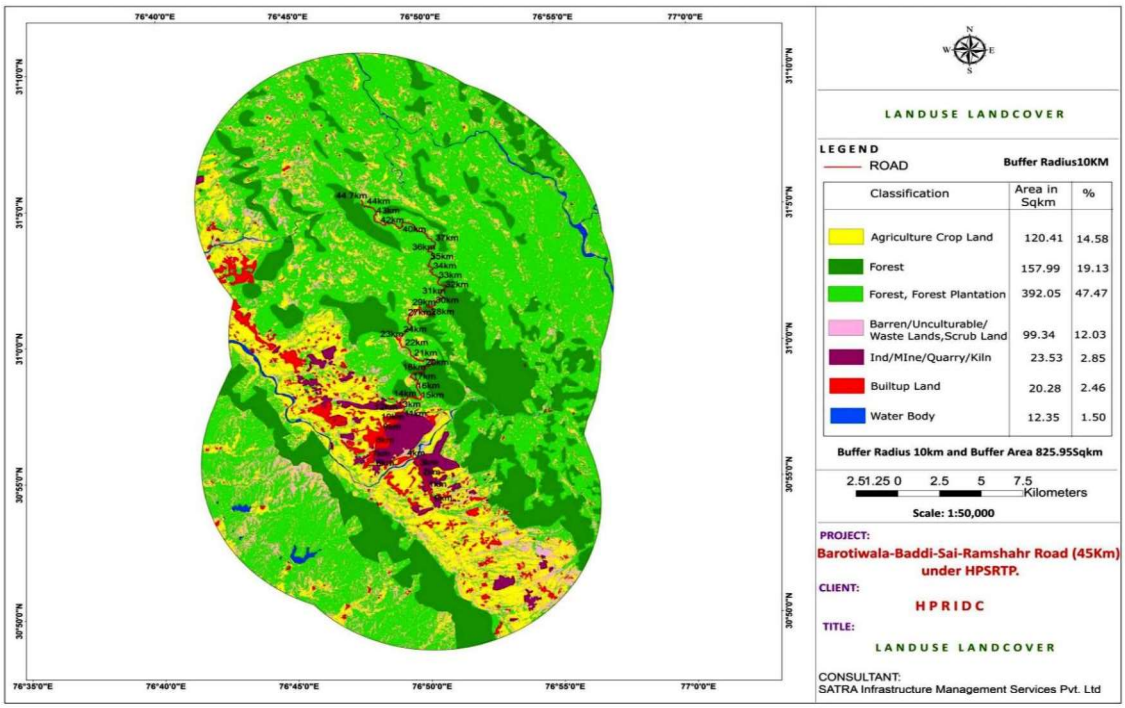
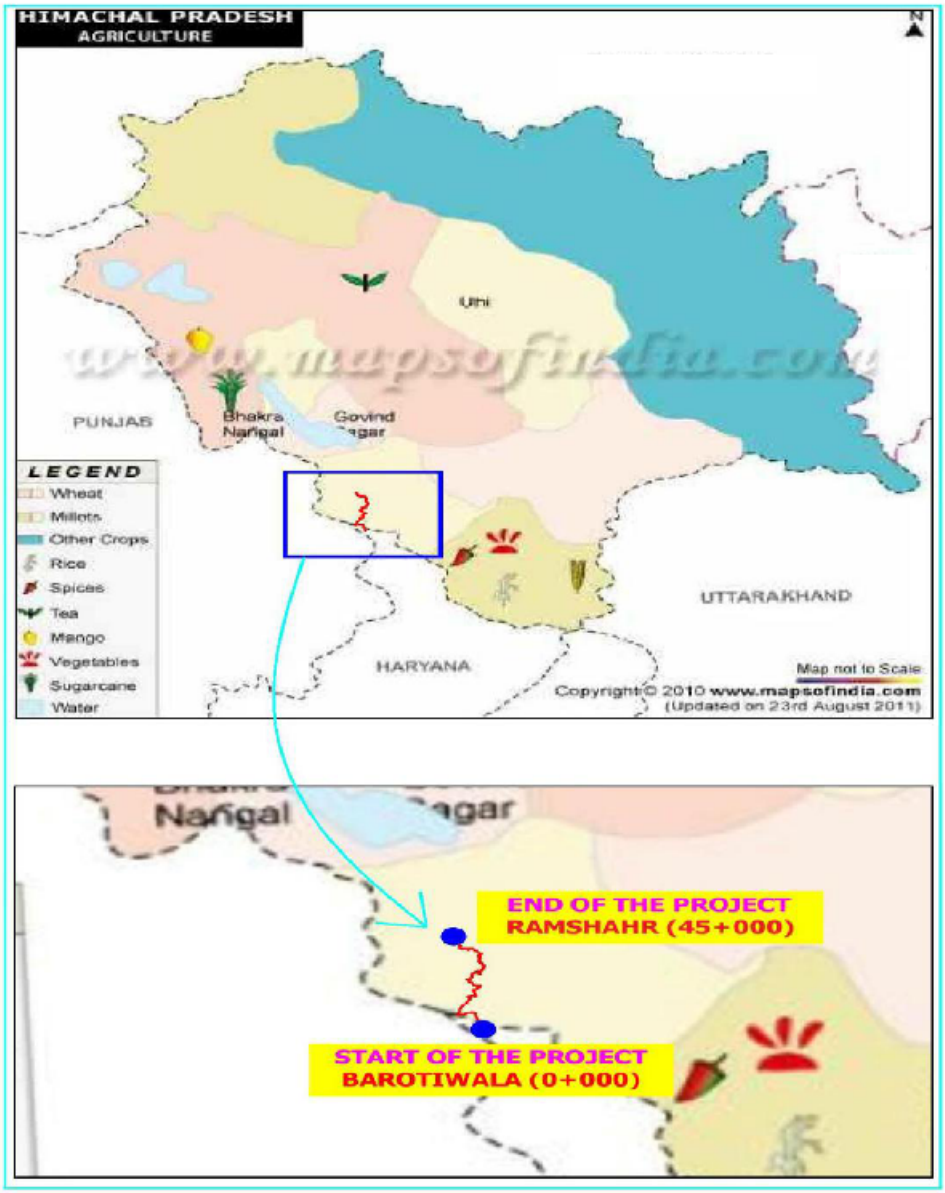


Figure 3.8: Land Use/Land Cover of Project Road

Agriculture

54. In Solan district, millets are the most dominant agricultural crop, which can also be seen in cultivable lands along the project road. Also, during the field investigations, cultivation of other minor crops like maize and tomato were also observed along the project road. The agriculture map along with the project road within the Solan district is shown in Figure 3.9.



Source:- https://www.mapsofindia.com/maps/himachalpradesh/himachalpradeshagriculture.html

Figure 3.9: Agriculture Map of Solan District

3.2 Physical Environment

Climate and Rainfall

55. The climate of the district is sub-tropical with four major seasons. The winter season commences from November to February and ends in March; summer season extends from March to June, followed by the monsoon period extending from July to September. Maximum precipitation occurs during July to September. Average annual rainfall in the district is about 1140.86 mm, out of which 85% rainfall occurs during June to September.

56. 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 district. The Project road doesn't experience snow fall. The Mean maximum and minimum temperature of the project road ranges between 32.2°C (May) and 0.6°C (January). The annual rainfall over a period 2014 to 2018 in Solan district is given in Table 3.3. The annual average rainfall is given in Figure 3.11.

Table Error! No text of specified style in document.**-3: Annual Average Rainfall in Solan District (2014-2018)**

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2014	67	99.9	121.1	62.9	71.5	125.8	354.9	157	137	24.6	0	122.5
2015	64.2	76.8	254.9	84.3	22.5	81.9	432.6	251	49.2	23.3	13.1	28.4
2016	6.4	33.2	109.6	13.2	109.9	253.4	274.6	316.5	54.4	16.9	0	5.9
2017	252.9	10	37.8	52.2	80.1	184.1	207.5	306.7	133.6	0	0.6	28.4
2018	14.1	40.8	11.6	55.3	46.7	130.8	326.9	360.1	292.8	2.6	32.2	13.7

Source:- Metrological centre, Shimla

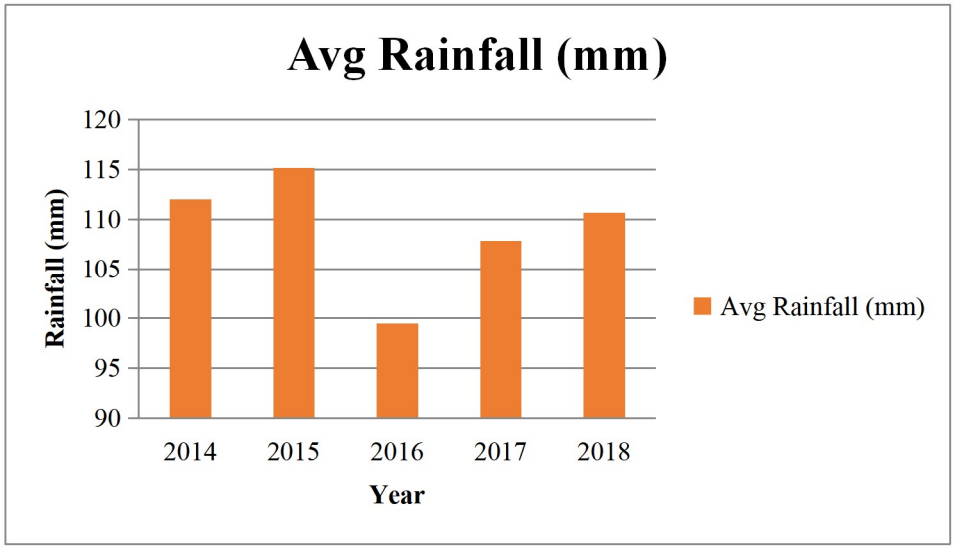


Figure 3.10: Annual Average Rainfall

Wind Speed

57. Wind Rose for the month of September 2019, for the wind data recorded at Ramshahr is given in Figure 3.11. Wind speed of 0.5 to 2.10 m/s in the direction of south west is observed majorly along the project road.

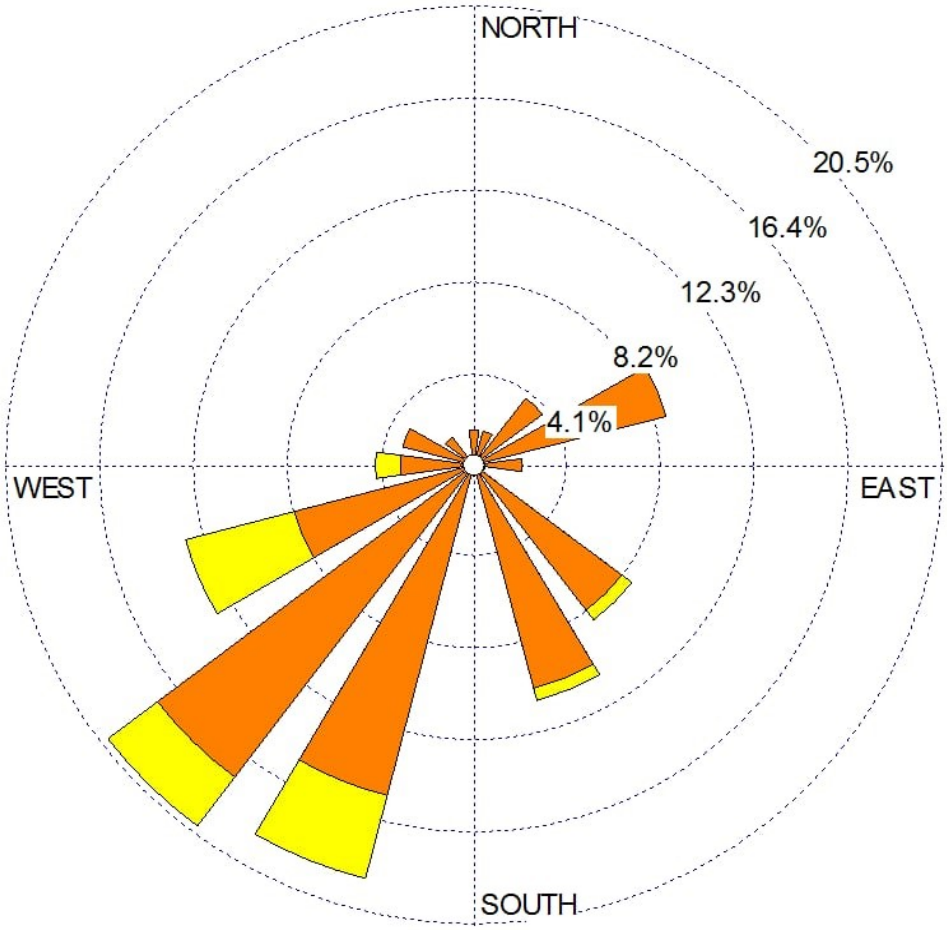


Figure 3.11 : Wind rose Diagram at Ramshahr

Ambient Air Quality

58. An Environmental monitoring along the project corridor was carried out during the month of Sept 2019. Residential and other sensitive locations proximity to road were the criteria used for selecting the sample locations (Table 3.4). The schedule of monitoring and methods used for analysis is given Table . The test results are given in Appendix 12. Map showing monitoring locations is given in Figure 3.12.

Table 3.4 : Locations for Environmental Monitoring

S.No	Parameter	Location	Location Code
1	Air	Barotiwala (change 0+000) and at Ramshahr chainage (44+000)	AAQ1, and AAQ2
2	Noise		N1, and N2
3	Soil	At Chainage Km 27+000 Tali village	S1
4	Ground Water	Near Baddi at 7+300	GW1

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

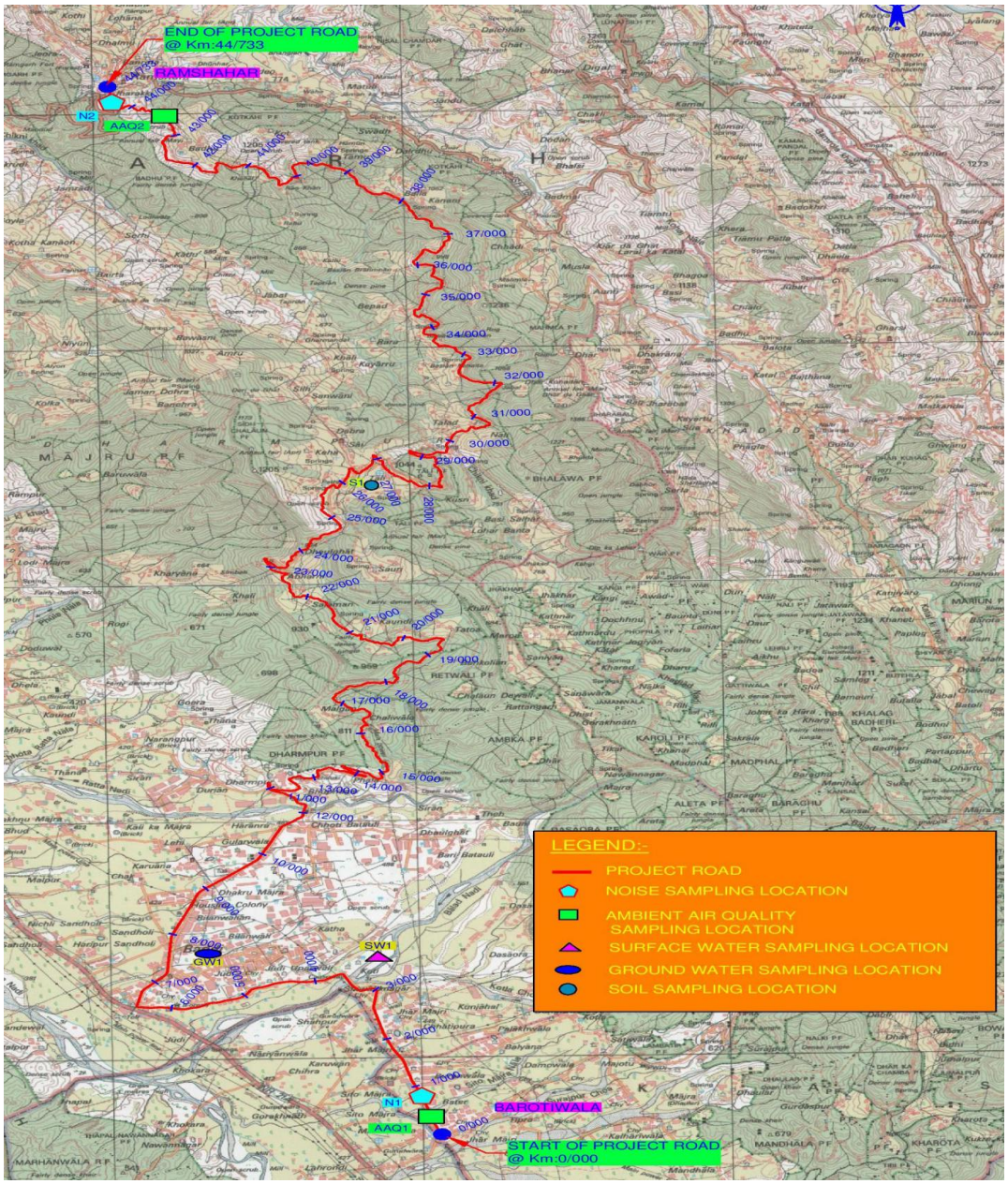


Figure 3.12: Map Showing Monitoring Locations along project Road

59. Ambient air quality monitoring was carried at Barotiwala and Ramshahr locations, which is mixed land use, junction of major highways with varying traffic volume includes both through and local. While in remaining stretch of road is pristine environment with no industries, less volume and smooth movement of traffic and locations of sensitive receptors away from road resulted to selection of aforementioned monitoring locations. The test results at both locations are below the National Ambient Air Quality Standards, 2009. The test results are given in Table 3.6.

Table 3-6 : Ambient Air Quality Monitoring Data

Date of Monitoring	Location & code	Week	Analysed Parameters Results			
			PM 10 (µg/m3)	PM 2.5 (µg/m3)	SO2 (µg/m3)	NO2 (µg/m3)
17.09.2019	Barotiwala-AAQ1	1	70.3	26.1	7.2	14.6
18.09.2019		1	65.1	24.9	8.2	14.5
21.09.2019		2	66.8	25.2	7.5	13.2
22.09.2019		2	64.5	24.5	7.1	13.8
25.09.2019		3	67.3	23.6	7.8	14.1
26.09.2019		3	65.6	24.1	7.4	13.5
29.09.2019		4	63.8	22.4	8.1	12.9
30.09.2019		4	64.2	23.2	7.6	13.2
17.09.2019	Ramshahr-AAQ2	1	48.2	16.9	6.9	13.1
18.09.2019		1	60.5	17.5	6.5	12.5
21.09.2019		2	49.1	15.5	6.3	11.9
22.09.2019		2	47.5	16.6	7.1	12.3
25.09.2019		3	49.8	15.2	6.5	11.5
26.09.2019		3	46.3	14.8	7.5	12.8
29.09.2019		4	48.6	14.2	7.3	12.5
30.09.2019		4	49.5	13.1	6.2	13.5
Limits as per NAAQS, 2009 (Industrial, Residential, Rural & Other Area)			100µg/m3	60µg/m3	80µg/m3	80µg/m3
EHS Guideline Values (24 hour, guideline value)			50	25	20	200 (hourly)

Ambient Noise Levels

60. Ambient Noise levels monitoring was carried at Barotiwala and Ramshahr locations along the project road. The test results are given in Table 3-1. It may be seen that the ambient noise levels (for both day and night times) at both the monitored locations are below the National Ambient Noise levels.

Table 3-1: Noise Monitoring Data

S.No	Date Of Monitoring	Sampling Location & Code	Noise Results	
			Day Time In Leq dB (A)	Night Time In Leq dB (A)
1	17.09.2019	Barotiwala (C)-N1	61.2	55.6
2	18.09.2019	Ramshahr (R)-N2	50.6	41
National Ambient Noise levels		Commercial	65	55
		Residential	55	45
EHS Guideline Values (One Hour Leq (dBA))		Commercial	70	70
		Residential	55	45

Surface Water

61. The terrain of project area is hilly and there are no perennial surface water sources/bodies other than seasonal streams and springs. The community during consultation informed of largely dependent on the piped water supply provided by Irrigation and Public Health Department, GoHP for drinking and other utilities. In addition to supply water, people also depends on springs, locally calls 'Chasma', located along major thrust/faults or structurally weak planes through which water seepage, which is collected on water storage tank or through Bowries, a type of dug well, structure constructed on the hill slopes to tap the seepage water. Such Bowries are very common and found all over the district. During field investigation survey, 27 seasonal streams were identified which flows only during monsoon season. There are no perennial water sources in study area and water quality test was limited to groundwater. List of Seasonal Streams is in Table 3-8 and photographs in Figure 3.14. The test results of surface water are given in Table 3.9.

Table 3-8 : Seasonal Streams

S.No	Proposed Chainage	Side		S.No	Proposed Chainage	Side
1	13+816	LHS		15	30+342	RHS
2	13+964	LHS		16	30+736	RHS
3	16+798	LHS		17	31+132	RHS
4	17+526	LHS		18	31+600	RHS
5	18+619	LHS		19	31+908	RHS
6	20/144	LHS		20	35+268	RHS
7	20+451	LHS		21	35+408	RHS
8	21+193	LHS		22	35+791	RHS
9	22+189	LHS		23	37+033	RHS
10	24+790	LHS		24	39+580	RHS
11	25/707	LHS		25	42+970	RHS
12	26/258	LHS		26	43+057	RHS
13	29+173	LHS		27	44+591	RHS
14	29+470	RHS				

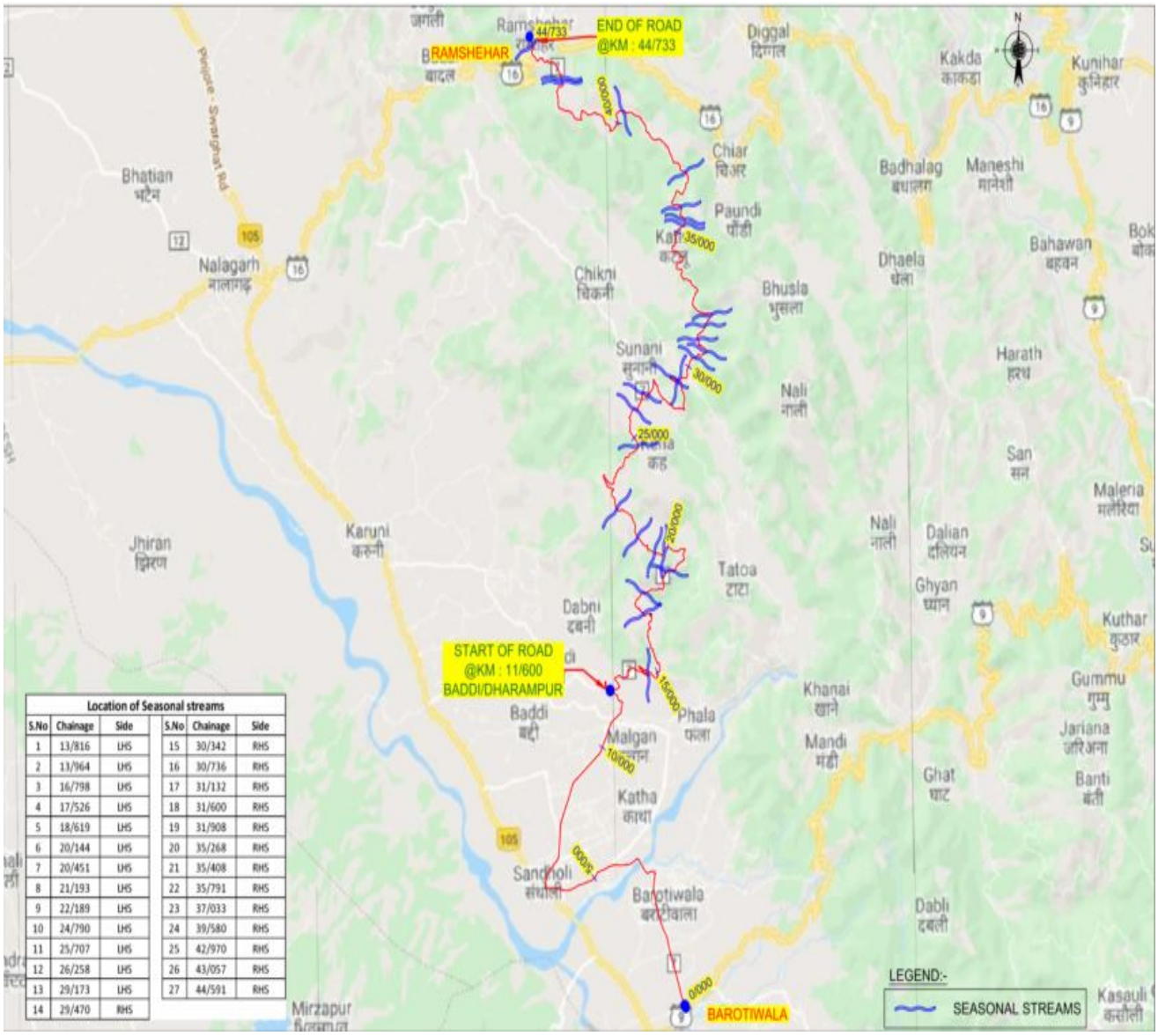


Figure 3.13:- Map Showing Seasonal Streams along the project road

Km 17+550 **Km 22+220**

Figure 3.14: Photographs of Seasonal Streams along Project road

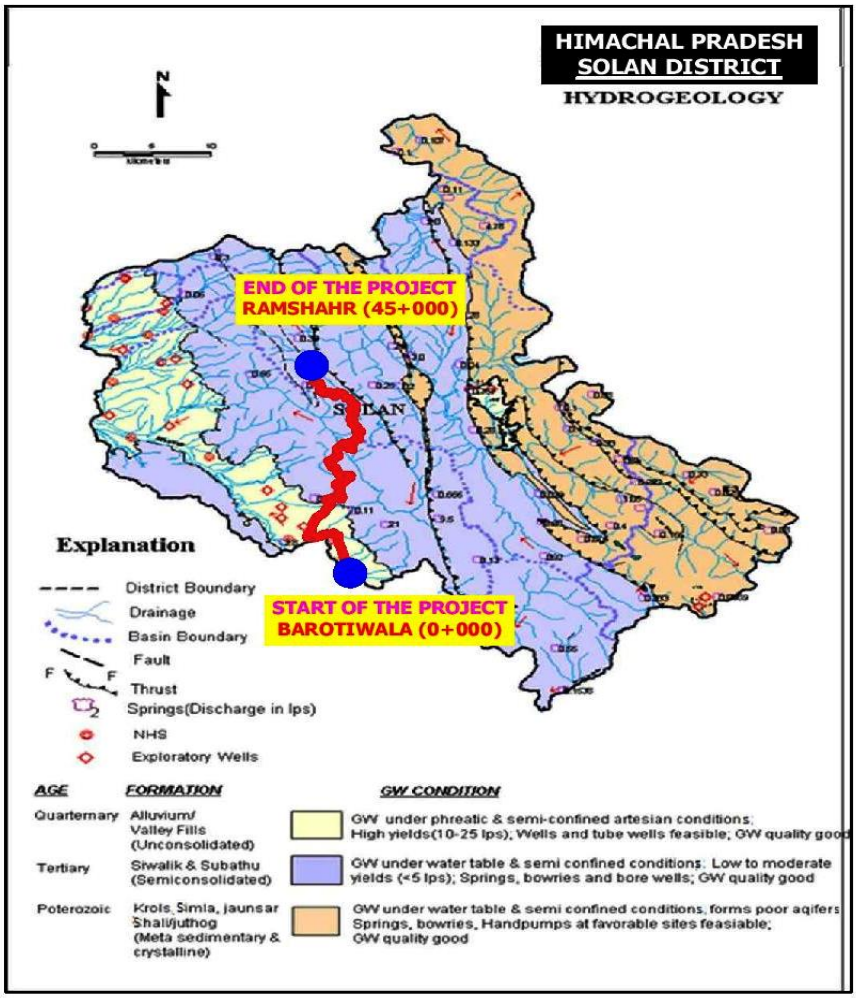
Table 3-9: Test Results of Surface water along the Project road

S.No	Parameter	Unit	Method	Result
1	pH	--	APHA 23rd Edition; 4500 H^+ B	7.91
2	Turbidity	NTU	APHA 23rd Edition; 2130 B	< 1.0
3	Conductivity	µMho/ Cm	APHA 23rd Edition; 2510 B	994.5
4	Total Dissolved Solids	mg/L	APHA 23rd Edition ; 2540 C	639.13
5	Color	CU	APHA 23rd Edition ; 2120 B	< 1.0
6	Odor	--	--	Agreeable
7	P-Alkalinity as $CaCO_3$	mg/L	APHA 23rd ᵗ Edition ; 2320 B	< 10.0
8	Alkalinity as $CaCO_3$	mg/L	APHA 23rd ᵗ Edition ; 2320 B	385
9	Total Hardness as $CaCO_3$	mg/L	APHA 23rd Edition ; 2340 C	510
10	Calcium as Ca	mg/L	APHA 23rd Edition ; 3500 Ca B	160.3
11	Magnesium as Mg	mg/L	APHA 23rd Edition ; 3500 Mg B	26.76
12	Sodium as Na	mg/L	APHA 23rd Edition ; 3500 Na B	38.24
13	Potassium as K	mg/L	APHA 23rd Edition ; 3500 K B	3.04
14	Chlorides as Cl^-	mg/L	APHA 23rd Edition ; 4500 Cl^- B	134.9
15	Sulphates as SO_4^{-2}	mg/L	APHA 23rd Edition ; 4500 SO_4^{-2} E	20.12
16	Nitrate Nitrogen as N	mg/L	APHA 23rd Edition; 4500 NO_3^- B	1.86
17	Fluorides as F^-	mg/L	APHA 23rd Edition ; 4500 F^- D	< 0.1
18	Iron as Fe	mg/L	APHA 23rd Edition ; 3500 Fe B	< 0.1
19	Manganese as Mn	mg/L	APHA 23rd Edition ; 3500 Mn B	< 0.01
20	Phenolic Compounds as Phenols	mg/L	APHA 23rd Edition; 5530 D	< 0.001
21	Copper as Cu	mg/L	APHA 23rd Edition ; 3111 B	< 0.01
22	Cadmium Cd	mg/L	APHA 23rd Edition ; 3111 B	< 0.001
23	Zinc as Zn	mg/L	APHA 23rd Edition ; 3111 B	< 0.5
24	Lead as Pb	mg/L	APHA 23rd Edition ; 3111 B	< 0.001
25	Mineral Oil	mg/L	APHA 23rd Edition ; 5520 B	< 0.001
26	Mercury	mg/L	Instrument Manual Method	< 0.001
27	Silver as Ag	mg/L	Instrument Manual Method	< 0.5
28	Selenium as Se	mg/L	APHA 23rd Edition ; 3111 D	< 0.05
29	Dissolved Oxygen	mg/L	APHA 23rd Edition 4500-O C	8.6
30	Chemical Oxygen Demand	mg/L	APHA 23rd Edition 5220 B	4.6
31	Biochemical Oxygen Demand (3day's at 27°C)	mg/L	IS : 3025(Part-44) :2009	0.5
32	Total Coli forms	MPN/100ml	IS:1622	36
33	Fecal Coli forms	MPN/100ml	IS:1622	9

Ground water

62. Hydro-geologically, the Solan district is characterized by unconsolidated valley fill or alluvial formation occurring in the valley area, semi-consolidated formations belonging to Siwalik Group and older consolidated hard 6 rocks forms the aquifer in the district. Major parts of the district are hilly and mountainous with highly dissected and undulating terrain. These areas are underlain by semi-consolidated and consolidated hard rocks of Tertiary and Proterozoic age.

63. The Ground water potential in areas along the project road mainly falls under the zone of GW under water table & semi confined conditions with Low to moderate yields (<5 lps). As per the CGWB report, as of 2013, the ground water development in valley areas of Solan district is mere 52% and therefore area is identified to be safe category. Thus, Solan district has scope for ground water development. The Hydrogeology of Solan District showing the project road is given in Figure 3.15.



Source:- https://www.researchgate.net/figure/Elevation-map-of-Himachal-Pradesh-state-of-India
Figure 3.15: Hydrogeology of Solan District

Ground Water Quality

64. The Ground water quality at Baddi village was tested during the monitoring and the test results are given in Table 3-10. It can be seen that almost all tested parameters of ground water sample at Baddi village are within the IS: 10500 (2012) permissible Limits.

65. The pH parameter is 8.12, which is in IS 10500 acceptable limits (6.5-8.5). Color value is <1.0 which is within the acceptable limit (5). The total dissolved solids are 287.5 and alkalinity is found to be 170 mg/l. The calcium, chloride, fluorides are found to be 48.09 mg/l, 19.99 mg/l, 0.82 mg/l respectively (which are in acceptable limits).

Table 3-10 : Test Results of Ground water at Baddi along the Project road

S.No	Parameter	Unit	Method	Result	IS 10,500 Limits	
					Acceptable	Acceptable
1	pH	--	APHA 23rd Edition; 4500 H^+ B	8.12	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	345.3	--	--

S.No	Parameter	Unit	Method	Result	IS 10,500 Limits	
					Acceptable	Acceptable
4	Total Dissolved Solids	mg/L	APHA 23rd Edition ; 2540 C	237.2	500	2000
5	Color	CU	APHA 23rd Edition ; 2120 B	< 1.0	5	15
6	Odor	--	--	Agreeable	Agreeable	Agreeable
7	P-Alkalinity as $CaCO_3$	mg/L	APHA 23rd t Edition ; 2320 B	< 10.0	--	--
8	Alkalinity as $CaCO_3$	mg/L	APHA 23rd t Edition ; 2320 B	170	200	600
9	Total Hardness as $CaCO_3$	mg/L	APHA 23rd Edition ; 2340 C	195	200	600
10	Calcium as Ca	mg/L	APHA 23rd Edition ; 3500 Ca B	48.09	75	200
11	Magnesium as Mg	mg/L	APHA 23rd Edition ; 3500 Mg B	18.24	30	100
12	Sodium as Na	mg/L	APHA 23rd Edition ; 3500 Na B	11.56	--	--
13	Potassium as K	mg/L	APHA 23rd Edition ; 3500 K B	2.06	--	--
14	Chlorides as Cl^-	mg/L	APHA 23rd Edition ; 4500 Cl^- B	19.99	250	1000
15	Sulphates as SO_4^{-2}	mg/L	APHA 23rd Edition ; 4500 SO_4^{-2} E	22.52	200	400
16	Nitrate Nitrogen as N	mg/L	APHA 23rd Edition; 4500 NO_3^- B	1.48	45	No Relaxation
17	Fluorides as F^-	mg/L	APHA 23rd Edition ; 4500 F^- D	0.82	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^- 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
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	4	Shall not be detectable in any 100 ml Sample	
33	Fecal Coli forms	MPN/100ml	IS:1622	Absent		

3.3 Biological Environment

Forest

66. 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 (Km²)	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
Total	37948	100

The forest map of Himachal Pradesh along with the project road is shown in Figur 3.14.

Forest Area Along Project Corridor

67. The project road is located on hilly terrain with hill and valley on both sides of centerline. It passes along forest areas and agricultural lands. A total 5km (approx.) of road length at five locations is aligned adjacent to existing forest where the existing carriageway is 3.2m while shoulder on both sides range from 0.3m to 0.5m. The details of forest land and likely required area for fitting propose road design is in Table 3-11.

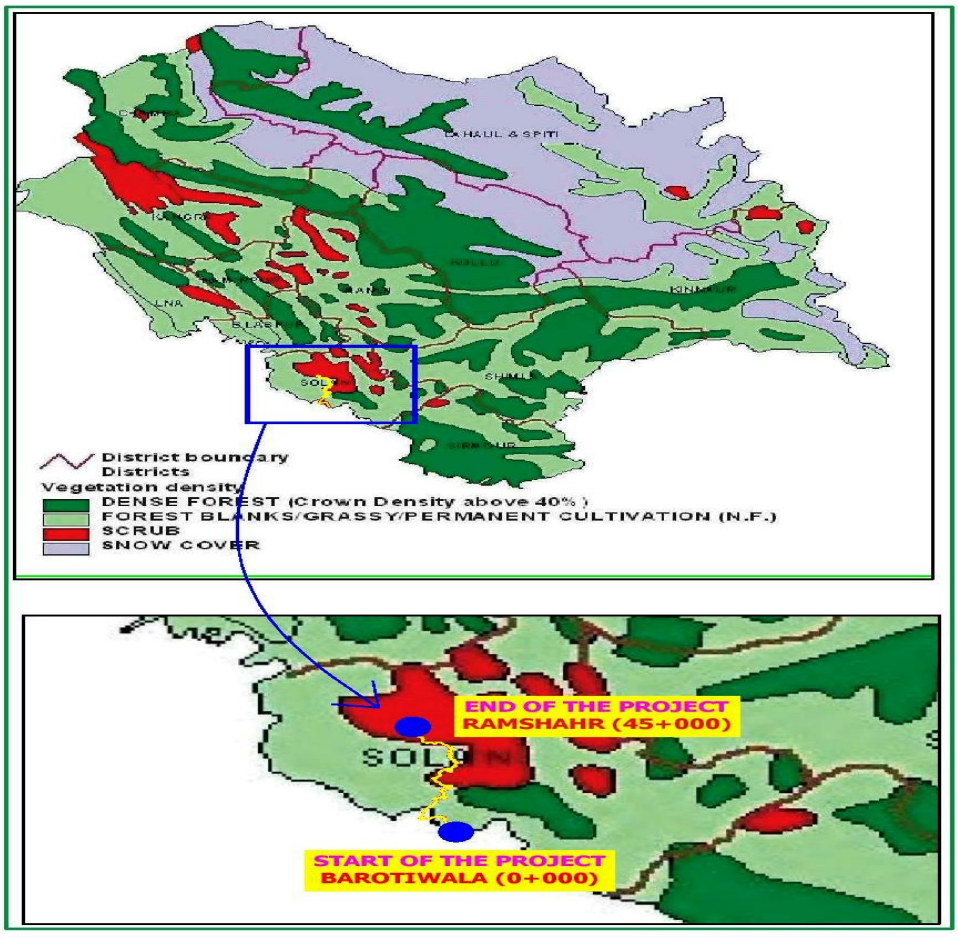


Figure 3.16 : Forest Cover of Solan District (*Source: https://hpforest.nic.in/*)

68. The average width of 3.5m of forest land needs to be diverted for the road improvement over a length of 4.430 km making to 1.51 Ha of forest area is under Nalagarh Forest Division of Solan circle. In view of forest land diversion for non-forest usages, Forest Clearance needs to be obtained prior to start of civil works or handing over under Forest Conservation Act 1980.

Table 3-11: Requirements of forest area for Project road (Widening/Upgradation)

S.No	Forest Name	Forest type	Side	From	To	Trees	Length (m)	Area (Sqm)
1	Dharampur	DPF	LHS	12/775	12/825	0	50	98
			Both sides	12/860	13/000	2	140	542.98
			Both sides	13/100	13/400	16	300	1206.906
			Both sides	14/170	14/370	0	200	809.937
2	Retwali	DPF	Both sides	17/250	19/010	46	1760	7220.278
3	Talli	DPF	Both sides	27/850	29/160	100	1310	5223.937
4	Bhalawa	DPF	Both sides	31/580	32/250	30	670	2681.08
Total						**194**	**4430**	**15125.295**

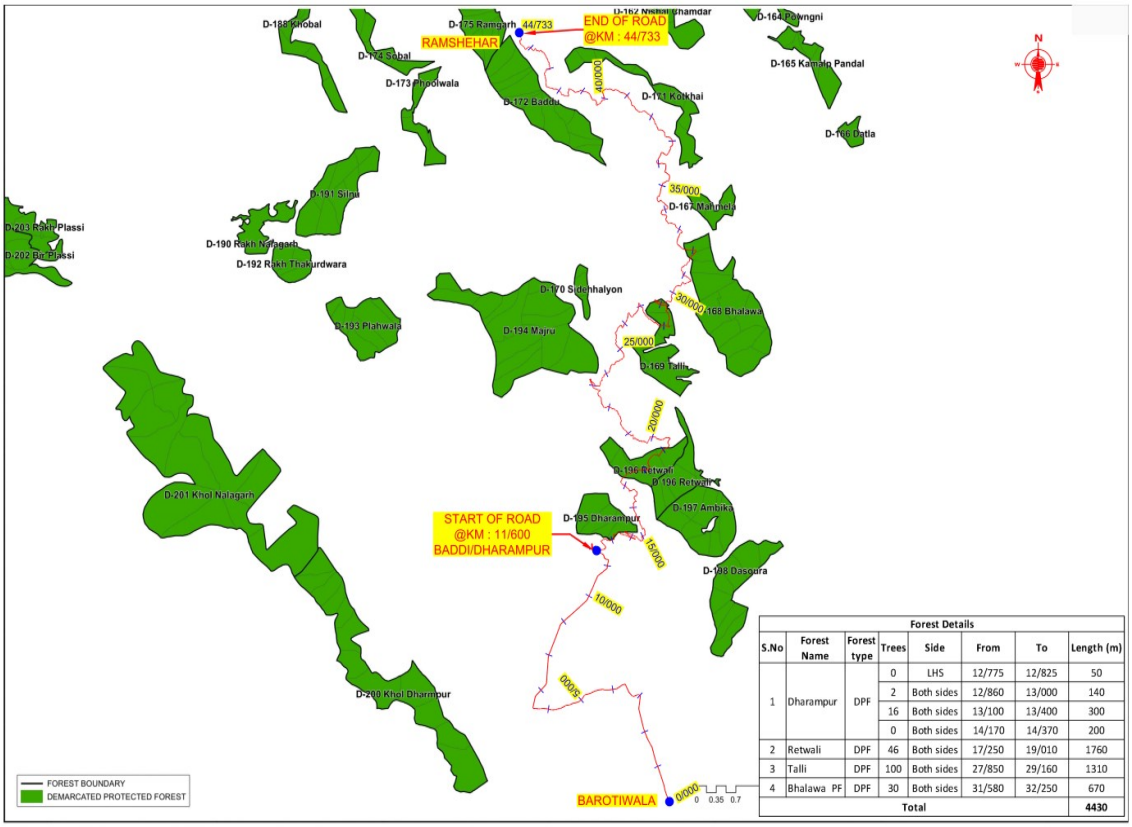


Figure 3-17 : Map showing forest locations along the project road

Protected Area

69. There are no National Park, Wildlife Sanctuary, Biosphere Reserve and any other notified sensitive area within the 15 Km radius of project road. An isolated instance of leopard crossing between km 32-km35 was reported during consultation. Presence of leopard in the area has also been confirmed by the Forest Department during consultations. Although, the forest department could not share readily any information about the events/statistical data regarding wildlife crossing along project road. The Wildlife Protected areas in Himachal Pradesh are shown in Figure 3.18.

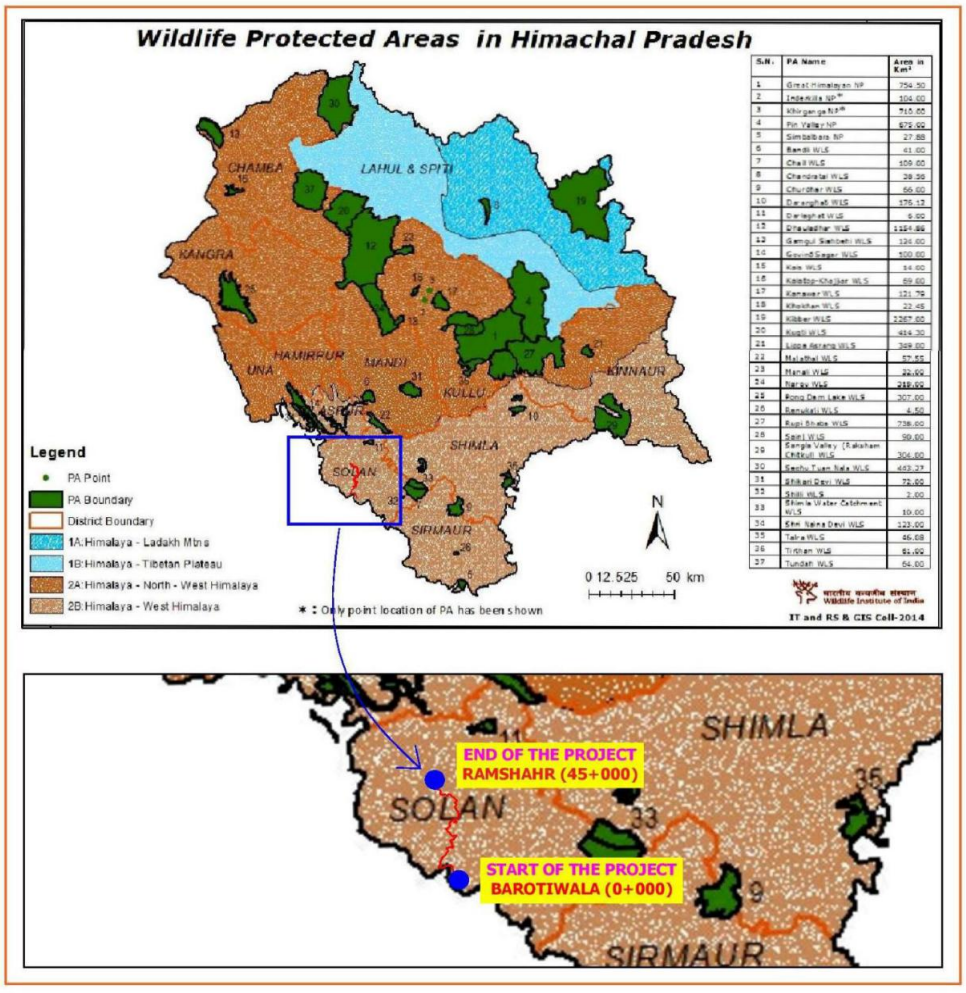


Figure 3.18: Himachal Pradesh Wildlife Protected Area Map

Biodiversity

70. 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

71. Chir-pine forests are present in the upper portion of road corridor (Near Sai and Ramshahr). Chir-pine (*Pinus roxburghii*) was found dominating in top canopy whereas the ground vegetation was composed of mainly *Rubus ellipticus, Prinsepia utilis, Myrsine africana,*

Woodfordia fruticosa and Berberis spp. Common grasses has recorded in these forests were *Eriophorum comosum, Agrotis alba, Heteropogon contortus, Themeda anathera and Chrysopogon fulvus.*

72. The project road corridor has a luxuriant growth of 81 angiosperm taxonomic group, out of which **invasive species** comprises *Ageratum conyzoides, Eupatorium adenophorum, Lantana camara, Parthanium hysterophoros.* The list and number of taxonomic group found along the project road are in Table 3-12.

73. Acacia catechu, Adhatoda vasica, Aegle marmelos, Agave Americana, Asparagus adscendens, Barleria cristata, Bauhinia vahlii, Bauhinia variagata, Berberis asiatica, Bombax ceiba, Cannabis sativa, Cassia fistul, Emblica officinalis, Eriophorum comosum, Melia azadirach, Phoenix sp., Terminalia balerica, Tinospora sinensis, Pinus roxburghii, are some of the flora having medicinal value and recorded along the project corridor.

Table 3-12: List of Taxonomic group species along the project road

S.No	Taxonomic group	Number
1	Angiosperm	81
2	Bryophyta	2
3	Gymnosperm	1
4	Lycopodiophyta	1
5	Pteridophyta	2

Endemic & RET Species

74. The flora recorded along the project corridor were assessed for their conservation status by cross checking with 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. The recorded plant species were also assessed for their endemism in the study area and none of the species was recorded endemic to present road corridor. All the species recorded along the road corridor were distributed more frequently and vigorously even outside the proposed RoW under present project.

75. The ecological investigations along the project corridor as indicated the presence of variety of trees, shrubs and herbs as given in Table 3-13

Table 3-13: List of Trees, Shrubs and Herbs along the Project road

Location	Tree	Shrub	Herb
Location-I (Near Baddu Village)	*Pinus roxburghii*	*Adhatoda vasica*	*Achyranthes bidentata*
	Mallotus phillipensis	*Berberis asiatica*	*Ageratum conyzoides*
	Toona ciliata	*Colebrookea oppositifolia*	*Asparagus adscendens*
	Celtis australis	*Murraya koenigii*	*Bidens biternata*
	Accia catechu	*Prinsepia utilis*	*Eupatorium adenophorum*
	Ficus roxburghii	*Vitex negundo*	*Heteropogon contortus*
	Mangifera indica	*Rubus ellipticus*	*Xanthium indicum*
	Phoenix sp.	*Debregeasia longifolia*	*Parthanium hysterophoros*
		Inula cappa	*Cassia tora*
		Agave Americana	*Tridax procumbens*
		Lantana camara	*Cynodon dactylon*
		Woodfordia fruticosa	*Cynotis vaga*

Location	Tree	Shrub	Herb
			Eriophorum comosum
Location-2 (Near Bepad Village)	*Acacia catechu*	*Adhatoda vasica*	*Adiantum caudatum*
	Terminalia tomentosa	*Carissa opaca*	*Ageratum conyzoides*
	Cordia dichotoma	*Colebrookea oppositifolia*	*Artemisia parviflora*
	Dalbergia sissoo	*Lantana camara*	*Barleria cristata*
	Terminalia balerica	*Murraya koenigii*	*Boehmeria variegata*
	Anogeissus latifolia	*Woodfordia fruticosa*	*Cassia occidentalis*
	Mallotus philippensis	*Lepidagathis cuspidata*	*Cassia tora*
	Lagerstromia parviflora	*Desmodium tiliaefolium*	*Commelina benghalensis*
	Flacourtia indica	*Bauhinia vahlii*	*Eriophorum comosum*
	Bauhinia variagata	*Jasminum officinale*	*Euphorbia hirta*
	Albizia lebbeck	*Rubus elipticus*	*Oxalis corniculata*
	Ougeinia oojeinensis	*Casearia tomentosa*	*Parthenium hysterophorus*
	Toona cliata	*Indigofera hirsuta*	*Rumex hastatus*
			Tinospora sinensis
			Tridax procumbens
			Vallaris solanacea
			Xanthium indicum
			Hetropogon controtus
			Cymbopogon martinii
			Sachharum spontneum
			Chrysopogon fulvus
			Eulaliopsis binata
location-3 (Dharampur DPF)	*Emblica officinalis*	*Adhatoda vasica*	*Abrus precatorius*
	Cassia fistula	*Carissa opaca*	*Cannabis sativa*
	Mallotus philippensis	*Colebrookea oppositifolia*	*Ageratum conyzoides*
	Sapium insigne	*Caesalpinia decapetala*	*Cassia tora*
	Aegle marmelos	*Lantana camara*	*Commelina benghalensis*
	Anogeissus latifolia	*Murraya koenigii*	*Euphorbia hirta*
	Melia azadirach	*Bauhinia vahlii*	*Parthenium hysterophorus*
	Butea monosperma	*Eophorbia royleana*	*Gerardiana diversifolia*
	Syzygium cumini	*Rumex hastatus*	*Tridax procumbens*
	Acacia catechu	*Woodfordia fruticosa*	*Urtica dioca*
	Lannea coromandelica		*Xanthium indicum*
	Albezia lebbeck		*Leucas lanata*
	Dalbergia sissoo		*Tinospora sinensis*
	Terminalia tomentosa		*Hetropogon controtus*
	Bombax ceiba		*Cymbopogon martinii*
	Erythrina suberosa		*Sachharum spontneum*
	Ziziphus mauritiana		*Chrysopogon fulvus*
			Eulaliopsis binata

76. During the baseline assessment, enumeration of trees number of trees with in Right of Way on each side of the road was conducted and numbers of trees were found to be 1766 (LHS – 843 & RHS – 923).

77. As per the current regulations of the department of forest, GoHP, after marking of the proposed center line of the proposed road corridor on the ground, a joint inspection have to be undertaken along with the forest officials to determine the number of trees to be felled for road construction.

Fauna

78. There are no National Park, Wildlife Sanctuary, Biosphere Reserve and any other notified sensitive area within the 15 Km radius PIA considered for baseline assessment. Also, no wildlife crossing corridors are reported along the project corridor, except for a Leopard crossing site near Bepar Bissian village (Km 32 to Km 35).

79. Herpatofauna: Monitor lizard (Varanus bengalensis) and Common House Lizard (Hemidactylus brookii) were sighted during primary study in the study area. Some species of snakes like Rat Snake (Ptyas mucosa), Indian Cobra (Naja naja), Himalayan Pit viper (Gloydius himalayanus) and Common Indian Karait (Bungarus caeruleus) were also reported from the PIA area but none of these species were sighted during primary faunal survey.

80. **RET Herpatofauna**: Among recorded species, Monitor lizard (Varanus bengalensis) is the only species of Herpatofauna, which comes under Schedule-I of as per Wild life Protection Act-1972.

Aquatic Ecosystems

81. During the site survey, all streams were dried and no information could be collected with regard to aquatic ecosystem.

Avifauna

82. A variety of bird species were reported along the project road. Among recorded/reported avifauna, Common peafowl (Pavo Cristatus) comes under Schedule-I (part III) category under Wildlife Protection Act-1972.

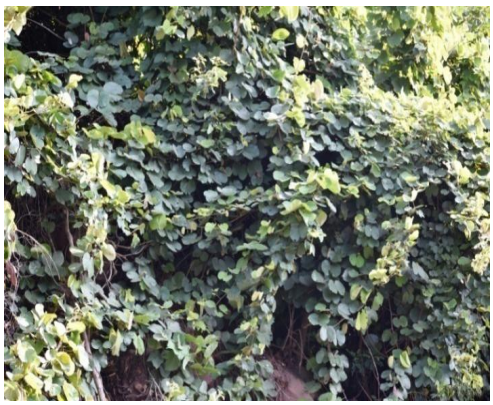
83. Photos of recorded Bio-diversity along the project road, and are given in Figure 3.19..

Monitor Lizard

Rhesus Macaque

Common Hoopoe

Carrisa opaca



Bauhinia vahlii

Rufous Treepie

Figure 3.19 : Photos of recorded Bio-diversity along the project road

3.4 Social Environment

84. This section presents the demography, education, health, industry, agriculture and tourism in the state followed by the corridor specific socio-economic profile of the affected households.

85. Demography: As per details from Census 2011, Himachal Pradesh has population of 68.65 Lakhs, an increase from figure of 60.78 Lakh in 2001 census. Total population of Himachal Pradesh as per 2011 census is 6,864,602 of which male and female are 3,481,873 and 3,382,729 respectively. In 2001, total population was 6,077,900 in which males were 3,087,940 while females were 2,989,960. The total population growth in this decade was 12.94 percent while in previous decade it was 17.53 percent. The population of Himachal Pradesh forms 0.57 percent of India in 2011. In 2001, the figure was 0.59 percent.Total area of Himachal Pradesh is 55,673 sq. km. Density of Himachal Pradesh is 123 per sq km which is lower than national average 382 per sq km. In 2001, density of Himachal Pradesh was 109 per sq km, while nation average in 2001 was 324 per sq km. Sex Ratio in Himachal Pradesh is 972 i.e. for each 1000 male, which is below national average of 940 as per census 2011. In 2001, the sex ratio of female was 968 per 1000 males in Himachal Pradesh.

86. **Education:** Literacy rate in Himachal Pradesh has seen upward trend and is 82.80 percent as per 2011 population census. Of that, male literacy stands at 89.53 percent while female literacy is at 75.93 percent. In 2001, literacy rate in Himachal Pradesh stood at 76.48 percent of which male and female were 85.35 percent and 67.42 percent literate respectively.In actual numbers, total literates in Himachal Pradesh stands at 5,039,736 of which males were

2,752,590 and females were 2,287,146.Sarva Shiksha Abhiyan, a programme that ensures each and every child receives elementary education, is being implemented in the state on a priority basis. Net enrolment ratio (NER) at the elementary stage (6-14 age group) of education in the state stood at more than 99%, indicating an extremely small number of students outside the formal range of education. As of December 2015, there were a total of 10,783 notified primary and 2,249 notified middle schools in the state. Out of these, 10,781 primary and 2,236 middle notified schools are functional. Himachal Pradesh is placing special emphasis on girl education, with the implementation of National Programme for Education of Girls at Elementary Level (NPEGEL) in eight educationally backward blocks, where rural literacy rates were below the national average. An amount of US$ 918.57 million has been allotted for educational development in the state under the annual budget of Himachal Pradesh for 2016-17.During 2015-16, there was a total enrolment of 57,724 students under the technical education sector. Out of these, 6,920 students enrolled in degree colleges, 1,030 students in B. Pharmacy, 10,178 students at diploma level and 39,596 students in ITIs/ITCs. Under the Digital India Awards, Himachal Pradesh won the gold award for best Mid-Day Meal Mobile App.The "Swayamsidham Project", that aims to provide teachers with online solutions for their problems and deliver academic support to school heads through the web portal, is being executed in around 2,153 schools of Himachal Pradesh. As per the state budget 2016-17, the state government has proposed to cover 340 more schools under the same project during 2016-17.There were 10,781 primary schools in 2015-16, ensuring education at the granular level. In order to provide extension of one year to teachers who have delivered consistent and 100% results over past five years in the Board examinations, the state government launched "Mukhya Mantri Shikshak Samman Yojna". Further, the state government also proposed to initiate the "Mukhya Mantri Adarsh Vidyalya Yojna" and has projected an amount of US$ 4.58 million for the same. As per budget 2016-17, the state government is planning to initiate a government polytechnic in Rehan, Kangra district for which a budget estimate of US$ 31.16 million has been proposed by the state government, during 2016-17. Moreover, the state government has announced plans to establish an engineering college in Jeori, Shimla district.

87. **Health:** A provision of US$ 258.02 million has been made for the Department of Health and Medical Education in the state's annual budget 2016-17. There are total 2,762 active healthcare institutions in the state as of November, 2015. The state Government has launched Himachal Health Vision 2020, to provide effective and efficient health services. In the state budget 2016-17, US$ 38.19 million has been allocated to the state's Ayurveda department. During 2015-16, pulse polio campaigns were launched in the state. As per budget 2016-17, the state government introduced new scheme- "Himachal Pradesh Universal Health Protection Scheme", which aims at enhancing affordable access for people to health care services of the state. Also, this scheme would include all those people who are not covered under the "Mukhya Mantri State Health Care Scheme" and other schemes related to medical reimbursements. Various health and family welfare activities that took place in the state during 2015-16 include: National Leprosy Eradication Programme, National Vector Borne Disease Control Programme, National Programme for Control of Blindness, Revised National TB Control Programme, Universal Immunisation Programme, National AIDS Control Programme, etc. The state has received approval from the Health Ministry to introduce pneumonia vaccines in a planned manner from 2017.

88. **Industry:** As of December 2017, the state recorded 40,172 working units, of which, the large Industrial units were recorded to be 138 whereas the medium scale units were 380. Out of the total allocated budget of US$ 5.23 million for the Industrial sector, an amount of US$ 3.03 million was incurred by the sector till December 2017. For development of industrial infrastructure, the state government has planned the following under the state budget 2016-17: Permission to workers and industrialists for constructing residences, under Section 118, would be granted by the state government during 2016-17. An outlay of US$ 1.52 million has

been proposed for the continuity of "State Mission on Food Processing". A new scheme- "Chief Minister Start-up/New Industries Scheme" has been announced to boost new enterprises and startups in Himachal Pradesh. According to Budget 2016-17, for the development of more industrial areas in the state, the state government has initiated work in Kandrori area of Kangra district and Pandoga area of Una district, at an estimated amount of around US$ 18.63 million and US$ 21.38 million, respectively. The light engineering goods industry in Himachal Pradesh includes precision engineering components, automotive components, steel fabrication units, and cylinder manufacturing. Kala Amb in Paonta Sahib has a large number of steel fabrication mills. Auto component units are mainly based in Parwanoo (Solan district). A general and light engineering industrial cluster is also located in Parwanoo. International Cars and Motors Limited has a factory in Una. Chennai-based Rajsriya Automotive Industries, a tier-I supplier of sheet metal pressed parts, opened a new plant in Nalagarh in January 2015 in order to be at a location close to its largest customer - TVS Motor Company.In the state budget 2016-17, an amount of US$ 7.63 million is proposed for installation of steel crash barriers on accident prone sites.

89. **Agriculture: W**ith suitable agro-climatic conditions, Himachal Pradesh has realised the importance of commercial crops, including off-season vegetables, potatoes and ginger. The state has emerged as the leading producer of off-season vegetables, with the annual yield reaching a million tonnes during 2014- 15. Production of commercial crops reached 1,480,000 tonnes during 2015-16. The food processing industry primarily focuses on the areas of traditional processing of agricultural and horticultural raw materials. Agri-procurement has lately been an investment area for corporate entities. In 2016-17, the Government of Himachal Pradesh announced plans to invest US$ 73.63 million for the Department of Agriculture. In Budget 2016-17, the government introduced a new scheme Mukhya Mantri Khet Sanrakshan Yojna to provide financial assistance of 60% for fencing of farms.

90. **Tourism:** The tourism sector of Himachal Pradesh contributes to 7.2% in the state GDP. In order to boost tourism in the state, Asian Development Bank (ADB) has sanctioned a loan of US$ 95 million. Phase 1 work of US$ 33 million is already under implementation. In the 2016-17 state budget tourism infrastructure projects are proposed under the ADB. Along the district of Kangra, projects related to development of tourism infrastructure in Jawalamukhi,Dharamshala,McLeodganj, development of Naldehra, restoration of two churches at Shimla, etc. shall be awarded during 2016-17.

91. As per the budget 2016-17, the state government proposed to establish several ropeway projects in the state which include Toba to Shri Naina Devi Ji in Bilaspur District, Dharamkot to Triund in Kangra District, Bashal Kanda in Shimla/Kinnaur District, Bhunter to Bijli Mahadev in Kullu District, etc. which are under the public private partnership mode whose bidding process is projected to commence during 2016-17. Tourism is one of the most important sectors for the state economy in terms of foreign exchange earnings and creation of employment opportunities. Himachal Pradesh is endowed with topographic diversity, historical monuments and religious shrines. As of May 2015, there were 3,250 registered hotels in the state.In the 2016-17 Budget, tourism department has proposed an investment of US$ 15.28 million under Himalayan Circuit project for development of tourist destinations in the state. Domestic tourist inflows in the state increased from 11.04 million in 2009 to 17.12 million in 2015. To boost tourism, the state plans to set up a golf course and improve connectivity by increasing the number of helipads. Sustainable Tourism Policy, 2013 was formulated for promoting sustainable tourism without damaging the ecology and environment.

Source:- http://himachalpradeshtravel.com/himachal-pradesh-tourist-maps
Figure 3.20: Tourist Map of Solan District

92. **Programmes and Policies:** Given below is a listing of key existing government schemes:

93. **National Rural Livelihood Mission**: The programmes of Ministry of Rural Development (MoRD), Government of India that directly target poor families for creation of assets and self employment started with Integrated Rural Development Programme (IRDP) in the year 1980. A major reform took place in 1999, when IRDP was transformed into Swarnjayanti Gram Swarozgar Yojana (SGSY). Self-employment through organizing poor into Self Help Groups (SHGs) became the cornerstone of the new strategy.Based on NRLM core belief that poor have innate capabilities and strong desire to come out of poverty, it aims to reduce poverty by enabling the poor households to access gainful self employment and skilled wage employment opportunities resulting in appreciable improvement in their livelihoods on a sustainable basis, through building strong and sustainable grass root institutions of the poor i.e. SHGs and their federations for which NRLM will provide dedicated & sensitive support structure for building their capacities, enabling them access to finance and other livelihood resources, skilling the unemployed rural poor youths for providing employment or self employment / micro- enterprise opportunities and making the institutions of poor strong so that this programme of the poor become the programme by the poor. NRLM is being implemented in Himachal Pradesh since April, 2013 through intensive approach strategy in 5 intensive blocks namely Basantpur, Kandaghat, Haroli, Mandi Sadar and Nurpur of which Basantpur and Haroli are also resource blocks where social capital is being created. The various financial / economic assistance provided are in the form of Revolving Fund up to Rs 15000/- per SHG, Community Investment Fund up to Rs. 1.10000/- per SHG in intensive Block, Interest Subvention on bank loan up to Rs. 3 lacs @ 4 % per annum on prompt repayment, Vulnerability Reduction Fund, SHG Start Up Cost up to Rs 3000/- and VO start up cost up to Rs 75000/- .

94. **Skill Development Mission:** The Skill Development Policy of the State is called as "Him Kaushal" and shall be undertaken in a Mission mode. The vision of the policy is "To empower all individuals of the State between the ages of 15 to 45 years to enhance learning and lifelong employment opportunities so as to increase the productive wage force of the State to take part in the economic growth of Himachal Pradesh and India and bridge its skill deficit". The Mission is to achieve convergence and harmonisation of different training programs run by various State departments / organisations with the aim of providing a platform for best available placement opportunities to the youth of the State.

95. **Pradhan Mantri Kaushal Vikas Yojana (PMKVY):** PMKVY is the flagship scheme of the Ministry of Skill Development & Entrepreneurship. The objective is to enable many Indian youth to take up industry-relevant skill training that will help them in securing a better livelihood. Individuals with prior learning experience or skills will also be assessed and certified under Recognition of Prior Learning (RPL). Under this Scheme, Training and Assessment fees are completely paid by the Government. PMKVY is applicable to any candidate of Indian nationality who is unemployed, school or college dropout, or as identified by the Sector Skill Council (SSC) for their respective job roles.

96. The following schemes are operational in Himachal Pradesh for skill development and employment generation as part of Central Government Assistance: *1. Deen dayal upadhyaya Grameen Kaushalya Yojana; 2. Financial Assistance for Skill Training of Persons with Disabilities; 3. National Apprenticeship Promotion Scheme; 4. Craftsmen Training Scheme; 5. Apprenticeship training; 6. Skill development for minorities; 7. Green Skill Development Programme; 8. Computer Siksha yojana*

97. **Rashtriya Swasthya Bima Yojna: Rashtriya Swasthya Bima Yojna (RSBY)** is being implemented in the Pradesh since 2008. It is a cashless scheme provided through smart cards. The scheme is designed by GOI, Ministry of Labour & Employment provides health insurance coverage of R 30,000 on family floater basis (maximum five members are covered) in a policy period to all the RSBY smart card holders by covering more than 1100 diseases. The premium is being shared between Centre and State in the ratio of 75:25.

98. **Women Development & Empowerment Programme:** Directorate of Women and Child Development was set up in the year of 2011 as a part of the department of Social Justices and Empowerment to give the much needed inputs to the holistic development of Children and women Empowerment in Himachal Pradesh. Various Programme includes:

Beti Hai Anmol Yojana: Under this Yojana, for all the families lying below the poverty line in Himachal and having one or two girls, a sum of Rs. 5100 will be deposited in the name of girls at the time of their birth. Moreover, to help in the education of such girls, scholarship ranging from Rs. 300 to Rs. 1500 will be given to them from class I to class XII.

Mukhaya Mantri Bal Udhar Yojana: Under this Yojana, Himachal govt. Decided to provided free education, accommodation, professional guidance and several other essential facilities to the orphans whether a girl or a boy.

Mukhaya Mantri Kanyadaan Yojana: Under this Yojana, the daughters of below poverty line families or widows or destitute were given a sum of Rs. 11,001 for their marriage by Himachal govt. Widows Pension Incremented in himachal: Earlier, the widows in Himachal were given a monthly pension of Rs. 200 which was increased to Rs. 330.

Himachal Pradesh Mahilavikas Protsahan yojana: Under the scheme, a state level award for the persons/organisation working for the development and empowerment of women in the field of health, education, sports, social services and art and culture, is granted.

Mata Shabari Mahilla Sashktikarn Yojana: Under this scheme LPG Gas connection is provided to the women who belong to BPL and SC family or whose income does not exceed rupees 35,000 per annum. For the purchase of LPG gas connection subsidy of Rs. 1300/- per beneficiary is provided by the Govt.

Self Employment Assistance for women: In this scheme women are granted rupees 2500 for establishing any project or venture who have annual income not more than 35,000 per annum.

Mother Teresa Matri Sambal Yojana: It becomes very difficult for widows and poor women to uplift their children and provide them food, shelter, necessary education etc. In order to provide financial relief to such poor mothers who are finding difficulty in the upbringing of their children, Mother Teresa Matri Sambal Yojana started by Himachal government benefitted them a lot. Such poor and weak mothers having children below 14 years of age were given a sum of Rs. 2000 by Himachal government under Mother Teresa Matri Sambal Yojana.

Vishesh mahila uthaan yojna: The Hon'ble Supreme Court of India in a criminal appeal No.135,2010 titled Buddha DevKarmaskar& state of West Bengal, had issued direction to Union Of India and all the states and Union territories to formulate schemes for rehabilitation of physically and sexually abused women through technical and vocational training. In pursuance of the decision of Hon'ble supreme court of India. A scheme namely "VISHESH MAHILA UTHAAN YOJNA" has been implemented in the State by the department vide Dated 18/08/2011 and women are provided vocational training under this scheme in selected ITI's of the State.

Financial assistance & support service to vicitm of rape: Rape is one of the most violent forms of crimes against women, which not only impact her bodily integrity but in the long run, impairs her capacity to develop meaningful personal and social relationships, and affects her life and livelihood. The victim of rape suffers mental and psychological trauma, which must be addressed so that she is able to lead a dignified and meaningful life. Under this scheme State Government is providing Rs. 75,000/- for support and other related services to the victims which in exceptional circumstances can be increased to Rs. One Lakh.

Indira Gandhi Balika Suraksha Yojana: Under Indira Gandhi Balika Suraksha Yojana, the families adopting the family planning after the birth of first female child will be given a sum of Rs. 25,000 and those adopting family planning after the birth of two female children will be given a cash of Rs. 20,000 Himachal Pradesh government has always been industrious when it comes to women empowerment or to provide services to the women. Yet moving a step ahead, health department of Himachal Pradesh has launched a free of cost transportation service to the pregnant women to the hospital for delivery . Either taxi or ambulance will be provided by the health department for carrying the pregnant women to the nearest medical hospital. Under this scheme, pregnant women of any category can avail this free transport facility to the hospitals for delivery. Another important feature of this scheme is that the person accompanying the pregnant women will be allowed to enter inside the labour room and build the confidence of pregnant women during delivery. Earlier only doctors were allowed to enter the labour room and no relatives of the pregnant women. This will surely help to get rid of the cases of infants being kidnapped or exchanged and will also avoid unskilled deliveries.

Widow Re-marriage Scheme: The objective of the scheme is to rehabilitate the widows. In this scheme Rs. 50,000 grant is providing to widow, on her remarriage.

Rashtriya Mahila Kosh: Rashtriya Mahila Kosh (RMK), established in 1993 is a national level organization as an autonomous body under the aegis of the Ministry of Women and Child Development, for socio-economic empowerment of women. The operating model currently followed by RMK is that of a facilitating agency wherein RMK provides loans to NGO-MFIs termed as Intermediary Organizations (IMO) which on-lend to Self Help Groups (SHGs) of women. RMK extends micro-credit to the women in the informal sector through a client friendly, without collateral and in a hassle-free manner for income generation activities. RMK has taken a number of promotional measures to popularize the concept of micro financing, enterprise development, thrift and credit, formation and strengthening of Women-SHGs through intermediary organizations.

Baseline socio-economic information

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 33.35 km. It covers Baddi, Ramsheshar Taluka of Solan district of Himachal Pradesh.

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

3.8.1 Socio Economic profile of Influence zone

99. As mentioned earlier considering the 15 km radius of influence area as per the terms of reference, to study the developments taking place within the region, and noted possible improvements in the connectivity to major tourism locations and trade for food and agricultural products falling within the proposed road. Where the details covered under the influence zone are demographic, socio economic and cultural details from the secondary source of studies.

100. Therefore to narrow down to the project road, it is important to know the state geographical, socio – economic dynamics. Himachal Pradesh is predominantly a mountainous state located in the North – West India. It is spread over an area 55673 Km sq with the population density of 123 person per sq km and its bordered by Jammu and Kashmir in the north, Punjab on the Southwest, Haryana on the South, Uttarakhand on the southeast and Tibet on the East. The name was coined from the Sanskrit 'Him" means 'snow' and achal means 'land' or abode literally means "The Abode of Snow".

101. The state has highly dissected mountain ranges interspersed with deep gorges valleys. The state has been divided into 3 divisions, 69 subdivisions. The 12 Districts comprising 78 development blocks, 3226 gram Panchayats and 20960 villages. The State has a population of 68,64,602 persons with the literacy rate of 82.80%.

3.8.2 Demographic Features of Solan District

102. Demographic Profile: Demographic profile has an important bearing on the development process. According to the 2011 census, the total population of Soaln district is around 5.80 lakhs comprising 3.08 lakhs males and 2.71 lakhs females. The population of the district has increased by 15.93% during 2001 to 2011. It constitutes 8.5% of the state population and rank 3rd in position. . Out of the total population of the district 82.40 per cent lives in rural areas while 17.60 per cent lives in urban areas. Economy of the district is mainly agrarian and 80 per cent of the population in the district is engaged in cultivation.

103. BBN (Baddi, Barotiwala and Nalagarh (BBN) industrial Cluster of Himachal Pradesh) belt. BBN is an industrial hub of Himachal Pradesh and one of the fastest growing areas in the state. In the recent past BBN has become a manufacturing hub having over 2,000 factories, including some of India's biggest pharmaceutical and consumer companies.According to the state industries department, the Solan district has seen industrial investments worth ₹19,976 crore between 2003 and 2019. Local industrial bodies have estimated that the area's total annual turnover to be over ₹40,000 crore. There are more than 1000 Medical, Pharma, Cosmetics, Packaging, Printing and Automobile manufacturing units at BBN.

Table 3.14 : Demographic profile of Solan District of Himachal Pradesh

Description		Total	Rural	Urban
No. of Households		122425	96510	25915
Population	Persons	580320	478173	102147
	Males	308754	249736	59018
	Females	271566	228437	43129
Sex ratio (Females per 1000 Males)		879	914	730
Proportion of SC Population		28.35		
Proportion of ST Population		4.41		
Source: Primary Census Abstract, Census of India, 2011				

104. 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. The profile comprises of the solan district as per census 2011.

- The total population of solan district 580320 comprising 308754 (53.20%) males and 271566 (46.79) females. This shows that the female population is higher than male population.
- Decadal population growth has increased by 15.93 per cent. Decadal growth rate in rural areas remained much higher (16.8 per cent) than this rate in urban areas (12.0 per cent). The growth rate of rural population is higher than the urban population in the district due to plain terrain of the district and industrial development. Out of total eight towns of the district, six towns have (Nalghar, Baddi, Arki, Kasauli, solan, sabathu) positive growth rate while remaining two towns have negative growth rate. The highest growth of urban population has taken place in Baddi (M Cl+OG) where population shows an increase of 32.3 per cent

whereas the lowest growth rate of the urban population is in Subathu (CB) with growth rate of -35.6 per cent during the decade.

- Out of the total population of the district 82.39 per cent lives in rural areas while 17.60 per cent lives in urban areas.
- The sex ratio of the study area is 879 females per every 1000 males.
- Among the total population of district, 4.41% (25645) consists of Scheduled Tribes, 28.35% (164536) are of the Scheduled caste population and 67.24% (390139) people belong to other castes.
- Among the total population, 62.11% of the people are literate excluding the 0-6 age group and 26.14% of the people are illiterate population. This shows that most of the population is literate.
- Among the literates 57.84% are males and 42.15% are females. This shows that the male literates are more than the female literates.

105. Average Household Size: The study area had an average family size of 4.7 persons per house hold on 2011. This is moderate family size and is in comparison with the other part of the district (4.7).

106. Population Density: The density of population works out to about 300 persons per km2., in the district.

107. Working Population: According to Census 2011, the total workers including main and marginal workers constitute 51.5 per cent of the total population of the district. Of the total workers, the share of the main workers is 37.80 per cent and the marginal workers are 13.70 per cent. The remaining 48.50 per cent population belongs to the category of non-workers. The work force participation rate in the rural area is 51.47 per cent and in the urban area is 44.61 per cent and overall average workforce participation 48.04 percent.

Table 3.15: Salient features of Proposed Road and Influence Area

S.No	DESCRIPTION	DETAILS
1	Length in Km	33.35
2	District	Solan
3	Connecting Places	Barotiwala – Baddi- Sai – Ramshahr
4	Near By NH/SH	Shalaghat- Arki- Kunihar-Barotiwala (MDR- 75) Pinjore- Baddi- Nalagarh- Swarghat (NH-205 A) Shimla- Kunihar- Diggal –Ramshehar- Nalagarh Derowal Road (SH-16)
c	Attractive Places	Ramshahr Fort, Nalghar Fort
7	Wild Life Sanctuaries and Protected Areas	Nil
8	Forest (type)	Open
9	Industrial Area	Barotiwala Baddi Nalghar Development Industrial Area
11	Archaeological Monuments	Nil
12	Industries	Nil
13	Mines and minerals	Nil
14	Airport/Railway	Nil
		Source: Census-2011, Amenities- District Household Census

Table 3.16 : Details of Amenities in the influential Area

1	Primary School	151
2	Middle School	49
3	Secondary School	19
4	Government Collages	2
5	Community Health Centers	3
6	Primary Health Centers	8

Table 3.16 : Details of Amenities in the influential Area		
6	Primary Health Sub-Centers	16
7	Maternity and Child Welfare	7
8	Veterinary Hospital	15
9	Hand Pumps	187
10	Post Offices	32
11	Commercial Bank	10

108. Description on Project Corridor: The impact zone is considered as 12m on either side of the road along corridor to study the maximum impacts due to the proposed project in the buffer areas. The social surveys were carried based on the above consideration which is more than required ROW to determine the social changes and to draw upon maximum impacts in the study area.

109. Geographical Coverage (impact zone) of project Corridor: The geographical coverage for SIA of the project extends to 12m of the impact zone of study area along 33.35 km corridor (Existing Length) upgradation to intermediate lane configuration from project road comprises as many as 39 villages 1 Municipal Corporation in 2 Tehsil's of the impact zone as detailed in Table 3.4.

110. 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;

111. Demography, socio-economic profile and social amenities

112. 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 populations of 39 villages 1 Municipal Corporation covering the impact zone 41801 in which the male population is 21212 (50.75%) and the female population is 20589 (49.25%). This shows that the female population more or less equal in ratio. In the villages of Panolu & Randhara the female population is 10% higher than the male population as per census 2011.
- The sex ratio of the study area is 970 females per every 1000 males.
- Of the total study area population, 0.94% (394) consists of Scheduled Tribes, 22.02% (9204) are of the Scheduled caste population and 77.04% (32203) people belong to other castes.
- The schedule tribe population in the influence zone is very less about 0.94% approximately and in the district it is 1.27%. They are already in main stream society with advanced 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 required.
- Among the total population, 73.36% (30668) of the people are literate and 17.40% (7277) of the people are illiterate. This shows that more than half of the population is literate.
- Among the literates 52.26% (16028) are males and 47.73% (14640) are females. This shows that the male literates are more than the female literates.
- Totally the illiterate constitute 17.40% (7277) of which the female 9.85% (4118) and the male 7.56% (3159) of the population. This shows that the male illiterates are more than the female illiterates.
- The study area had an average family size of 4.2 persons per household as per 2011 census. This is moderate family size and is in comparison with the State it's nearly the same.

- The village wise population breakup and literacy levels of impact zone of the project, as per 2011 census is enclosed as Annexure.

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_06**	**P_SC**	**P_ST**
1	Bisian Brahmna (450)	Rural	14	95	54	41	11	63	0
2	Dhar Da Ghat (451)	Rural	10	61	24	37	10	57	0
3	Persada (445)	Rural	4	17	7	10	4	17	0
4	Talar Basi (446)	Rural	26	146	79	67	26	130	0
5	Sai (408)	Rural	34	184	92	92	20	29	0
6	Patta (410)	Rural	47	248	131	117	36	134	0
7	Tali (409)	Rural	76	335	170	165	49	305	0
8	Abharni (415)	Rural	37	201	106	95	30	46	0
9	Judi Khurd (209)	Rural	83	279	181	98	35	13	0
10	Judi Kalan (210)	Rural	64	269	160	109	33	17	10
11	Dharampur (193)	Rural	280	1330	764	566	184	443	121
12	Gularwala (194)	Rural	313	1499	804	695	202	466	733
13	Katha (211)	Rural	40	157	94	63	21	12	1
14	Phala (423)	Rural	7	59	30	29	5	0	0
15	Malgan (420)	Rural	44	250	134	116	27	250	0
16	Kaundi (416)	Rural	23	138	70	68	14	46	0
17	Tatoa (417)	Rural	22	121	67	54	19	121	0
18	Jhar Majri (215)	Rural	262	1233	674	559	143	328	3
19	Kunjahal (216)	Rural	304	1471	780	691	204	532	153
20	Buranwala (201)	Rural	122	610	371	239	74	41	76
21	Bather (200)	Rural	364	1739	950	789	208	196	197
22	Barotiwala (196)	Rural	418	1743	986	757	210	258	227
23	Surajpur (198)	Rural	73	381	201	180	37	197	0
24	Dhaular (194)	Rural	95	534	267	267	66	28	0
25	Kurhanwala (188)	Rural	89	526	258	268	80	119	0
26	Baddi Sitalpur (204)	Rural	51	310	152	158	41	115	159
27	Suraj Majra Labana (205)	Rural	37	147	82	65	27	15	0
28	Baddi (M Cl + OG)	Urban	8352	29911	19332	10579	3883	3463	899
29	Bilanwali Gujran (198)	Rural	13	58	28	30	4	2	0
30	Badi Sitalpur (OG) (Part) WARD NO.-0010 (Rural MDDS CODE:021231)	Urban	91	300	191	109	33	10	0
31	Suraj Majra Labana (OG) (Part) WARD NO.-0011 (Rural MDDS CODE:021232)	Urban	100	437	244	193	111	0	0
32	Bilanwali Gujran (OG) (Part) WARD NO.-0012 (Rural MDDS CODE:021233)	Urban	240	1070	603	467	186	509	0

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_06**	**P_SC**	**P_ST**
33	Haripur Sandoli (OG) (Part) WARD NO.-0013 (Rural MDDS CODE:021234)	Urban	359	1614	932	682	228	106	5
34	Bhatauli Kalan (OG) (Part) WARD NO.-0014 (Rural MDDS CODE:021235)	Urban	196	851	483	368	122	238	5
35	Badhu (226)	Rural	90	451	240	211	44	119	1
36	Tiamun Warla (228)	Rural	34	170	90	80	20	50	27
37	Baila (215)	Rural	26	161	76	85	17	0	0
38	Kahnani (214)	Rural	27	145	73	72	10	30	0
39	Bepar Bisi (210)	Rural	14	77	35	42	7	0	0
40	Taungri (209)	Rural	8	51	23	28	4	0	0
			12489	49379	30038	19341	6485	8505	2617
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									

3.5.4 Occupational Distribution

- Among the total population 50.66% (25019) are non-workers and remaining constitute the working population i.e. 49.32% (24360). The overall work force participation rate is lesser than the state work force about 51.58 %.
- Among the working population 45.88% (22658) are main workers and 3.44% (1702) are marginal workers.

3.5.5 Social Amenities

- The educational facilities in the influence zone existing are 20 primary schools, 09 Middle schools and 05 Secondary schools. For the Degree collages and professional courses they will visit Nalghar which are 10 km around.
- A part of the health facilities the zone consists of one (1) community Health Centers, five (5) Primary health sub center, three (3) Maternity and child welfare centers in the towns.
- For animal husbandry care there are two (2) veterinary hospitals as the people are largely dependent on cultivation. There are hand pump functional all around the year.

3.5.6 Salient Socio-Demographic features and Social Amenities

- Female population as well as literacy is relatively low in the influence area.
- There is no indigenous people and the ST population very low than the state average.
- The overall work force participation rate is less than the state work force about 51.50 per cent.

3.9 Socio-economic Status of Project Villages

113. The social and census surveys were conducted in month of August and September, 2019 for the primary data collection which constituted the most important element of the methodology 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 from the natives about the negative environmental and socio economic impacts for ancillary works of the project in the area and the measures initiated by them to mitigate those impacts.

114. Field survey was carried out in the influence zone containing a total of about 22 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 collected with the help of interview based structured questionnaire. A number of questions were open ended questions to facilitate capturing perceptions of the respondents objectively. The socio-economic survey questionnaire has been placed in annexure 3.3.

115. In addition to household survey, rapid participatory rural appraisal tools comprising transect walks, focused group discussions, interview with the stakeholder's consultation were used in collecting the village level qualitative information.

116. 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 – physical and social – facilities available

Profile of the likely Project Affected Families

117. The total numbers of families surveyed are 22 and the 17 CPR's, structures are 23 under the proposed impact zone within the corridor. The survey has been carried out as per the requirements of social impact assessment. All of the households are staying along the roadside from a long time since more than 10 years. Details are presented in table below. Analysis on literacy level of the affected household shows that all of them are literates except around a negligible percent 18.18 percent is illiterates. The average household size for the project affected population is 5.1.

Table 3.18: Socio-cultural characteristics of Structure affected population

Item	**Description**	**No**	**% of total**
Population	Male	57	50.44
	Female	56	49.56
	Total	113	100
Religious Group	Hindu	22	100
	Total	22	100
Social Group	General	15	68.18
	BC	0	0
	SC	6	27.27
	ST	1	4.55

Item	Description	No	% of total
	Total	22	100
Family Type	Joint	7	31.82
	Nuclear	11	50
	Individual	4	18.18
	Total	22	100
Years of stay	Up to 10 year	0	0
	10 to 20 Years	0	0
	21-50 Years	16	72.73
	Above 50	6	27.27
	Total	22	100
Education level of HH	Illiterate	4	18.18
	New-literate	1	4.55
	Primary	2	9.09
	Middle	5	22.73
	High school	3	13.64
	Intermediate	5	22.73
	Graduate	1	4.55
	Post graduate	0	0
	Professional	0	0
	Others	1	4.55
	Total	22	100

118. Economic Profile: Occupation wise, most of them are engaged into commercial activity of trade/business (45.45%), Agriculture (18.18),, Agri labour (4.55%) and and retired persons (9.09%). The incidence of service (Govt. & Private) Employees and Others is around 13.64 percent and 9.09 percent respectively. Details are presented in Table 3.7 below.

119. The income levels of majority of the households fall under higher middle income category earning 1 lakh to 2.5 lakh per annum 18.18 percent. The incidence of lower-income families is about 63.64 percent who earn less than 1 lakh rupees per annum. About 18.18 percent of them are middle income families who are earning Rs. 2.5 lakh to 5 lakh per annum.

Table 3.19: Economic profile of Structure affected population

Item	Agriculture	4	18.18
Occupation of HH	Trade/Business	10	45.45
	Petty shop keeping	0	0.00
	Agri labour	1	4.55
	Non-Agri labour	0	0.00
	HH Industries/Artisan activity	0	0.00
	Service	3	13.64
	Professional	0	0.00
	Self employed	0	0.00
	Retired	2	9.09
	Unemployed	0	0.00
	Others	2	9.09

Total	22	100.0
<75000	3	45.46
75001 - 1lakh	4	18.18
1lakh - 2.5lakh	4	18.18
2.5lakh - 5lakh	4	18.18
Total	22	100.00

120. The expenditure pattern for the affected household's shows that a majority of them are having an average monthly expenditure between < 6000 per month. Details are given in Table 3.20.

Table 3.20: Monthly expenditure and others for Structure affected population

	Description	**No of HH**	**% of HH**
Monthly Expenditure (Rs)	<6000	13	59.09
	6001 to 10000	4	18.18
	10001 to 20000	2	9.37
	> 30000	3	13.36
	Total	**22**	**100.00**

121. Household Assets: For inferring the consumption standard of the households, their possession of various consumer durables was recorded in the survey. All the families have minimum standards of living as the assets owned are seen from the given table below. It can be seen from the following table in the context of possession of Household assets, of the total 22 surveyed households 90.90% possess TV, Fridge, 80.00% and 72.72 % possess washing Machine and 100%cell phone respectively.

Table 3.21 : Number of HH's with Assets

S.No	**No of HH with Assets**	**Total**	**%**
1	TV	20	90.90
2	Fridge	19	86.36
3	Washing Machine	16	72.72
4	Cycle	4	18.18
5	Motor Cycle	12	54.54
6	Car	4	18.18
7	Telephone (Land Line)	0	0.00
8	Mobile (cell Phone)	22	100.0
Source: Primary data Collection			
**Total Surveyed HH 22*			

122. Savings & Indebtedness: The households enumerated in the present socio economic survey is from the total 22 households, 17 households have long term deposits and only 4 have short term deposits in the banks & LIC etc. the details are given below table 3.10

Table 3.221: Financial Deposits

Type of Deposit	Institution where deposited	No's
Long Term	Bank, LIC	17
Short term	Bank, LIC	4
	Total	**21**
Source: Primary data Collection,2019		

123. Whereas families indebted to the banks are 6 who owe for various purposes, interestingly they have not borrowed from the any money lenders.

Table 3.2: Details of debt levels of Households

Purpose Of Borrowing	Source of Borrowing	No of HH's
Agriculture	Bank	1
Animal Husbandry	Bank	1
Commercial	Bank	2
Household Expenditure	Bank	2
Total		**6**
Source: Primary data Collection		

124. Health: Data on health status of PAFs indicate that hundred percentages of the families have recorded some form of illness. Details of health status are mentioned in Table 3.8. No major illness or chronic diseases has been reported in the social survey. The main dieses reported in the area are Diabetes, Cardio problems, thyroid, Blood Pressure and Fever.

Table 3.24: Health Status of PAFs

S. No.	Health Status of PAFs	Number	%
1	Illness	17	78
2	No illness	5	22
		22	**100.0**

Gender

125. Over the last five decades the 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 970 females per thousand males, which is lower the district sex ration of 1007. Women in this region also have a good literacy rate of 47.73% compared to male population.

126. 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 50.75% and females are 49.25% reflects female population is more or less equal. While the health center nearby have informed women are aware about the health problems and do take advice on gynecological problems. One HIV hotspot has been found during survey which is located near the police commissioner office.

[5] Source : Gender Statistics, HP, DoES, Shimla

127. 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 affaire not disclosed in public. Consultations with police, it has been found that major complaints related to gender violence is property related issues.

Status of women

128. 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 80. All women (100%) member look after household activities like any other women member in the country. There are about 3.33% of women members are involved in other activities, 23.33% women are involve in collection of water, 3.33% are engaged as an agricultural labours. 10.0% are helping their family members in trade and business. Only 3.33% women are worked in service and worked as allied activities. Women are involved in multiple activities in the daily life and the percentage of their involvement in various mundane activities area given below:

Table 3.25: Engagement of women in economic and non-economic activity

S.No	Activities women engaged	% N=22
1	Cultivation	0.00
2	Allie Activities,	3.33
3	Sale of forest products	0.00
4	Trade & business,	10.00
5	Agricultural labour,	3.33
6	Non Agricultural labour	0.00
7	HH Industries	0.00
8	Services	3.33
9	Household Work including cooking	100.00
10	Taking care of infants/children	96.67
11	Fetching water	23.33
12	Relaxation & Entertainment	83.33
13	Others (Specify)	3.33

129. 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 3-25.

Table 3- 26 : Involvement of women in family

Decision making		%
Education	Yes	90
	No	10
Health	Yes	100
	No	0
Financial	Yes	70
	No	30
Assets	Yes	53.33
	No	46.67
Day Activities	Yes	93.33
	No	6.67
Social	Yes	90
	No	10
Others	Yes	3.33
	No	96.67

3.5 Cultural Environment

Archaeological And Historical Monuments

130. No notified/protected Archaeological or Historical monuments exist within corridor of impact. Ramshahr fort, which has a historical value but not protected by state/Central Govt is situated at 3 km away from project road end point.

Common Property Resources

131. A total of 17 common property resources like hand pumps, bus stops along the project road have been identified and are given in Table 3-27.

Table 3-27: List of Common Property Resources

Common Property Resources	Nos.
School	6
Religious	3
Bus Stand/Rain Shelter	1
Health Center	0
Hand Pump	5
Others (Toilets, Compound Walls,)	6
Total	**17**

3.6 Hazard and Vulnerability Profile

132. The Hazard and Vulnerability profile of the project region and Solan district includes landslide hazards, wind hazards, earth quake hazards, flood hazards.

3.12.1 Landslide Prone Area Zones

133. As per Landslide Vulnerability map of Himachal Pradesh, the project road traverses in severe to very high landslide zones as shown in Figure 3.21. During the field investigations, about 15

stretches along the project road have been identified, which are prone to landslides and slippages. As per discussion with local people and PWD officials, the main cause of landslide at these locations was due to heavy rainfall in month of August-October 2018. Chainage wise landslide locations are listed in Table 3-28.

Table 3-28: Landslide locations along the project road.

S.No	Existing Chainage (KM)		Design Chainage (CH)		Length (m)	TCS Type	Remarks
	From	To	From	To			
1	11/830	11/880	11+790	11+840	50	TCS-10	Land Slide Location
2	12/450	12/470	12+410	12+440	30	TCS-10	Land Slide Location
3	12/990	13/020	12+950	12+980	30	TCS-10	Land Slide Location
4	13/200	13/240	13+160	13+190	30	TCS-10	Land Slide Location
5	13/960	14/040	13+920	14+000	80	TCS-10	Land Slide Location
6	14/730	14/770	14+690	14+730	40	TCS-10	Land Slide Location
7	16/000	16/030	15+960	15+990	30	TCS-10	Land Slide Location
8	16/960	17/050	16+920	17+000	80	TCS-10	Land Slide Location
9	27/400	27/450	27+350	27+400	50	TCS-10	Land Slide Location
10	29/790	29/840	29+750	29+800	50	TCS-10	Land Slide Location
11	31/550	31/650	31+500	31+600	100	TCS-10	Land Slide Location
12	31/970	32/000	31+920	31+950	30	TCS-10	Land Slide Location
13	32/770	32/820	32+720	32+770	50	TCS-10	Land Slide Location
14	37/590	37/620	37+530	37+560	30	TCS-10	Land Slide Location
15	43/090	43/120	43+025	43+055	30	TCS-10	Land Slide Location

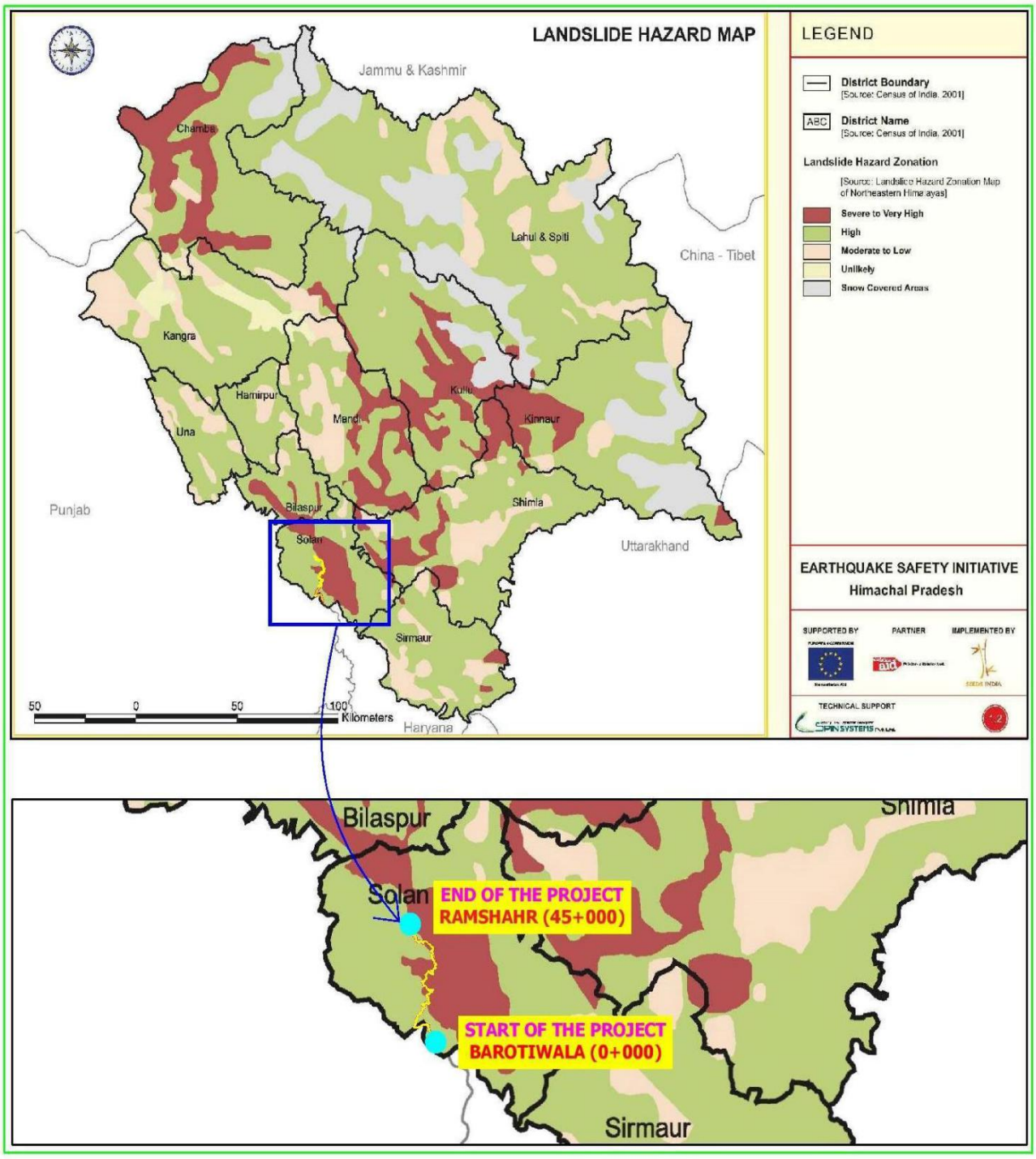


Figure 3.21 : Landslide Hazard Map (*Source :- https://ndmahimachalpradesh.)*

Wind Hazard

134. As per wind hazard map of Himachal Pradesh, the project road traverses in high damage risk zone for 80% of length and remaining 20% length in moderate zone. The wind hazard map along the project road is shown in Figure .

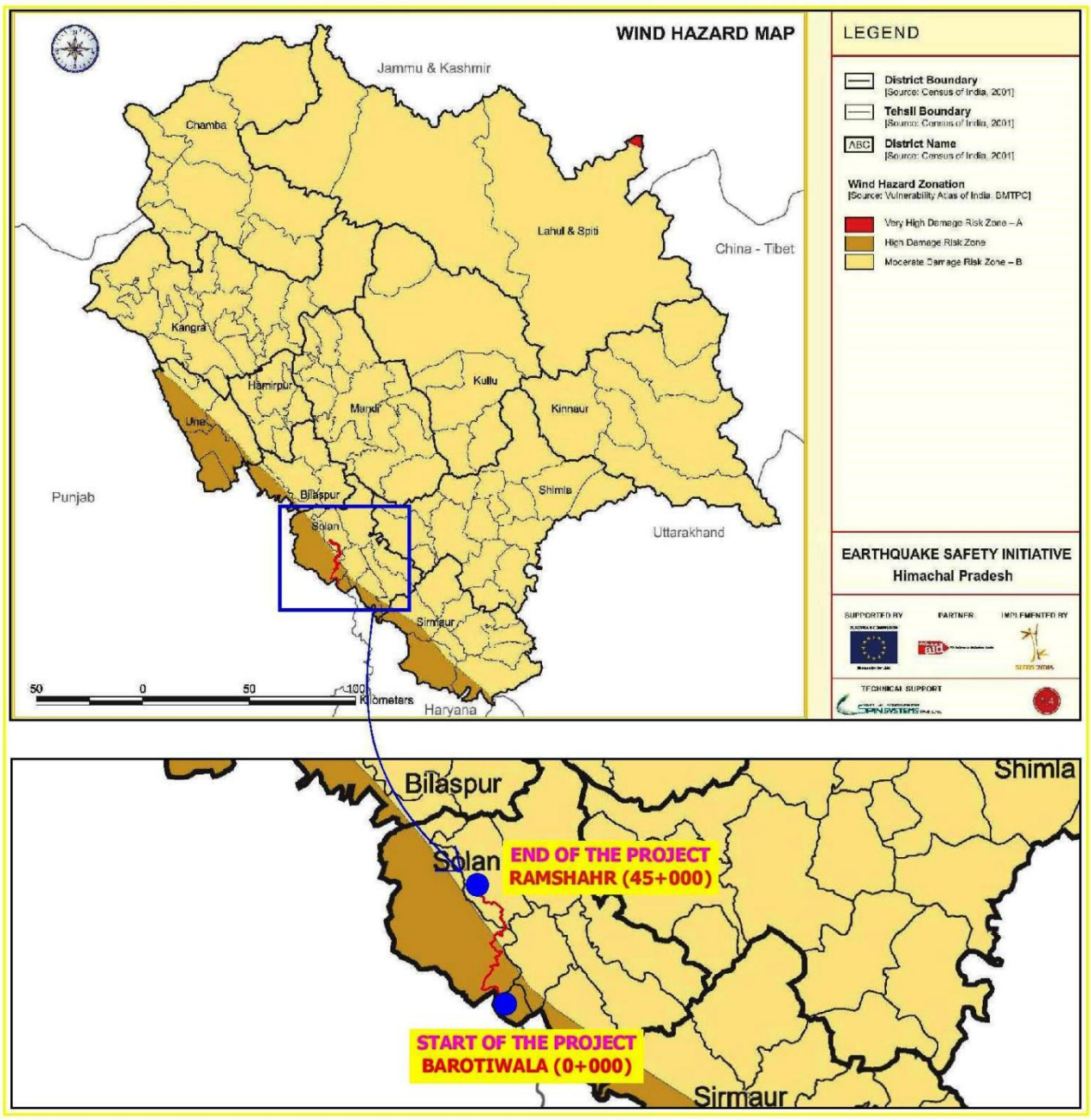


Figure 3.22: Wind Hazard Map of Solan District (*Source :- https://ndmahimachalpradesh.)*

Flood Zones

135. As per flood zone map, a small length of the project road is prone to flash floods as shown in Figure . The project road has many seasonal streams, which originate from hill side between Km 13+000 to Km 45+000.

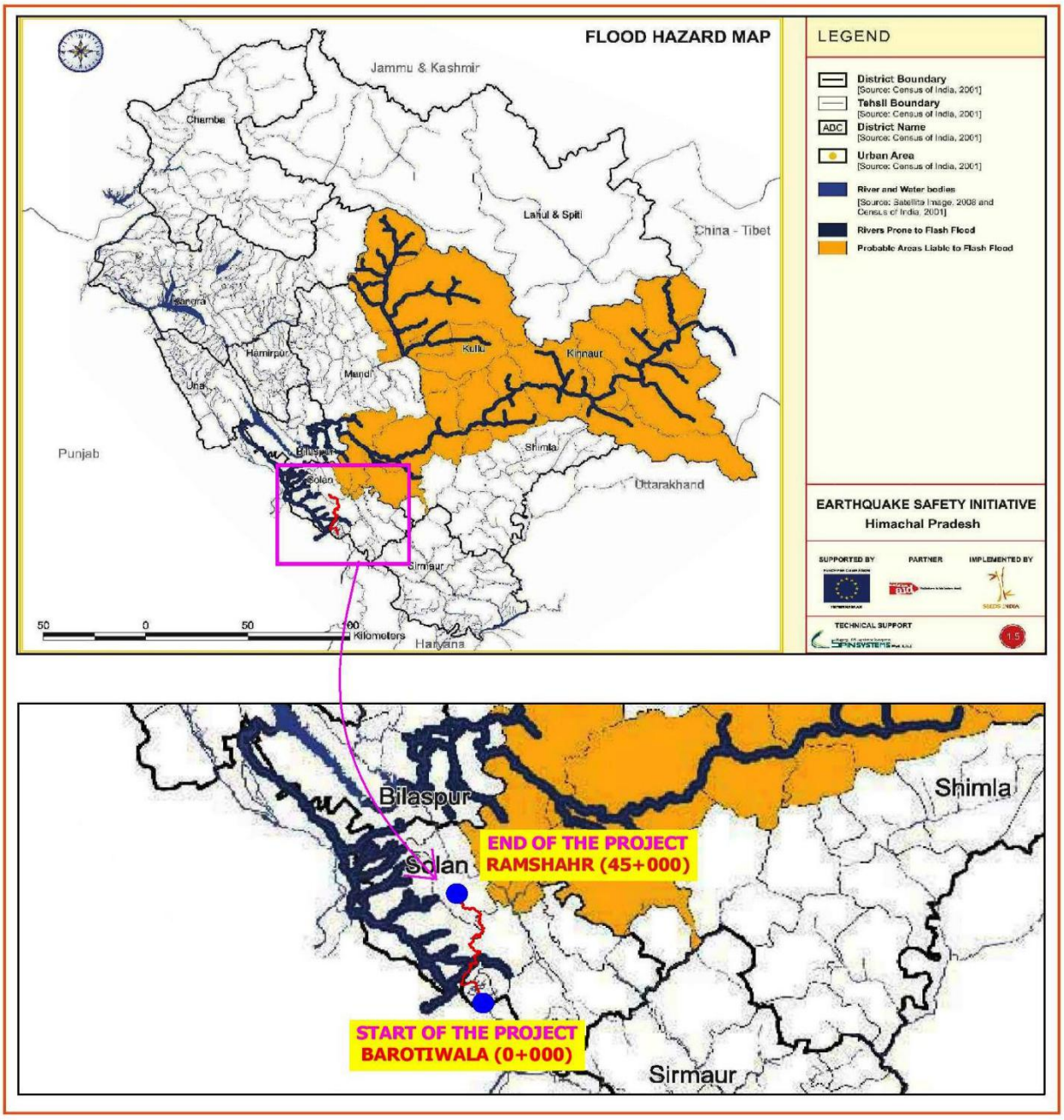


Figure 3.23: Flood Hazard Map (*Source :- https://ndmahimachalpradesh.*)

Earthquake Zones

136. 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 as given in table 3.29.

137. The project road falls under Zone – IV, which is at High risk and warrant earthquake resistant designs for structures. The earthquake hazard map along the project road is shown in Figure 3.24.

Table 3-29: 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

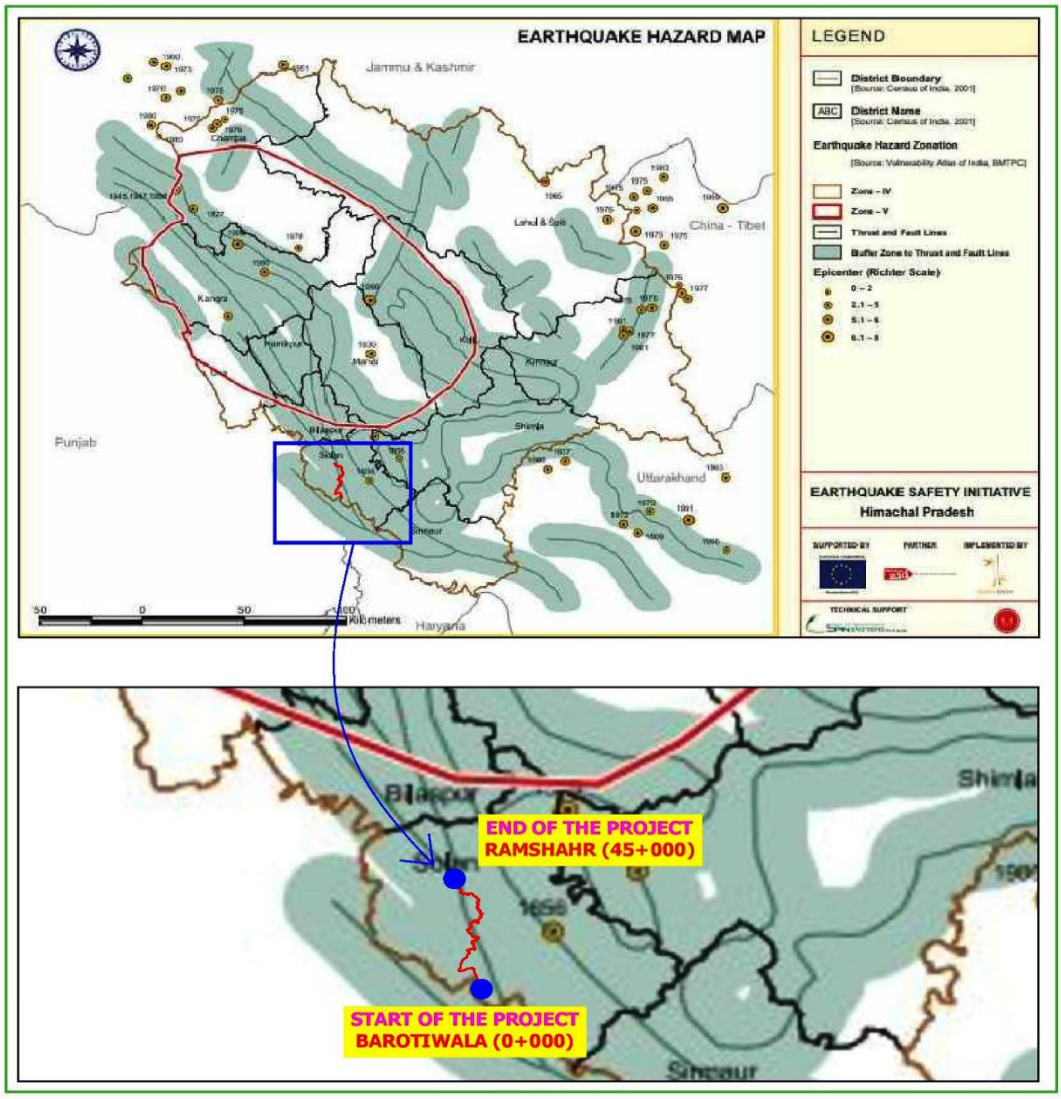


Figure 3.24: Earthquake Hazard Map (*Source :-* https://ndmahimachalpradesh.)

Vulnerability Status of Project

138. The overall vulnerability of the project road can be stated as moderate. List of various hazards and Vulnerability status along the project road are given in table 3.30.

Table 3-30: Over all Vulnerability of Project Road

S.No	Name of Road	District	Hazards			
			Earthquake	Flood	Landslide	Vulnerability
1	Barotiwala-Baddi-Sai-Ramshahr	Solan	Zone - IV (High Damage Risk Zone)	Flash Flood	Severe to Very High	Moderate

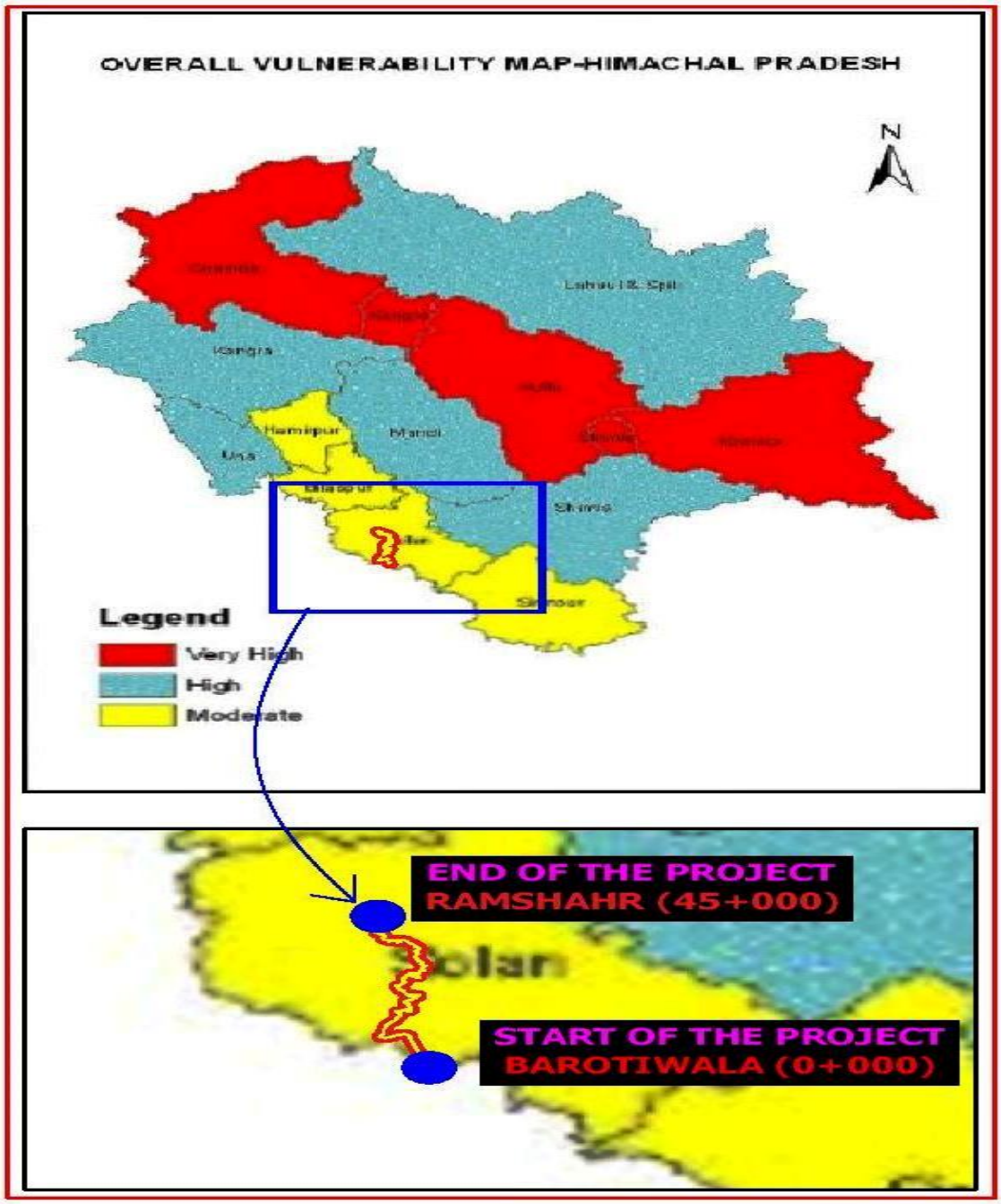


Figure 3.25: Overall Vulnerability Map (*Source:- https://www.hpsdma.nic.in/*)

CHAPTER 4 – STAKEHOLDER CONSULTATIONS & INFORMATION DISCLOSURE

139. This chapter summarizes public/stakeholder consultations conducted as part of environmental and social impact assessments for the proposed road construction between Baddi-Sai-Ramshahr. 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. Appendix 3 presents the list of stakeholders consulted.

140. 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 2018, 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

141. 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.

142. Through public participation, stakeholder's view points and suggestions were captured as in 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 Communities		
S.No	**Summary of Queries, Concerns and suggestions**	**Responses provided**
Queries		
1	People wanted to know about the road cross sections and how much of the land on either side of the roads will be acquired. In a number of cases the people have said that a marginal reduction in the Corridor of Impact will save their houses.	Current designs were explained that considered minimization of impacts
2	The people wanted to know what safety measures will be adopted by the project in villages and built up area. The people are apprehensive that an improved road will lead to vehicles moving at greater speeds, leading to accidents in the village.	Safety provisions such as speed breakers, signages were explained
Concerns		
3	The people wanted to know what the compensation and assistance package was for the project.	The resettlement principles and policies under consideration in the HPSRTP was explained.
4	People are apprehensive about the timely payment of assistance and compensation. In all the meetings they have asked the Project Authorities to pay compensation on time.	Communities were assured that construction activities will commence only after they are paid for the impacted assets
5	In as number of cases people have not been paid for land which has been acquired earlier by the PWD. As a result of this people were not willing to give land for this project	Individuals were asked to provide details so that these can be verified with the revenue department
6	Some of the likely affected persons have requested the project not to affect their livelihood – as they will be left with no alternatives. This is especially	The resettlement principles and policies under consideration in the HPSRTP was explained. They were assured all types of losses

Table 4.1– Summary of consultations with Communities		
S.No	**Summary of Queries, Concerns and suggestions**	**Responses provided**
	in the case of those losing their land. In some cases families will be losing their total agricultural land and will not have any other source of livelihood.	including loss of livelihoods would be adequately mitigated
7	Where houses/structures were getting affected, people asked for replacement cost of the structure.	The resettlement principles and policies under consideration in the HPSRTP was explained that includes provision for compensation at replacement cost
8	Land slides prone were a major concern and communities wanted the project to address this issue.	Concern was noted. Bio-engineering solutions towards slope stabilization were explained.
9	People wanted to know how the project will replace affected community structures. In most cases the people were willing to identify available government land for the same. People were largely concerned about replacement of drinking water source. In some places temples are seen as important part of their social fabric, and people have requested to retain them as far as possible	Communities were assured that assets such as temples would be avoided to the extent possible and impacts if any, would be suitably addressed in consultations with communities during implementation
10	Parking is a big issue as the parking is on MC's land and is not adequate	Parking areas would be considered as part of design depending on availability of space/land
11	Roadside water sources (seasonal stream or springs) must be protected from any damages.	Concern was noted. Uphill side treatment would be undertaken to ensure mud flow in seasonal stream was explained
12	Market property should not be damaged for execution of the project. There are economic crisis already in the market and any acquisition of the property will create a double whammy to the businessmen.	Concern was noted

Table 4.1– Summary of consultations with Communities		
S.No	**Summary of Queries, Concerns and suggestions**	**Responses provided**
13	Baddi market should to be bypassed from Sikka Hotel to Vardhman Chowk (Sun City road).	Avoidance of impacts were explained and principles to be followed were explained
14	BBNDA has already passed the plan for existing shops.	Point was noted.
	Suggestions	
15	The people wanted village specific issues to be considered in the designs.	Communities were assured that designs would be context specific and welcomed suggestions on their concerns
16	People wanted the project to build realignments and bypasses where ever it was passing through congested villages.	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.
17	In the case of hand pump getting affected the people have said giving compensation is not enough. The common problem is that while replacing the hand pump water may not be found in the first attempt. So the people have asked the project authorities to replace with a water yielding hand pump, instead of giving compensation.	Concern was noted for informing the project authorities appropriately
18	Requests were made to explore the possibilities of convergence of other development programmes by government agencies.	As part of preparation of RAP these aspects would definitely considered.
19	Due to acquisition of agricultural land, farmers will get affected; people asked for suitable livelihood support and compensation for these category of	The resettlement principles and policies under consideration in the HPSRTP was explained. They were assured all types of losses

Table 4.1– Summary of consultations with Communities		
S.No	**Summary of Queries, Concerns and suggestions**	**Responses provided**
	affected persons	including loss of livelihoods would be adequately mitigated
On specific issues		
20	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 World Bank policy and standards
21	The proposed intermediate lane road may be concern for safety specifically for women and children, accident risk will increase	Proper road safety measures are incorporated in the project design. Special measures like signage, speed breakers at schools, hospitals and market places will be provided by the project.
22	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.
23	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.
24	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.
25	People want more consultation during project implementation and want to participate in the project	Public consultation will continue throughout the project cycle.
26	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.	A thoughtful consideration is required by the project authority to relocate/ install required number of water tanks/ well/ hand pumps at identified locations.
27	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.

Table 4.1– Summary of consultations with Communities		
S.No	**Summary of Queries, Concerns and suggestions**	**Responses provided**
28	Necessary measures to be taken during the construction stage.	Mitigation measures address in the Management plan to be followed by the contractor and necessary measures to be taken to mitigate the impacts on natural resources.
	Women concerns	
29	Water shortage is one of the major problems facing all women. Women spend substantial amount of time fetching water. The women asked if the project could improve the availability and accessibility of water source by setting up more hand pump points.	Women were assured that this concern would be passed onto the project authorities for appropriate follow up with the concerned department
30	Another major issue facing all women was lack of toilet facilities along the corridor. All the women group meetings have revealed that the panchayat would maintain the toilets, once built	Communities were informed provision for separate toilets for women and men at bus shelters have been made in the design. Besides such facilities can be considered at other locations as well depending on availability of free space
31	Construction contractors bring outside labor to work near our habitations and sometimes it is unsafe for our women, girls. Will the project address that	Communities were assured that such concerns will be incorporated into their assessment and suitable actions will be provided for in the action plan (GBV risk mitigation plan)

Table 4.2 – Summary of consultations with Institutional stakeholders				
S.No	**Date**	**Designation and Place**	**Summary of Suggestions as input to technical design**	**Whether included in design or not**
1	18.07.2019	Vice President, MC Baddi	Need Rain Water Shelters, Electricity Poles, Both Side Strom Water Drainage. Nallahs to be Channelized	Yes. Rain Water Shelters, Electricity Poles, Water Drainage, Nallahs are provided for in the design

Table 4.2 – Summary of consultations with Institutional stakeholders				
S.No	**Date**	**Designation and Place**	**Summary of Suggestions as input to technical design**	**Whether included in design or not**
2	18.07.2019	Chairman, M.C.Baddi	Need side water drains, drainage rain shelters, electricity poles. The road must be constructed in such away so that there should be no encroachment of the shopkeepers. Proper cuts be provided in the tom for entry. Nallalhs to be challized from sai road stating point to vardhamen chowk need.	Yes. Rain Water Shelters, Electricity Poles, Water Drainage, Nallahs are provided for in the design
3	2.8.19	Local person Baila	Rain shelter and Toilet Facility at Baila, Drainage and Solid waste management, Plantation along the road, Water pond facility for forest and local animals, Street light and crash barrier provision on road, Crop bazar development, Drinking water provision to the villagers	Yes. Rain Water Shelters, Electricity Poles, Water Drainage, Nallahs were provided. Solid Waste management is not specific to this project road.
4	19.07.2019	Sai Smt. Urmila Devi – Pradhan, G.P. Sai. Mr. Sohan Singh – Vice Pradhan, Mr. Ramji Das – Ward Member	Rain shelters at villages and public toilet facility, Playground at GSSS Sai, Community Center at Sai, Children Park at Patta Connectivity track for bus stand form villages (Talli - Taller ghat)	Yes. Rain Shelters are provided for in the design
5	11.9. 2019	Bhatolikalan Gram Panchayat -	-	

Table 4.2 – Summary of consultations with Institutional stakeholders				
S.No	**Date**	**Designation and Place**	**Summary of Suggestions as input to technical design**	**Whether included in design or not**
6	11.9. 2019	MC Baddi - -	1. Speed breakers and footpath should be provided along the new road, Signboard should also be provided, Provision of traffic and street lights (in the median) 2. A resolution in the MC has been passed under street vendor act for the rehabilitation of kiosks. Under the act they will be rehabilitated to an already identified area (nearby vegetable market) 3. Upgraded road should have proper drainage system, Bus stops along with bus bays must be provided at appropriate places. There needs to have a provisions of public comfort stations. If provided in the project fund, it will be taken up by MC for further maintenance.	Yes. Signboards, Speed brakers, street lights, bus bays are provided.
7	11.9. 2019	BBNIA (Baddi-Barotiwala-Nalagarh Industrial Association) BBNIA	1. Association very happy for such development project. 2. Improved road should have median. 3. The purpose of the road improvement will not be solved, if up gradation of the road from Ramshahr to Kunihar is not considered in the project. Options for bypass must be considered. Road should have proper footpath and enough parking spaces along roadside.	Yes. Foot paths are provided.
8	12.9. 2019	Gullarwala Gram Panchayat	1. The road should be widened and improved. Junctions needs to be developed, where road diverts to Gullarwala panchayat. At the junction, where road to Gullarwala Panchayat is diverted from project road, there is a need of foot over bridge. There exist three Schools and regular movement of the people (of approximate 8-9 villages) at this point. Due to heavy traffic, sometimes, it takes half an hour to cross road in the peak hours., New road should have parking facilities, Bus stops including bus bays must be provided at appropriate places	Yes. Noise barriers at sensitive locations, bus bays, parking facilities were provided.

Table 4.2 – Summary of consultations with Institutional stakeholders				
S.No	**Date**	**Designation and Place**	**Summary of Suggestions as input to technical design**	**Whether included in design or not**
9	12.9. 2019	Gurudwara Committee -	1. Happy to know about the road development proposal in anticipation that this will lead to socio economic improvement of the area. 2. The existing road is prone to landslide. Improved road should have proper provisions of retaining walls to avoid landslides. 3. Heavy crowed is expected during Makar Sankranti and Chhath puja. There is a lack of parking facilities on existing road. 4. Debris must be disposed of with proper protection/drainage measures in the Govt. land just after crossing bridge (both sides) near to Sun flame factory. Later, this place must be developed as parking area. 5. Bus stops including bus bays must be provided at appropriate places. One bus stop must be provided at Bhupnagar after crossing bridge. Roadside water sources (springs) must be protected from any damages	Yes. Debris disposal locations are identified and safe disposal will be ensured. Also bus bays were provided.
10	12.9. 2019	Ramshehar Bus stand -	1. The Road is congested and requires improvement. 2. This road is very important from the tourism point of view. 3. Ramshehar village should have parking provisions 4. Junction must be developed 5. Culverts need to be widened on the road. 6. The area is prone to landslides. Hence, there must be regular maintenance 7. Roadside water sources (springs) must be protected from any damages. Debris can be disposed of at Govt. School and College ground of the Ramshahr.	Yes. Parking facilities, landslide measures, measures for seasonal streams will be provided.

CHAPTER 5 – ANALYSIS OF ALTERNATIVES

5.1 Introduction

143. In accordance with the principle of mitigation hierarchy for management of E&S risks and impacts, analysis of alternatives has been considered for the proposed widening/upgradation. Further, the designs are being revised keeping in view safety considerations, geometric improvements and current and future traffic projections. As these revisions are taking place, this chapter focuses on "With" and "Without" project scenario.

5.2 With and Without Project Alternatives

5.2.1 Without Project Scenario

144. 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.

145. 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.

5.2.2 With Project Scenario

146. 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 four lanes/two lane/intermediate of the existing stretch as envisaged in the project objectives.

147. 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.

148. To avoid the large-scale acquisition of land and properties, the project envisages the possible laning of the MDR within the existing ROW, In spite of the various development benefits likely to accrue due to the project, as is the case of every road development project; the project would be accompanied by certain impacts on the natural, social and environmental components.

149. 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.

Table 5- 2: "With and Without" Project Scenarios – A Comparative Assessment		
Component	**"With" Project Scenario**	**'Without" Project Scenario**
Highway Geometry	2-lane with PS/ Intermediate lane is being developed with geometric improvements	Existing Single/two lane carriageway with poor geometry
Design Speed	(40/80kmph for 2 lane), (30/40kmph for Intermediate lane)	20-40 kmph entire project section.
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 increases 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. Double the number of new young and healthy saplings to be planted as compensation.	No felling of trees. 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	No enhancement measures involved.

	water front in an aesthetic manner.	
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.

5.3 Environmental and Social considerations

150. The various avoidance measures for minimizing the extent of environmental impacts and avoiding of sensitive environmental features have been worked out. The table provides the measures that have been adopted for offsetting the impacts. A description of the measures has been presented in the following sections.

Table 5- 3: Alternative considerations for Minimisation of Environmental Impacts

Environmental and social considerations	Provisions considered in project road design
Maintenance of Design Speed for through traffic	Improved geometrics
Improvement of Road Safety	Intersection Improvements; Geometric improvements at curves, Signage etc.,
Adequate drainage	Provision of longitudinal drains and CD Structures
Reduction of Air and Noise Pollution	Intersection improvements; site specific attenuation measures; tree plantations
Minimisation of Direct Impact on Sensitive Receptors, cultural and religious properties	Provision of Noise barriers and other appropriate and site specific EMP
Minimisation of Property acquisition	Realignments; Concentric widening to minimize social impacts
Displacement of Commercial Properties	Concentric widening to minimize social impacts
Minimisation of Loss of Utility Lines	Centre line alterations to minimize shifting requirements
Erosion control and Stabilisation of Slope	Turfing / Pitching/ Provision of Retaining walls, Breast wall and bio-engineering measures
Landslides and Erosion control	Provision of Retaining walls, Breast wall and bio-engineering measures

151. Environmental and social impact assessment during pre-design stage helps to minimize, reduce or mitigate potential negative impacts of project action and enhance positive impacts, sustainability and development benefits. Although many benefits are expected from the project, social assessments have identified potential adverse impacts on roadside communities immediately and directly affected by project construction and operation. These impacts include losses of land, assets and livelihood. In accordance with the principle of mitigation hierarchy for management of E&S risks and impacts, analyses of alternatives have been considered to reduce potential direct negative E&S impacts of the project. The recommendations have also been made to incorporate for detailed studies at DPR stage

from technical and socio-economic perspective. This chapter focuses on alternatives considered and finalized.

152. 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, wherever feasible.

153. Considerations through good road designs to mitigate impacts included 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.
    - Smoothening of curves and bends for better geometric design. In case where it affects settlements, alignment changes were indicated.
    - Paved shoulders to be maintained as far as possible to facilitate movement of non-motorised traffic.
    - Avoiding unnecessary displacement by modifying project alignments, reducing the width of the corridor of impact, or modifying design based on rural and urban cross sections.
    - Reducing design speed in built up areas;
    - Reducing impacts on existing shrines and worship places;
    - Providing suitable safety measures, such as speed reductions near schools and hospitals;
    - Minimizing the raising of roads in urban areas to prevent water seepage to the houses adjoining the roads and;
    - Providing access to businesses and residential units that would be otherwise impacted by construction; and minimizing losses of public and private property, such as tube wells, tree plantations and other common property resources within the ROW, by minimizing the width to be cleared.

CHAPTER 6 ENVIRONMENT AND SOCIAL RISKS AND IMPACTS AND MITIGATION MEASURES

154. 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 34 Km of road of HPSRTC 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 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[2] and financially[3] feasible;
    v) To help identify differentiated impacts on the disadvantaged or vulnerable and to identify differentiated measures to mitigate such impacts, wherever applicable

155. 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 …related to Assessment and Management of E&S risk and impact (ESS 1):

Disadvantaged and Vulnerable persons

156. Under this project and in accordance with the ESF directive[6], Project shall define vulnerable person who has been designated under 'Below Poverty Line' category as identified by the concerned State Govt. level. Disadvantaged persons belonging to SC, ST, disabled, handicapped, orphans, destitute persons and woman heading the household are also recognized as vulnerable persons.

157. **Mitigation measures:** Mitigation of impacts on such vulnerable persons will be undertaken through provisions and measures in the Resettlement Action Plan. Project shall consider other measures in accordance with The Rights of Persons with Disabilities Act, 2016. These could include access ramps to bus shelters .

[6] ESF directive on Addressing Risks and Impacts on Disadvantaged or Vulnerable Individuals or Groups

6.2 … relating to Labor and working conditions (ESS 2)

158. 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 3.

Table 6-1: Estimated Construction Workforce

Sl No	Designation	Estimated numbers
1	Project Managers	2
2	Dept. Project Managers	4
3	Specialized Engineers	8
4	Site Engineers	8
5	Mechanical Engineers	6
6	Technicians	12
7	Supervisors	6
8	Skilled and unskilled workers/labours)	345
9	Other supporting staff	4
10	**Total**	**395**

Note: 1. The number of skilled and unskilled labors can reach a peak level of 300 and a bare minimum of 30 at any given time of project implementation phase
2.The Staff indicate above excludes the HPRIDC staff deployed for supervision

Source: Estimated based on HPSRP Phase I and Information Provided by DPR Consultants

159. 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.

Project shall comprise the following types of workers:

160. ***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.

161. ***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.

162. ***Migrant Workers:*** 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. The migrant workers are those, 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.

163. ***Community Workers:*** Community workers may be employed by the contractor in relation to this Project from local sources particularly for supporting bio-engineering solutions towards slope stabilization workers. However, a better estimate would be known only at the time of construction.

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

i. Safety issues while at work 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

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

165. **Mitigation measures:** The borrower – HPRIDC will prepare Labor Management Procedures that would be applicable for the entire program. The Labour Management Procedure (LMP), will include the Environmental, Occupational Health & Safety and Social (OHSS) guideline, management system and governance controls 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. ill clearly spell out the requirements relating to provision of terms and conditions of employment; promoting of non-discrimination and equal opportunity; worker's organization.

166. 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[7] 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 @ 1% of accepted contract value.

167. 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 Workers' Camp Management Plan that addresses specific aspects of the establishment and operation of workers' 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 contractor's policies and Worker Code of Conduct (where applicable).

168. 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 will be prepared. The Plan will provide a set of measures such as orientation to all categories of labor, communities' sensitization,

[7] 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.

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 and Pollution Prevention and Management (ESS 3)

Impact on Physiography

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

Impact on Geology

170. 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 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 due to dumping etc., are still being assessed and will translated into final design to achieve minimum construction footprint.

Table 6-2: Borrow Pits along the Project Road

BA. No.	Chainage (km)	Lead (m)	Side	Land use type
BA-1	10+000	0 -20	RHS	Government land (Hill side)
BA-2	17+000	0 -20	RHS	Government land (Hill side)
BA-3	23+200	0 -20	RHS	Government land (Hill side)
BA-4	29+400	0 -20	RHS	Government land (Hill side)
BA-5	36+140	0 -20	RHS	Government land (Hill side)
BA-6	40+400	0 -20	RHS	Government land (Hill side)

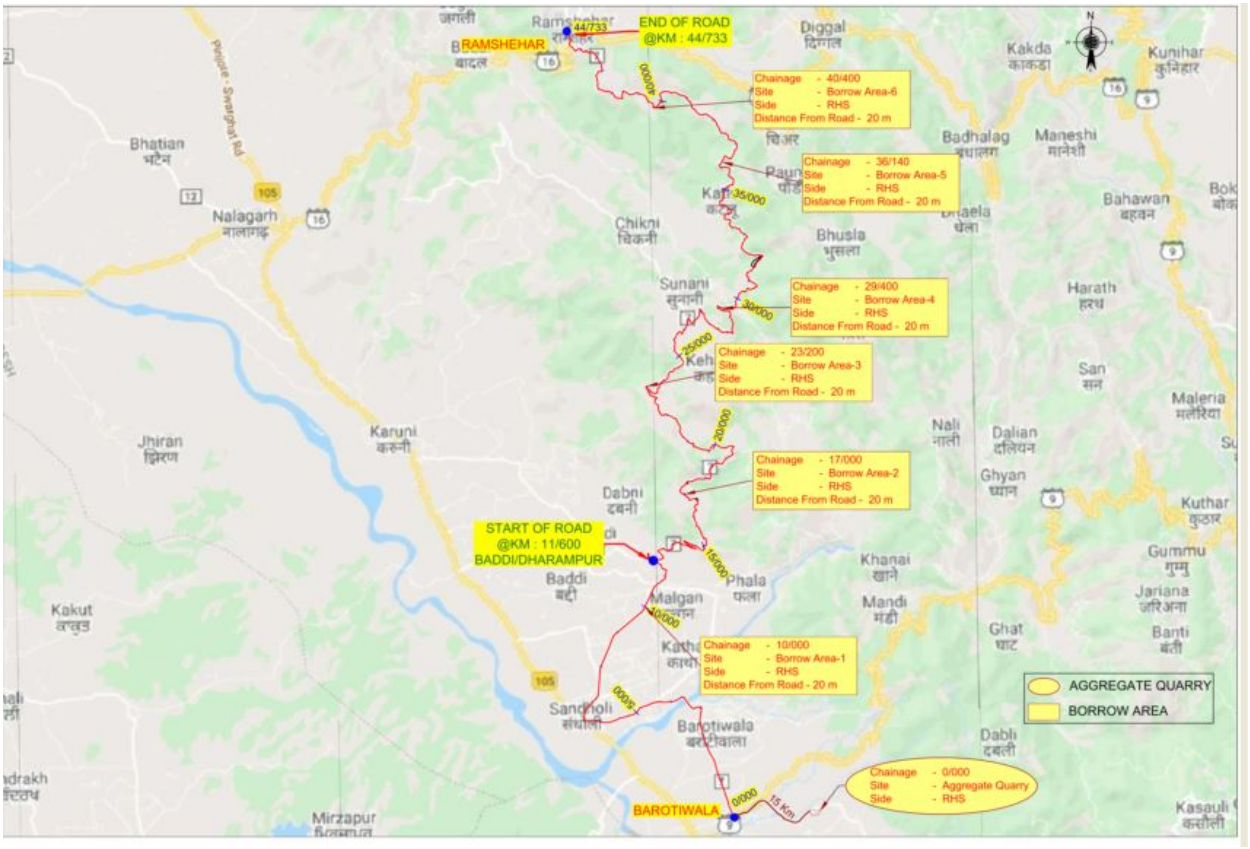


Figure 6.1:- Map showing the Borrow Areas along the Project Road

171. 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.

172. 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.

173. 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 6-3.

Table 6-3 : Estimated Construction Materials Requirement

S.No	Description	Unit	Quantity
A	**Road Works**		
1	Earthwork for Excavation	Cum	772828
2	Earthwork from Borrow Area	Cum	221957
3	Aggregates for (Road Work)	MT	333363
4	Bituminous material	MT	1799
B	**Bridges**		
1	Aggregates for (Bridges)	MT	68462
2	Cement	MT	17014
3	Concrete (Bridges)	Cum	47543
4	Sand	MT	32092
5	Steel	MT	2480

174. Mitigation Measures:

- The project's demand for boulders, aggregate and sand for road construction will be through pre-existing authorized quarries only.
- As part of project preparation, 6 locations with a lead distance of 0 to 15 Km have been identified for borrowing the earth.
- 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 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 will
- 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

175. The land within the COI will be directly impact due to removal of topsoil, compaction and spillage of chemical. During construction phase stripping of topsoil upto depth of 15cm is anticipated to be directly affected during clearing and grubbing. 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.

176. Based on soil quality test, the content of sand, clay and silt is 67.8%, 19.9% and 12.3%, respectively which indicate that soil texture is sandy clay loam class and prone to erosion by water and wind.

177. The land within the COI will be directly impact due to removal of topsoil, compaction and spillage of chemical.

178. 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:

179. The estimated cut and fill volumes of both rock and earth work as per project design is given in Table 6-5. The majority of the material generated during the construction phase is anticipated to be excavated rock cut.

180. The main activities that will generate excavated rock are hill cutting, excavation of existing pavements and reconstruction of culverts. The waste generation estimated is 86871.718 cubic meter from these activities are likely to be earth, rocks and concrete wastes. Out of this, the project considers to reuse/recycle 3293.54 cubic meter of earth and rocks for the construction of sub grade, sub base and base layers, retaining walls, breast walls among others. This approach not only will reduce the amount of waste leaving site, but also reduces the need to import material.

181. The reuse of 3195 cubic meter of excavated rock constitutes 48 % of the total quantity and thus only 52 % will need to disposed off in debris/muck disposal sites.

182. The extent of the identified muck disposal sites at 5 locations is 5.6 Ha, which is adequate to dispose the both excess rock cut material. The disposal of debris is likely to have significant 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 Estimated Rock and Earth Work Materials (Cut and Fill)

S.No	Rock Cut				Earthwork Cut				Rock Fill				Earthwork Fill			
	Length (m)		Volume		Length (m)		Volume (cum)		Length (m)		Volume (cum)		Length (m)		Volume (cum)	
	LHS	RHS	LHS	RHS	LHS	RHS	LHS	RHS	LHS	RHS	LHS	RHS	LHS	RHS	LHS	RHS
1	2790	0	6630	0	23460	15850	36096	47439.71	0	2490	0	3195	20	0	98.54	0
Rock Reuse/Refill			3195		Excess		3435..358		48% Reuse							
Earth Reuse/Refill			98.54		Excess		83436.36		0.10% Reuse							

183. 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 an 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 EMP.
- 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

184. As the project road completely traverse in hilly and rolling terrain, the construction itself doesn't cause floods during monsoon seasons. However, there exist 27 seasonal streams which flow across the road at different chainages. These streams have a tendency to bring high runoff discharge from hill leading to high erosion and mud slide, temporary water stagnation and overflowing over road surface. This is mainly due to clogging of side drain, inadequate discharge capacity and cross drainage at downstream side. Further, more, road construction inevitably 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.

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

- The construction of CD structures at new locations and reconstruction of existing structures at same locations connected with side drain on hill sides along the road is suggested for easing the drainage across the road is given in Appendix -6.
- Construction of check dams on the upstream side of 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. A total of 30 check dams and 15 cement concrete steps which acts as a water fall at most warranted seasonal streams.
- In addition, bio-engineering interventions are also considered at selected locations to minimize the erosion and improve the slope stability.

6.3.3 Water Resources Depletion

186. The terrain of project area is hilly and there are no perennial surface water sources/bodies other than seasonal streams and springs. The community during consultation informed of largely dependent on the piped water supply provided by Irrigation and Public Health Department, GoHP for drinking and other utilities. In addition to supply water, people also depends on springs, locally calls 'Chasma', located along major thrust/faults or structurally weak planes through which water seepage, which is collected on water storage tank or through Bowries, a type of dug well, structure constructed on the hill slopes to tap the seepage. Such Bowries are very common and found all over the district.

187. The collection of primary data for groundwater could not be undertaken due to time limitation under current assignment to fulfill requirements for monitoring water level, which spread over monsoon and post monsoon period. Therefore impact assessment study has relied mainly on ground water development studies report of the Central Ground Water Board, GoI. Though valley area of Solan district is identified as safe category, but decline trend of water level has been reported due dependence on groundwater as major source for irrigation and domestic water supply, in both rural and urban areas. Further, hand pumps provided in hilly and mountainous area have an average depth of 50-60m with low discharge. This underline very low groundwater potential in project area due to its hydro-geomorphic set-up.

188. However, during project period water will be required for civil works construction, workforce on site and at camps. Based on details in DPR, water demand is estimated (**Error! Reference source not found.**) for different construction activities like embankment, sub-grades, bituminous work, concrete, dust suppression and daily consumptive use at work force camp, site offices, among others. a total water usages of 680 KLD is estimated for three years construction period.

Table 6-5 : Estimated Construction Water Requirement

S.No.	Activity	Unit	Quantity in litres required/meter length of road	Estimated project Total Water Qty requirement (in lakhs)
1	Road/Embankment	Litres/metre	500	225
2	Subgrade/WBM	Litres/metre	250	113
3	Construction of 203 CD Structures	Ls@10000 litres per location	20,30,000	21
4	Dust Suppression and camp site management	Litres/metre	250	113
5	On site sanitation & Drinking water	per day in Litres	5,000	15
6	Camp Site Water Requirement	Litres	1,000	3

S.No.	Activity	Unit	Quantity in litres required/meter length of road	Estimated project Total Water Qty requirement (in lakhs)
7	Plantation of saplings/trees	Litres	54,00,000	54
Total Water Requirement				544
Add 5% for wastage and 20% for Contingency				136
Quantity of Water Requirement for entire Construction period				680

189. Considering there is high dependence on groundwater, average depth of water level (most suitable site for hand pump in hilly area) is 50-60m, and no perennial surface water sources, the additional water demand for the project has potential to stress existing water sources and conflict with community. 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.

190. **Mitigation Measures:** The impacts of 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 tubewell and abstracting water. However, tube 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

191. Road construction related pollution risks include accidental release of fuel 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.

192. 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.

193. 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

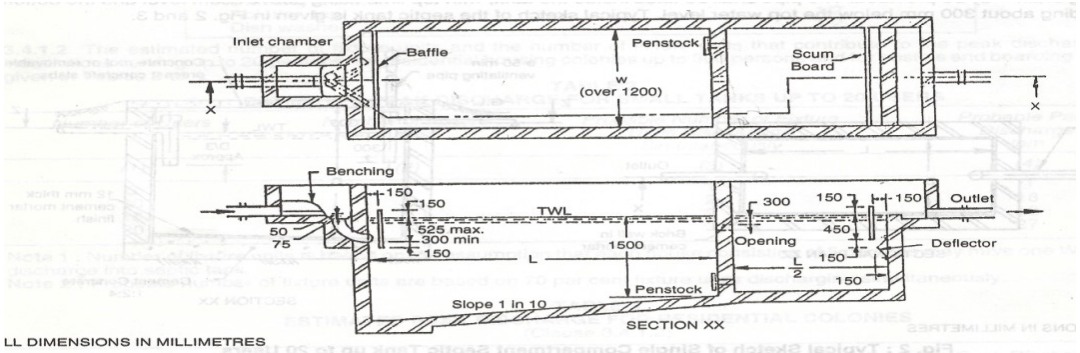
Category	Nos	LPD	Quantity	Peak Sewage generation (80%)	Average	Lean
Supervision staff	50	45	2250	1800	900	324
Non local /Migrant labor at camp site	240	90	21600	17280	10800	3888
Total				**19080**	**11700**	**4212**

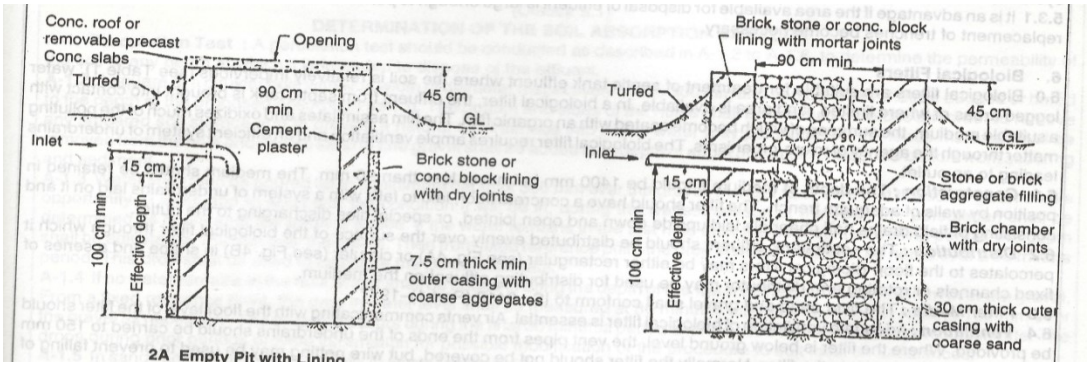
194. In particular, the proposed construction works is likely to affect water quality during monsoon period, when all seasonal streams will be flowing. The most commonly associated will be increased suspended solids and turbidity in runoff from land clearance, earthworks and stockpiles where works are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

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

- All toilets and wash areas with in 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 5 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.





2A Empty Pit with Lining

- 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. (as per below drawing)

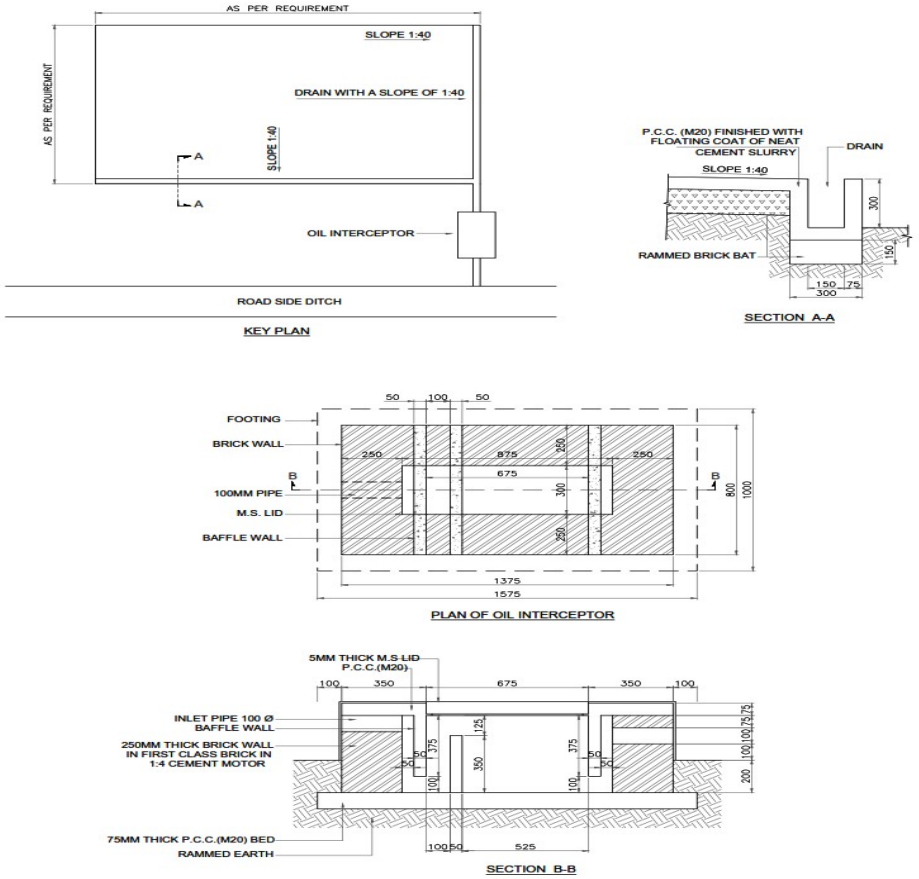


Figure 6.1- Oil Interceptor

- No construction debris and/or spills of construction materials are dumped on to stream waterway. The upstream and downstream sides 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

196. The baseline results of all air quality parameters (PM10, PM2.5, SO2, NO2, HC, CO) 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.

197. 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 presence of concrete batching plant, hot mix plant and wet mix macadam plants could also result in significant emissions of dust, though the impact will depend on their location in relation to sensitive receptors. The level and distribution of dust emissions will vary according to the duration and location of activity, weather conditions, and the effectiveness of suppression measures.

198. Gaseous emission during construction will be from road construction machinery, equipment and trucks used for material transportation. The operation of vehicles and equipment 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.

199. 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 61242.53 tons of carbon dioxide equivalents (CO2) (which includes N2O as well as CH4.). The GHG estimates of the widened project road scenario (as of 2019) is 35241.62 tons of CO2, (which includes N2O as well as CH4.) shows that the widened project road could reduce GHG emissions by 25151.49 tons of CO2 as given in Table.

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

Present condition Road in 2019				Proposed Road widening			Change in emission		
Type of vehicles	**CO_2**	**N_2O**	**CH_4**	**CO_2**	**N_2O**	**CH_4**	**Δ CO_2**	**Δ N_2O**	**Δ CH_4**
Two wheelers	3196.29	0.00	64.29	1827.90	0.00	37.11	-1368.39	0.00	-27.18
Three wheelers	4251.97	0.09	3.23	2431.60	0.05	1.91	-1820.37	-0.04	-1.32
LMV (4 Wheel)	44418.81	0.65	0.51	25386.19	0.37	0.30	-19032.62	-0.28	-0.21
Bus	2503.88	0.20	0.00	1430.83	0.11	0.00	-1073.05	-0.09	0.00

Present condition Road in 2019				Proposed Road widening			Change in emission		
Heavy truck	2089.63	0.22	0.00	1194.08	0.13	0.00	-895.54	-0.09	0.00
Lite truck	2699.77	0.12	0.00	1767.49	0.08	0.00	-932.28	-0.04	0.00
Total emission	**59160.34**	**1.28**	**68.03**	**34038.10**	**0.74**	**39.32**	**-25122.24**	**-0.54**	**-28.71**
Total in terms of Co2	**59160.34**	**381.44**	**1700.75**	**34038.10**	**220.52**	**983**	**-25122.24**	**-160.92**	**-717.75**

Note:- N_2O and CH_4 is converted into Co_2 Equivalent using 298 kg and 25 kg as multiplication factor respectively.

200. 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 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_2	**N_2O**	**CH_4**	**CO_2**	**N_2O**	**CH_4**	**Δ CO_2**	**Δ N_2O**	**Δ CH_4**
2020	61146.34	1.31	70.91	Construction Stage			Construction Stage		
2021	63769.39	1.14	101.8						
2022	76005.44	1.62	101.18						
2023	83854.37	1.78	111.62						
2024	92265.83	1.96	130.15	53794.81	1.17	80	-38471.02	-0.79	-50.15
2025	100261.81	2.13	133.47	58456.75	1.24	86.93	-41805.05	-0.89	-46.53
2026	109278.84	2.33	145.47	63714.05	1.35	94.75	-45564.79	-0.97	-50.72
2027	119145.14	2.54	158.61	69466.51	1.46	103.3	-49678.63	-1.08	-55.31
2028	127614.85	2.55	173.45	73949.37	1.47	112.98	-53665.47	-1.09	-60.47
2029	139378.92	2.98	173.61	81192.94	1.73	113.04	-58185.98	-1.25	-60.57
2030	151057.37	3.22	201.09	88072.61	1.87	130.97	-62984.75	-1.35	-70.11
2031	162913.33	3.47	216.86	94985.06	2.01	141.25	-67928.27	-1.45	-75.61
2032	176205.22	3.75	234.55	108086.02	2.57	152.77	-68119.21	-1.17	-81.78
2033	187995.25	3.96	252.35	108919.35	2.27	164.36	-79075.91	-1.69	-87.99
2034	197945.23	3.96	270.57	116783.6	2.43	176.23	-81161.63	-1.53	-94.34
2035	216144.73	4.56	290.13	128471.37	2.58	188.97	-87673.35	-1.97	-101.16
2036	232434.83	4.9	312	134666.4	2.81	203.21	-97768.43	-2.09	-108.78
2037	248611.71	5.24	333.71	144039.91	3	217.35	-104571.8	-2.24	-116.35
2038	266670.26	5.62	357.95	154501.45	3.22	233.14	-112168.81	-2.4	-124.8
Total	**2812698.86**	**59.02**	**3769.46**	**1479100.22**	**31.2**	**2199.26**	**-1048823.09**	**-21.97**	**-1184.69**
Total in terms of Co2	**2812698.86**	**17587.96**	**94236.5**	**1479100.22**	**9297.6**	**54981.5**	**-1048823.09**	**-6547.06**	**29617.25**

Note:- N_2O and CH_4 is converted into Co_2 Equivalent using 298 kg and 25 kg as multiplication factor respectively.

The GHG emission projections of the improved project road over its life cycle indicate that there will be a net reduction of 37961.93 Metric tons.

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

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

Details	Emission factor (g/Mile)		
	PM_{10}	$PM_{2.5}$	CO
Year 2019	1.04	1.48	5.82
Year 2038	2.13	4.23	12.68

PREDICTED INCREMENTAL CONCENTRATIONS

Details	2019			2038		
	Parameter(µg/m^3)			Parameter(µg/m^3)		
	PM_{10}	$PM_{2.5}$	CO	PM_{10}	$PM_{2.5}$	CO
Maximum Concentrations	2.6	3.9	1050	5.21	10.4	1840
Barotiwala	2	0.5	300	2	3	400
Ramshahar	1	1	500	4	5	800

Cumulative Constrictions at Various villages

Details	Baseline			Ground Level			Cumulative		
	2019 Parameter(µg/m^3)			2019 Parameter(µg/m^3)			2019 Parameter(µg/m^3)		
	PM_{10}	$PM_{2.5}$	CO	PM_{10}	$PM_{2.5}$	CO	PM_{10}	$PM_{2.5}$	CO
Barotiwala	70.3	26.1	410	2.6	3.9	1050	72.9	30	1460
Ramshahar	48.2	16.9	350	2	0.5	300	50.2	17.4	650

203. 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 and median plantation. This will further reduce the concentration of PM & CO.

204. 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.

205. 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.

206. However, in MDR 7 (Barotiwala-Baddi-Sai-Ramshahr) project, the emissions will increase significantly due to increase in traffic density.

207. The Isopleths of PM10, PM2.5 and CO concentration along the project stretch are given below in Figures below.

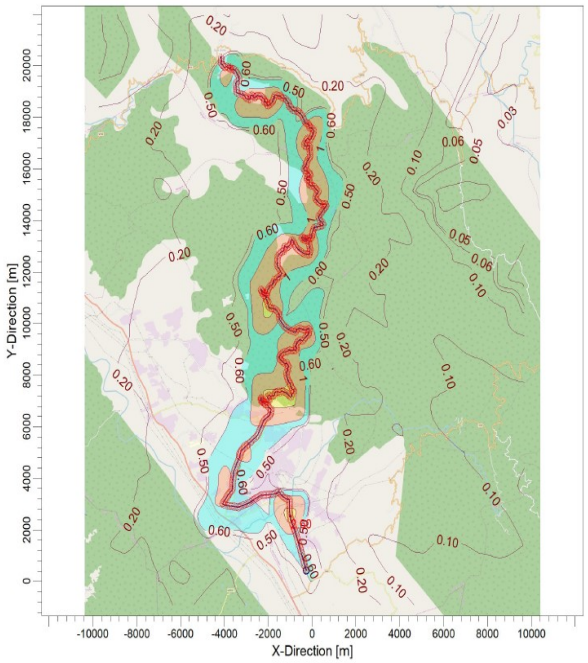
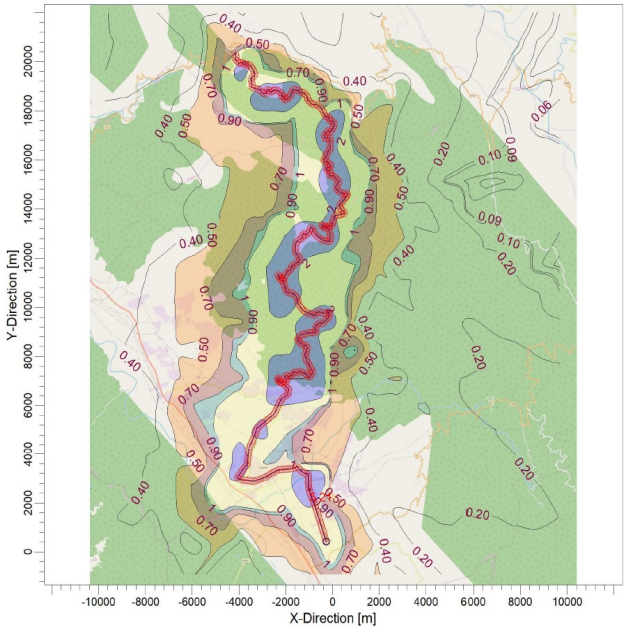
2019	2038
	

Figure 6.2: Isopleth of Incremental GLC of Particulate Matter (PM10) from MDR 7 (Barotiwala-Baddi-Sai-Ramshahr) Road Project for the year 2019 & 2038

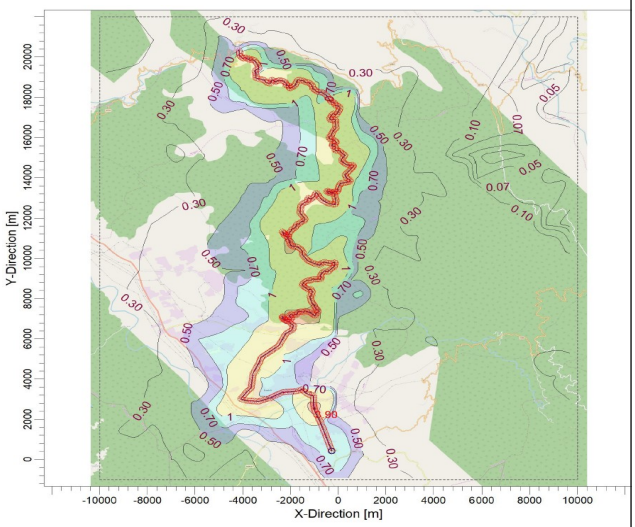
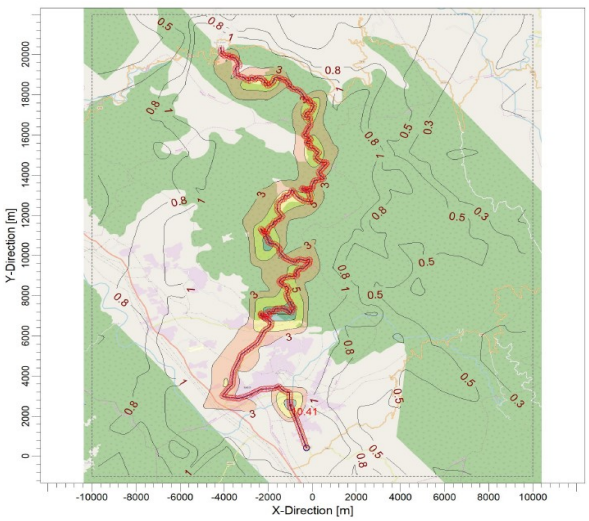
2019	2038
	

Figure 6.3: Isopleth of Incremental GLC of Particulate Matter (PM2.5) from MDR 7 (Barotiwala-Baddi-Sai-Ramshahr) Road Project for the year 2019 & 2038

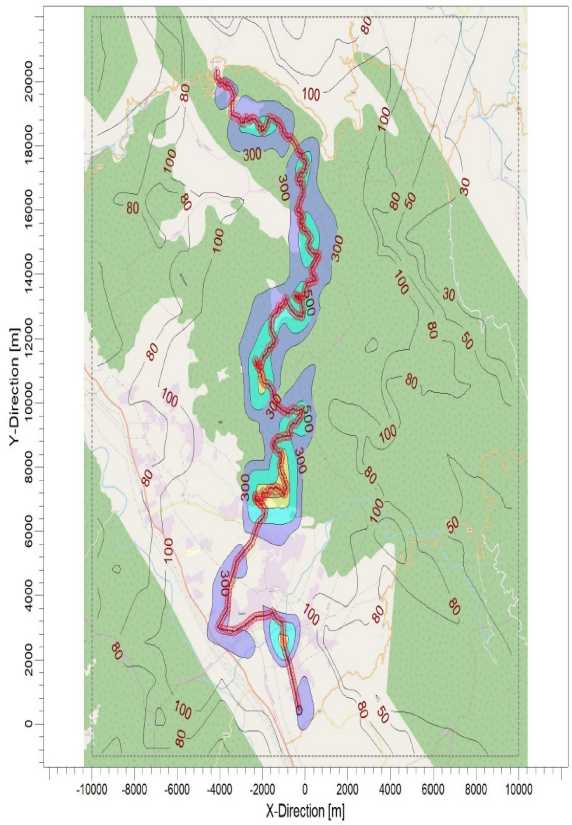
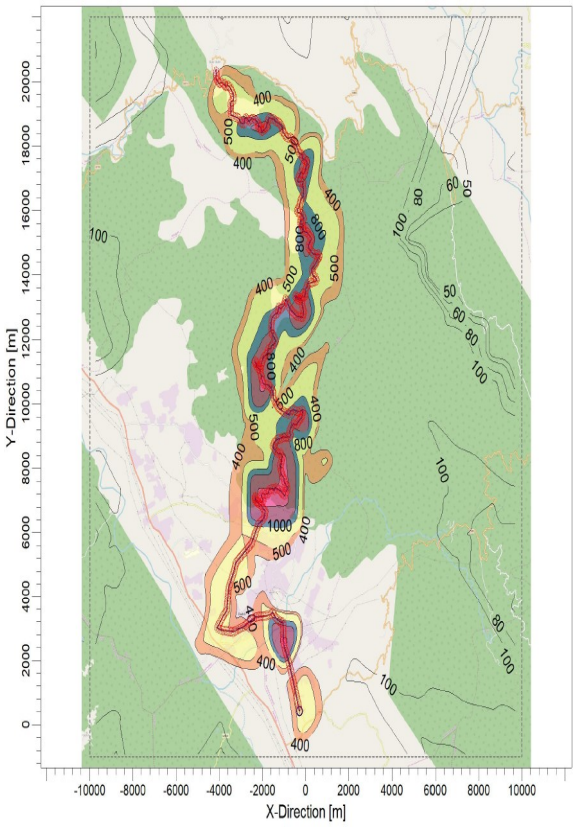
2019	2038
	

Figure 6.4 : Isopleth of Incremental GLC of Carbon Monoxide (CO) from MDR 7 (Barotiwala-Baddi-Sai-Ramshahr) Road Project for the year 2019 & 2038

208. **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 1year 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 the batching plants and 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 shall provide wind barrier, depending on most prevailing wind direction and presence of sensitive receptors at downwind side, 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

209. 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.

210. The vibration produced by rollers can be transmitted along the ground. This may cause damage to kutcha structures located along the alignment. 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.

211. 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.

212. A noise propagation modeling 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.

Noise level predictions for the locations

S.No	Name of Locations	Noise Level dB(A) 2019	Noise Level dB(A) 2038
1	Barotiwala	60	74.2
2	Ramshahr	57	63.4

213. 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.

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

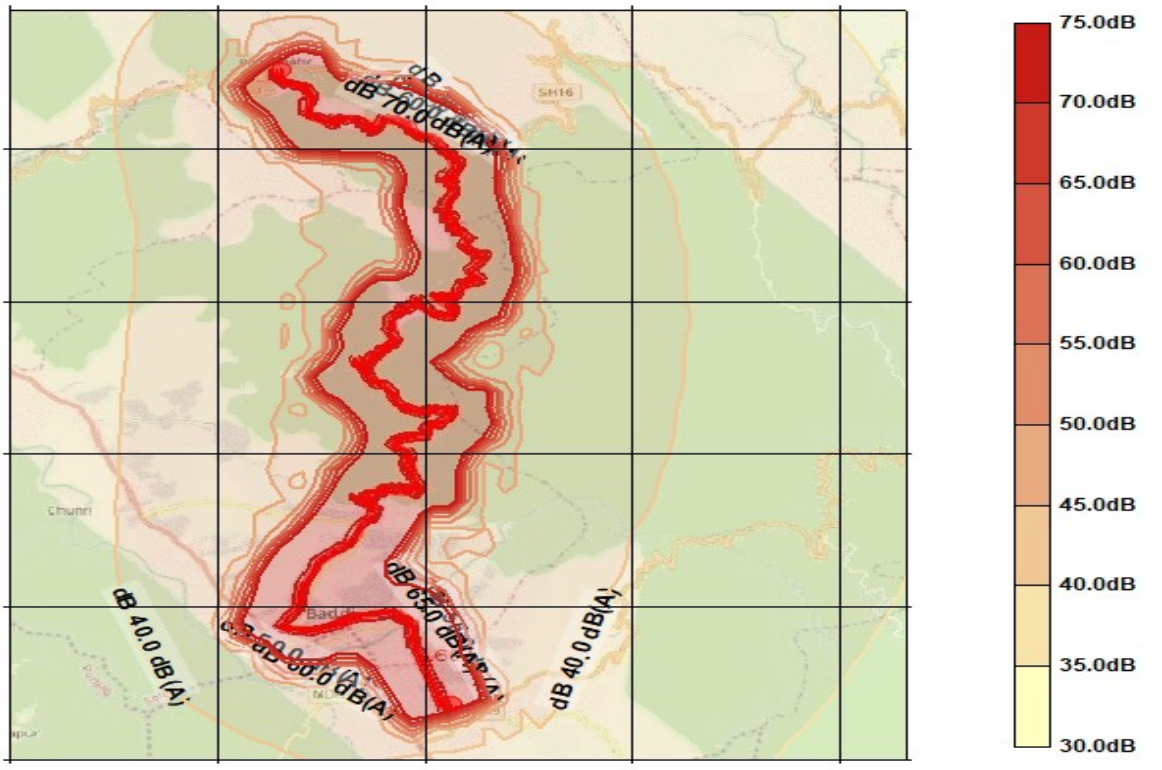


Figure 6.5: Contour map showing noise levels due to total traffic outcome at the Barotiwala – Baddi – Sai - Ramshahr Road (MDR7) stretch for the year 2019

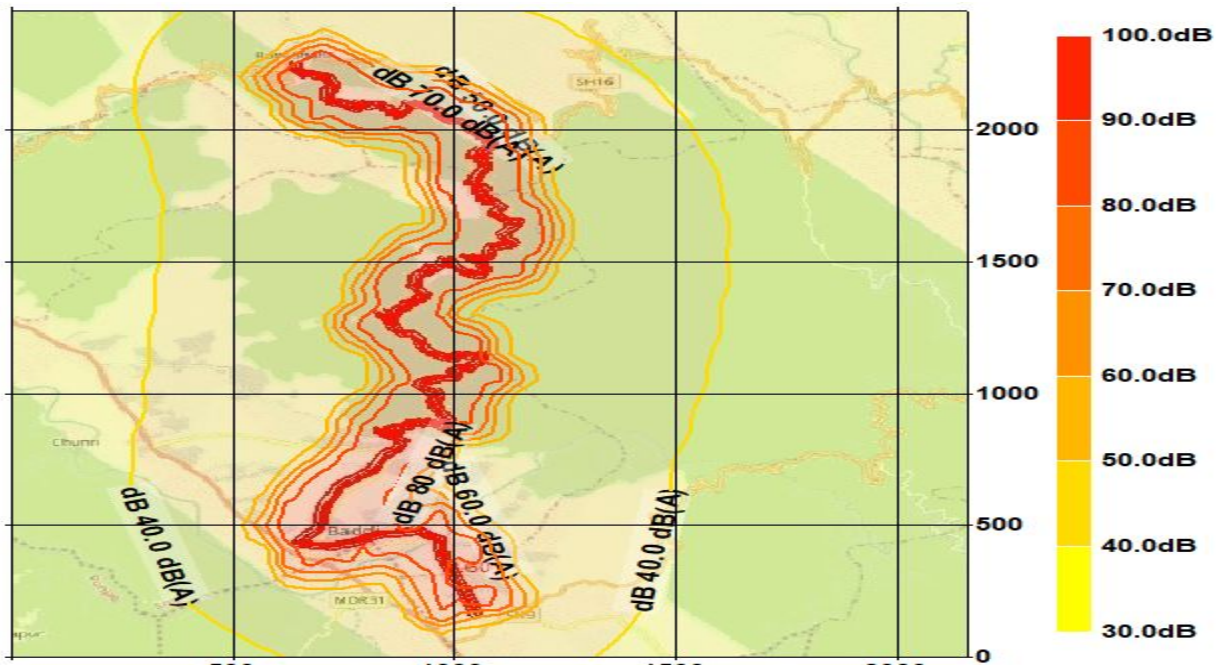


Figure 6.6:- Contour map showing noise levels due to total traffic outcome at the Barotiwala – Baddi – Sai - Ramshahr Road (MDR7) stretch for the year 2038

215. **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 located 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 9 most warranted out of total 13 locations. The details of the noise barrier design are provided in **Error! Reference source not found.**.
- 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 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.

Table 6.9: 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

6.4 … relating to Community Health and Safety (ESS 4)

6.4.1 Occupational Health and Safety

Transport and accessibility

216. The project road is 34 km in length and intersected by major and minor junctions. In addition, there are accesses (dirt track) that connect house(s) on up-hill and down-hill with project road especially in built up areas and is also the only route available to local people. The road will act as haul road for transporting construction materials along with construction activities will result in blocking of dirt track and 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, hilly/mountainous terrain will provide limited option for manoeuvring, 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.

217. There are 31 major settlements en-route this hilly and mountainous corridor, including major settlements such as Baddi, Sai, Taller and Ramshahr village. These villages 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:
    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.

218. **Mitigation measures:** 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 acceptance. The CESMP will include a detailed explanation of how the contractor will comply with the project's safeguard documents and demonstrate that sufficient funds are budgeted for that purpose. It will include Management Strategies and Implementation Plans (MSIPs) for: (i) work activities; (ii) traffic management.

219. The C-ESMP shall be approved prior to the commencement of construction activities. The approved C-ESMP shall be reviewed, periodically (but not less than every six (6) months), and updated in a timely manner, as required, by the Contractor to ensure that it contains measures appropriate to the Works activities to be undertaken

Infrastructure and services

220. There are any utility services that are existing along the corridor. This includes 7 transformers, 85 electric and telephone poles, 18km of water supply line, 22km of OFC cable lines, low and high tension transmission line along and crossing the road. The average offsets of these utility services from existing centre-line range from 3 to 15m, 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 community 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.

221. 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

222. The entire alignment of project road is in hilly terrain with conglomerate type of soil, many seasonal streams, springs and high rainfall have been observed along road, which are known primary causes for slope stability and landslide.
223. In addition, anthropogenic activities like deforestation and unregulated hill cuts were identified as one of man-made causes for slope stability and landslide. After geological and Geo-technical site investigation, a total of 25 locations have been identified prone to erosion and landslide. The involvement of hill cutting clubbed with aforementioned factors and road located in high seismic zone (Zone-IV) accentuates high risks nature of project road and potential impacts on building/assets/properties/farmland located on downhill or uphill sides.

Table 6-10: Details of locations prone to slope stability and Landslide

S.No	From	To	Affected length (m)		S.No	From	To	Affected length (m)
1	11+200	11+230	30		14	31+720	31+740	20
2	11+700	11+740	40		15	31+780	31+800	20
3	11+950	12+000	50		16	31+970	32+000	30
4	12+800	12+850	50		17	32+050	32+120	70
5	13+100	13+140	40		18	32+350	32+400	50
6	14+600	14+650	50		19	32+770	32+820	50
7	16+970	16+710	40		20	33+500	33+550	50
8	17+500	17+530	30		21	33+780	33+800	20
9	27+400	27+440	40		22	33+870	33+900	30
10	29+800	29+850	50		23	36+000	36+050	50
11	30+300	30+380	80		24	36+150	36+180	30
12	31+000	31+050	50		25	36+930	36+950	20
13	31+550	31+600	50					

224. **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 6.11

Table 6.11: 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, bio-engineering measures 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 .

- Provisions made for the bioengineering interventions 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's among others.

Table 6.12: Bio-Engineering measures for slope stability and erosion control for project road

S.No	Chainage	DESCRIPTION OF WORKS
2a	14+200 to 44+700	Hill side: large stature grass plantation alongside 4m breath. Valley side: 2 rows brush layering and grass seed sowing. Fascine 5 % of Brush Layer (BL)
2b	14+200 to 44+700	Hill side: large stature grass plantation. Valley side: 2 rows brush layering and grass seed sowing. Fascine 5 % of Brush Layer (BL)
3		Protection and conservation of 8 ponds each having (10m*10m) 100 sqm area. Plantation of large stature grass on all sides of pond 2 m high. Hedge row plantation at edges on all 3 sides
4		Pilot sites
4a	18+550 to 18+580	Bamboo Crib Wall (BCW) 30 m and 5 layers; Bamboo plantation100 sq m area for each bamboo. Large stature grass plantation in remaining area, Shrub Plantation in plains with tree guard, Tree plantation in plains with tree guard
4b	25+500 to 27+500	Hedge Row Plantation (HRP-) 2000 m
4c	31+950 to 32+00	Bamboo Crib Wall (BCW) 50 m 5 row; Hedge Brush Layer (HBL) 50m, 5 row
4d	32+840 to 32+870	Brush Layer (BL) 4 row; grass row 5 layers, 5 plants per RM
4e	43+800 to 43+840	Large stature grass slip plantation, hydro seeding
4f(i)	43+370 to 44+600	Large stature grass slip plantation, Jute netting
4f(ii)	43+370 to 44+600	4 layers Brush Layer(BL)
4g	44+100 to 44+120	Bamboo Crib Wall (BCW) 5 row; Hedge Brush Layer (HBL) HBL 4 row; Fascine 2m long, 3 nos; Palisade 2m

Hazardous and non-hazardous wastes

225. 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.
226. During the complete construction phase, an estimated 204 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.

Table 6-13 : 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	6	15	4	360	36	9.6
Vibratory Roller (2 Tandem + 1 Vibro) - Minimum 8-10T static Weight	3	12	4	144	14.4	4.8
Pneumatic Road Roller - 200-300KN Cap.	2	10	4	80	8	3.2
Smooth Wheeled Roller - 8-10T Cap.	2	15	4	120	12	3.2
Tipper - 5.5 Cum Cap.	30	15	4	1800	180	48
Water Tanker - 6 KL Cap.	5	15	4	300	30	8
Tractor-Trolley - 50HP Cap.	5	10	4	200	20	8
Rock Excavator/Ripper - 60 Cum/hr Cap.	2	12	4	96	9.6	3.2
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
Mini smooth wheeled roller - 3-5T Cap.	4	12	4	192	19.2	6.4
Air Compressor - 170-250 cfm Cap.	8	10	4	320	32	12.8
Plate Compactor	4	15	4	240	24	6.4
Transit Mixer - 3-4.5 cum per hr Cap.	10	15	4	600	60	16
Cranes 60-80 T – capacities, with telescopic arm of Min 25 m length	2	15	4	120	12	3.2
	97			5392	539.2	155.2

227. During the construction phase, the generation of municipal solid waste is estimated 72 kg per day, as shown in following table which is to be stored and disposed off safely.

Table 6.14: Estimated Solid waste Generation during Project Construction Phase

Category	Nos	Kg per day	Quantity Kg	Solid Waste (Peak)	Average	Lean
Supervison staff	50	0.25	12	12	6	2
Non local at camp site /Migrant	240	0.25	60	60	30	11
Total Municipal Solid Waste in Kg during Construction phase			**72**	**72**	**36**	**13**
Organic Waste (40%)			29			
In organic Waste (60%)			71			

Mitigation Measures:

228. 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 facilitates 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.

229. 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 Barotiwala BBN and Solan.

230. Waste management and the minimisation 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

231. The vulnerability status of the Solan district as a whole is moderate in terms of landslides, floods, and earthquake. However, the impact due to construction of 34km 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 may be 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.
232. 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)

233. The data related to likely loss due to improvement of the road has been collected through detailed social survey. On the basis of Social Impact Assessment for project road, the categories of impact has been finalised for the collection of likely impact data. The categories includes:
    1) Structure (Private, Encroachments) - Residential, commercial and Squatters (residential, commercial and Residential –cum- commercial);
    2) Common Property resources (School, College, religious structures, bus shelter/bus stand, borewell and Hand pump.

234. An attempt has also been made to find out the extent of land to be required for the up-gradation of roads. As per the information provided by PWD and revenue officials, there is no land acquisition from private sources

235. The total numbers of families surveyed are -22 and the CPR structures are 17 under the proposed impact zone within the corridor. The project will have very marginal impact on religious institution like temples etc. These data will be useful as referencing point at the time of detailed preparation of RAP.

Table 6.15 : Likely Impact of the project on structures, CPRs and estimated Land Acquisition

Impact Category	Likely Impact
Titleholder Residential	
- Residential	7
- Commercial	1
- Residential + Commercial	0
- Others (Compound Walls, Sheds)	0
Non-Titleholder – Encroachments	
- Residential	6
- Commercial	9
- Residential + Commercial	0
- Others (Compound Walls, Sheds)	0
- Squatters	0
Sub-Total	23
Common Property Resources	

Impact Category	Likely Impact
School	2
Religious	3
Bus Stand/Rain Shelter	1
Health Center	0
Hand Pump	5
Others (Retaining Walls, ATM, Toilets, Compound Walls, RW)	6
Total	17
Vulnerability/Vulnerable Household	7
Schedule Caste	6
Schedule Tribe	1
Women headed Household	0
Below Poverty Line	0
Orphane	0
Destitute	0
Transgender	0

236. During construction stage, land to tune of 0.8 to 1.5ha is anticipated to be required to establish construction camps, material stack yards, hot mix plants & machinery. 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.

237. 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.

238. **Mitigation Measures**: Impacts on land and assets arising pre-construction stage activities will require to be addressed and mitigated 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 mitigation provisions. The mitigation provisions broadly includes as per entitlement matrix available in Resettlement Policy Framework of the project. Those includes:1) compensation at full replacement cost for losses of assets attributable directly to the project;2) assistance (such as shifting allowance, transition allowance, economic rehabilitation grant etc.) during relocation;3) support after displacement, for a transition period, to restore their livelihood and standards of living; and 4) provide with development assistance in addition to compensation measures, such as credit facilities, training, or job opportunities. The RAP also has the sections for implementation schedule, M&E and grievance redressal arrangements. 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.

239. 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)

Forest

240. The project road at four stretches passes through protected demarcated forest area. In order to accommodate propose road road widening and improvement, additional land width will be required to tune and would involve diversion of 1.512 Ha is estimated, which may increase or decrease depending on final road design and verification of ownership.

Table 6-16 :- Forest locations long the project road

S.No	Forest Name	Forest type	Side	From	To	Trees	Length (m)	Area (Sqm)
1	Dharampur	DPF	LHS	12/775	12/825	0	50	98
			Both sides	12/860	13/000	2	140	542.98
			Both sides	13/100	13/400	16	300	1206.906
			Both sides	14/170	14/370	0	200	809.937
2	Retwali	DPF	Both sides	17/250	19/010	46	1760	7220.278
3	Talli	DPF	Both sides	27/850	29/160	100	1310	5223.937
4	Bhalawa	DPF	Both sides	31/580	32/250	30	670	2681.08
Total						**194**	**4430**	**15125.295**
Note: The number of trees and forest land area for diversion is likely change after joint verification of ownership, in progress, for above road stretches.								

241. **Mitigation Measures:** This include

- As per existing environmental regulation, diversion of forest land from Demarcated Protected Forest will attract the provision of Forest (Conservation) Act and hence forest clearance would be required for acquisition of forest land. HPRIDC after finalisation of alignment shall submit application for obtaining Forest Clearance and all the conditions stipulated in the forest clearance will be complied with during construction.
- The civil works at these four stretches of road shall only commence after obtaining forest clearance.
- No construction Plants, construction camp or borrow area will be located in the road stretch along the Protected Demarcated Forest.
- The contractor will take all precautionary measures in the forest stretch to avoid any incidence of forest fire.

Impact on Flora

242. The 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 like *Ageratum conyzoides, Eupatorium adenophorum, Lantana camara, Parthanium hysterophoros.* Consultation with forest department, GoHP informed past effort for management of these weeds, through mechanical/ cultural and chemical methods. Most of the past efforts have not yielded desired results due to lack of focus on long-term follow up system. The ecological investigations have indicated that there are no rare, endangered and threatened species with in the corridor.

243. A total of 1766 trees has been enumerated within existing right of way, though not all are likely to be affected due to propose 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 the permissions for tree felling, the forest department will stipulate planting of 3 saplings for every tree cut and maintenance of the same for five years with 70% survival rate. The species wise list of trees falling with in the corridor of impact is given in Table 7

Table 6-17: List of trees with common and botanical name along the project road

S. No.	Common / Local Name	Botanical Name	S. No.	Common / Local Name	Botanical Name
1	Chhal	Anogeissus latifolia	19	Karaunda	Carissa spinarum
2	Jhingan	Lannea grandis	20	Dhavi	Woodfdordia fruticosa
3	Siris	Albizzia lebbek	21	Kathi	Indigofera pulchella
4	Simal	Bombax ceiba	22	Gandhela	Murraya koenigii
5	Pula	Kydia calycina	23	Bassuti	Adhatoda vasica
6	Amaltas	Cassia fistula	24	Keor	Hollarrhena antidysentrica
7	Chamrour	Ehretia leavis	25	Bhabar	Eulaliopsis binata
8	Sandan	Ougeinia ougeinensis	26	Mokora	Heteropogon contourtus
9	Kaimb	Mitragyana parviflora	27	Dub	Cynodon dectylon
10	Kangu	Flacourtia indica	28	Dhautu	Chrysopogon montanus
11	Khair	Acacia catechu	29	Lamb	Cymbopogon spp
12	Jamun	Syzygium cumini	30	Munj	Erianthus munja
13	Chilla	Cascaria tomentosa	31	Tour	Bauhinia vahlli
14	Amla	Emblica officinalis	32	Sarali	Pueraria tuberosa

S. No.	Common / Local Name	Botanical Name	S. No.	Common / Local Name	Botanical Name
15	Kachnar	Bauhinia variegeta	33	Kairinghan	Caesasalipiana sepiara
16	Kambal	Mallotus philipppinensis	34	Kurar	Acacia pennata
17	Dhak	Butea monosperma	35	Belkangu	Clematis gouriana
18	Harsingar	Nycanthes arbotrtis	36	Dhudi	Cryptolepsis buchanan

244. 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 with in 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.
- 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

245. There is no National Park or wildlife sanctuary with in 10km from the project corridor. The biodiversity investigation along the project corridor has not indicted presence of Monitor Lizard (*Varanus Bengalensis*) and common peafowl (*Pavo Cristatus*) comes under Schedule-I (part-II) category of Wildlife Protection Act, 1972. In addition, during consultation with local informed about Leopard crossing near Bepar Bissian village (Km 32 to Km 35), though Forest Department didn't have any information on wildlife crossing along the corridor.

246. 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.
- 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.
- 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 wild animals under any circumstances
- Work force shall be strictly prohibited like hunting of wild animals like wild boar etc., either for consumption or for pleasure.
- 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. Atleast 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)

247. The corridor does not have any schedule V areas. Though it has 10-15[8] tribal households might be impacted across the 34 km corridor these households are well mainstreamed into the general population and society and do not meet the characteristics outlined in ESS 7[9].

248. Mitigation measures: Hence no differential provisions will be required to address the impacts on these 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)

249. 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.

250. However, 3 religious structures/shrines are expected to be partially impacted by the proposed road improvement activities. These have been identified through surveys and stakeholder consultations. Extent of impact including on access on these structure, could vary depending on the final designs during preparation and potential modifications during construction stage. Impacts will be addressed through a Cultural Heritage Management Plan as part of ESMP. The cultural heritage management plan will include:

i. a chance finds procedure to be established
ii. 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
iii. fair and equitable sharing of benefits from commercial use of cultural resources
iv. 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

251. 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.

252. The right of way of the project road has 9 sensitive receptors like schools, hospitals, religious structures temples, etc.

253. 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 8 locations to attenuate the noise levels due to anticipated increase in the traffic after the upgradation of project road. The details of the locations where noise barriers have been considered as a mitigation measure is given in Table .

[8] Exact number of affected tribal households will be known after the finalization of designs and field verification of impacted households

[9] characteristics as outlined in ESS 7 – Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities

254. 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.

Table 6-18: Mitigation measures for 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	Health Dispensory	25+780	LHS	Yes	Noise Barrier	20 m long, 3m Height, 300mm thickness

CHAPTER 7 – KEY MEASURES AND ACTIONS FOR ENVIRONMENTAL AND SOCIAL COMMITMENT PLAN (ESCP)

255. This section summarizes the key issues and presents a list of issues, actions and measures that need to part of the ESCP. Key issues and findings:

i. Verification of land ownership at four stretches of road passing through forest area.
ii. The environmental issues highlighted by communities are related to drainage, road safety, drying of spring, protection and maintenance at landslide locations, safety concern at dump sites.
iii. Managing of construction water demand in absence of perennial water sources.
iv. Most negative social impact identified by community members was the potential for loss of land to project interventions.
v. Majority of stakeholders consulted, the benefits of the project outweigh impacts from minor losses of land.
vi. Gaps exist in the provisions in policies between government acts/policies and World Bank's ESS
vii. Institutional arrangement to address E&S aspects are currently relatively weak and need significant strengthening
viii. GRM is decentralized and ad-hoc and requires systematic recording of grievances and redressal

256. 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. develop clear procedures for the land acquisition and determination of compensation/ transactions are carried out in transparent manner and satisfactorily documented;
iii. describe the policy, institutional and implementation framework to guide the compensation for loss of land and assets and ensure that no affected land is displaced without proper consultation and compensation;
iv. develop mechanisms to foster greater participation of more passive members of the community, including disadvantaged persons, women and vulnerable groups;
v. 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. More specifically, to facilitate community outreach and project information dissemination, as well as to enhance the knowledge of communities about entitlements to mitigate adverse social impacts, an information pamphlet in the local language summarizing the key principles of voluntary land donations and entitlements presented in the RPF, will be distributed to each village impacted by project interventions.
vi. to coordinate with forest department and verify the ownership of land over road is existing at four stretches of road traversing forest area and early resolving of the matter by processing of application for Forest Clearance, if needed.
vii. The road design to explore mitigation options for environmental concerns highlight by communities and its integration in EMP.
viii. Environment and Social impact management training modules needs to be prepared and will be delivered early in project implementation to build capacity of the project staff.

257. Key measures and actions and the timeframe required for the project to meet the requirements of the ESSs are as follows

By Appraisal

i. 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.
ii. HPRIDC to provide draft consolidated ESIA.
iii. Disclose Draft Consolidated Environment and Social Impact Assessment (ESIA) for the road corridors on Department website and WB portal
iv. Disclose Draft Stakeholder Engagement Plan
v. HPRIDC to prepare Resettlement Policy Framework for the overall project including rehabilitation and maintenance corridors
vi. HPRIDC to disclose approved RPF on its website
vii. disclosure of the approved ESCP

By Project Negotiations

viii. Disclose draft corridor specific ESMP (EMP, RAP, TDP, SEP, GBV Plan)
ix. HPRIDC to develop and include the project grievance mechanism in SEP
x. Wherever land parcels are required, HPRIDC should initiate acquisition proceedings using the RFTCLARR Act 2013 and simultaneously also form price fixation committees to conduct private negotiations as per the GoHP Financial Commissioner, Standing Order No. 28 so that loss of time can be avoided in case there is/are hold ups from the landowners

Table 8.1 – Plan documents to meet relevant ESS requirements

ESS 1	EMP and ESMP	By January 2020
ESS 2	Labor Management Procedure for HPRIDC[10]	By January 2020
ESS 3	Waste Management Plan & Pollution Prevention Management Plan	By January 2020
ESS 4	Emergency Response Plan & GBV Mitigation Plan	By January 2020
ESS 5	Resettlement Action Plan	By January 2020
ESS 6	Bio-diversity Management Plan (To be determined[11])	By January 2020
ESS 7	Not applicable	
ESS 8	Cultural Heritage Plan (will be included as part of the ESMP)	By January 2020
ESS 9	No Plan needed as no financial intermediaries are involved	
ESS 10	Draft Stakeholder Engagement Plan	By December 2019

This will be used in developing the Environmental and Social Commitment Plan (ESCP).

[10] Labor Management Procedure shall be applied by HPRIDC for all upgradation and maintenance roads

[11] Settlements en-route have reported Leopard movement; details are being gathered to confirm the same and shall be used to prepare Biodiversity Management Plan, if required.

LIST OF APPENDICES