# Himachal Pradesh State Roads Transformation Program

(Funded by World Bank)

## Dadhol-Ladrour (Km 0.00 to KM 13.500)

## Environment and Social Impact Assessment

## (Draft)

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**(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 |
| 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 |
| SDO | Social Development Officer |
| 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– Dadhol-Ladrour

3. The Dadhol-Ladrour road is 13+500 Km and is designated as OSR-9 (Other State Road) is one of the four priority corridors proposed for upgradation. The project road traverses entirely within Bharari tehsil of Bilaspur district and connects to SH-32 at Ladrour end and also to National Highway (NH-103) at Dadhol. The altitude of project corridor ranges between 697-981 m above mean sea level. The existing width of carriage way (bitumen paved width) of the project road varies between 3.0 m to 3.3m in rural areas and varies between 5.0 mtr to 7.1 mtr in settlement/built-up areas. The existing pavement condition of the project road is in distress condition at several intermediate stretches, except for initial stretch of 3 kms. Other aspects observed included: severe cracking, patching & potholes, besides which the current Pavement condition surface is bad and undulations are predominant.

4. There are 15 settlements along the project road. Some of the big settlement areas along the project road are Padyalag, Gahar, Gatwar, Ladhyani, Bharari, Mihara and Ladrour. These locations do not have any schedule V areas or tribal households. 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."***

5. 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 consultant. 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.

6. 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

7. 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. In addition, the project will be implemented within the framework of all applicable labor laws of GoI. 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

8. The proposed project is located in District Bilaspur of Himachal Pradesh state. The baseline E&S profile of project influence area covering 15 km radius of the project as well as Bilaspur district. The project road lies in the range of 248-1141 m. The maximum and minimum elevation of the project road is 981m at km 13+300 and 697 m at Km 0+900. The project road traverses majorly along agricultural lands. Millets are the most dominant agricultural crop, which can also be seen in cultivable lands along the project road. The climate of the district is temperate to sub- tropical. The project road falls within the jurisdiction of Bilaspur division, but there are no forest areas along the 13.5km long Dadhol-Ladrour road. There are no National Parks, Wildlife Sanctuaries, Biosphere Reserve and any other notified sensitive area within 15km on either side of the project road. Further, no wildlife crossing corridors are reported along the project corridor.

9. The project road passes through 15 villages of Bharari sub-tehsil (administrative unit) and the adjacent tehsil is Ghumarwin tehsil. Socio-economic data from secondary sources has been collected and analysed from Bharari sub-tehsil and Ghumarwin tehsil and it has been called as "project influence area". The total population of Bilaspur district with 381,956 comprising 192764 (50.46%) males and 189192 (49.53%) females, shows that the male population is nearly equal to the female population. Out of the total population of the district 93.42 per cent are in

rural areas while mere 6.58 per cent are in urban areas. The male and female ratio of the district is 981 females per every 1000 males. It is higher than the national average. As per census 2011, the average sex ratio of India was 940 females per 1000 male. Among the total population of district, 2.8% (10693) are Scheduled Tribes, 25.92% (98,989) are Scheduled caste population and 71.28% (272274) people belong to other castes. Among the total population, 84.59% of the people are literate and 15.41% of the people are illiterate excluding the 0-6 age group population. This shows that most of the population is literate. Among the literates 91.16% are males and 77.97% are females. This shows that the male literates are more than the female literates. The project influence area/district had an average family size of 4.7 persons per household on 2011. This is moderate family size and comparable with the other part of the district. The density of population of the project influence area/district works out to about 327 persons per $km^2$ in the district.

10. In respect of socio-economic profile of the affected families, 136 families were surveyed. Most of the households are staying along the roadside from a long time where in nearly 78.03% of them are living since more than 10 years. About 21.97% of them are found to have settled in the last 5-10 years.. Analysis on literacy level of the head of the affected household shows that all of them are literates except around a negligible percent 12.12 percent is illiterates. The average household size for the project affected population is 3.6. The work participation rate is 37.26 per cent in the study area is higher than the national work force participation of 39.1 per cent. Distribution of occupation wise details shows, most of them are engaged into commercial activity of trade/business, petty shop, services (44.69 %) followed by agriculture, non-agriculture labour (24.24%), household industries consists 0.76 percent. The incidence of Govt. Employees, Private Employees and Others is around 16.67 percent, 13.64 percent respectively. The income levels of majority of the households fall under higher middle-income category earning more than Rs. 4,00,000 per annum (81.77%). The incidence of lower-income families is about 3.32 percent who earn below 1,80,000 per annum. About 7.5 percent of them are middle income families who are earning Rs. 1,80,000 to 4,00,000 per annum. The expenditure pattern of the affected household's show that majority of them have an average monthly expenditure above Rs.30,000 per month.

11. Of the total female population, around 50 percent populations are in the age group between 15-40. Around 23 percent women population is in the age group of 6-14. There are 4.63 percent women population is in the age above 60. It can be seen from the following table that of the total female population those who are in the age group above 6, are 2.14 percent are illiterate. There are 32.56 %, 15.60%, 18.64% and 14.21% are primary, middleclass, SSC and pre-university educated. Around 7.26 % are degree holder. There are 6.34% and 3.25% are technically qualified and post graduate degree holder. In respect of occupation, there are about 72.32% of women member engaged in cultivation. Only 4.24% of women members are involved in other activities, 65.25% women are involved in collection of water, 21.21% are engaged as an agricultural labors. 13.74% are helping their family members in trade and business. Only 5.25% women are in service and merely 20.81% of women are worked as allied activities.

## 6.0 Stakeholder Consultations

12. Consultations were also held with communities at various locations en-route and also specifically at locations where common property resources were getting affected. Consultations were also held with communities at various locations en-route and also specifically at locations where common property resources were getting affected. Key queries and concerns were relating to: what compensation will be paid to title holder and non-title holders; avoidance of impacts on CPRs such as temples used for various religious and community purposes; project authorities to consider available open land wherever it was available instead of impacting their house and land;

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

## 7.0 Analysis of Alternatives

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

## 8.0 E&S Risks and Impacts

14. 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.

15. 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. Based on the survey, the Project shall affect 48 vulnerable households – 45 (Scheduled Caste) and 3 (Scheduled Tribe).

16. 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. At this stage, it is estimated that the project will require to engage 560 labor (including project managers, supervisors, labor, etc.) 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.

17. 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 (2 locations); blocking or filling of springs and seasonal streams (3 number); construction water demand (26.7 million Liters); stressing water sources used by community (absence of perennial water sources); emission from construction vehicles, equipment and plants; dust from earth works, hill cutting, stack yard, transportation of materials;, noise pollution (2 schools) and settlements along road; damage to structure vibration from movement of machine and equipment (structure on embankment); handling of hazardous and non-hazardous wastes, quarry and borrow area. 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.

18. 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, landslides, road excavation, use of vibratory equipment, construction debris handling and disposal etc. during construction; ii) high likelihood of direct exposure to increased construction related traffic and equipment especially at road sections traversing settlement area with limited carriageway/roadway width, and sensitive receptors such as schools, religious place, health centre/hospitals; iii) high dust levels from earthworks/hill cutting, high noise and emission level from traffic congestion and idling of vehicles; iv) influx of migrant workers could potentially cause local discomfort or potential conflicts with local people including possible Gender based violence.

19. E&S risks and impacts on land & assets (ESS 5): As per the available right of way information provided by PWD units and revenue officials there is no additional land that needs to be taken. The total numbers of families affected are 136– all of which are non-titleholder encroachers. These structures of these affected families are mainly residential, commercial and mix of residential and commercial, besides others such as cattle sheds, etc. In addition, there are 48 CPRs that comprise Schools (3), Religious structures (4), and Hand Pump (29). These also comprise 6 vulnerable households comprising 1from Scheduled Tribes (ST) and 5are from Scheduled Caste (SC) categories.

20. E&S risks and impacts relating to Bio-diversity & Living Natural Resources (ESS 6): There are no presence of rare, endangered and threatened flora species along project road. However, invasive species like *Ageratum conyzoides, Eupatorium adenophorum, Lantana camara, Parthanium hysterophoros* are observed, which are being managed through Forest Department, GoHP. The construction of road is likely to affect 75 of 3614 trees existing within right of way. No rare, endangered and threatened floral species are identified within the corridor. Monitor lizard (*Varanus bengalensis*) was observed along the road, which is listed under Schedule-I (part III) of Wildlife Protection Act-1972. The biodiversity investigation along the project corridor has not indicted the presence of any scheduled fauna. Hence, the project road construction is not likely to cause any impacts on the fauna.

21. 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, 1 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.

22. 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

23. 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

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

25. 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 documents - ESMP (EMP, RAP) and GBV Plan 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.**

4. 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.

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

## 1.2 Sub-Project Road – Dadhol to Ladrour

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

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

| S.No | Name of the Road | District | Length (in Km) |
|---|---|---|---|
| 1 | Baddi – Sai – Ramshahr | Solan | 35.950 |
| 2 | Dadhol – Ladrour | Bilaspur | 14.500 |
| 3 | Mandi – Rewalsar – Kalkhar | Mandi | 28.000 |
| 4 | Raghunathpura-Mandi-Harpura- Bharari | Bilaspur | 2.500 |

7. The Dadhol-Ladrour road is 13+500 Km and is designated as OSR-9 (Other State Road). The project road traverses entirely within Bharari tehsil of Bilaspur district and connects to SH-32 at Ladrour end and also to National Highway (NH-103) at Dadhol. The latitude of the project road at Dadhol and Ladrour are 31.29'.52" N to 31.34'.22" N respectively and Longitude is 76.29'.52" E to76.40'.07" E respectively. The altitude of project corridor ranges between 697-981 m above mean sea level.


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

8. There are 15 settlements along the project road. Some of the big settlement areas along the project road are Padyalag, Gahar, Gatwar, Ladhyani, Bharari, Mihara and Ladrour. Out of the total 13.5 km length, the built-up areas of the settlements extend to 4 km, which is about 30% of the road length.

9. The existing width of carriage way (bitumen paved width) of the project road varies between 3.0 m to 3.3m in rural areas and varies between 5.0 mtr to 7.1 mtr in settlement/built-up areas. The existing pavement condition of the project road is in distress condition at several intermediate stretches, except for initial stretch of 3 kms. Other aspects observed included: Severe Cracking, Patching & Potholes, besides which the current Pavement condition surface is bad and undulations are predominant.

10. The available right of way for the project road varies between 12m to 18m, with minimum being 12m and maximum upto 25m. Thus, available right of way is adequate for the proposed widening scheme and no fresh land (either private or Govt land) is required to be acquired for the project road.

11. The project road has 10 bus stops that are also locally known as rain shelters. Under the project widening scheme, all the bus stops/rain shelters will be remodeled to provide cross ventilation as well as to prevent entry of stray animals into the bus stop and these will be reconstructed with bio-toilet provision.

12. 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. The project road has 10 bus stops between Km 0 to Km 13.5 and these are also locally known as rain shelters. Under the project widening scheme, all the bus stops/rain shelters will be remodeled to provide cross ventilation as well as to prevent entry of stray animals into the bus stop and these will be reconstructed with bio-toilet provision.

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

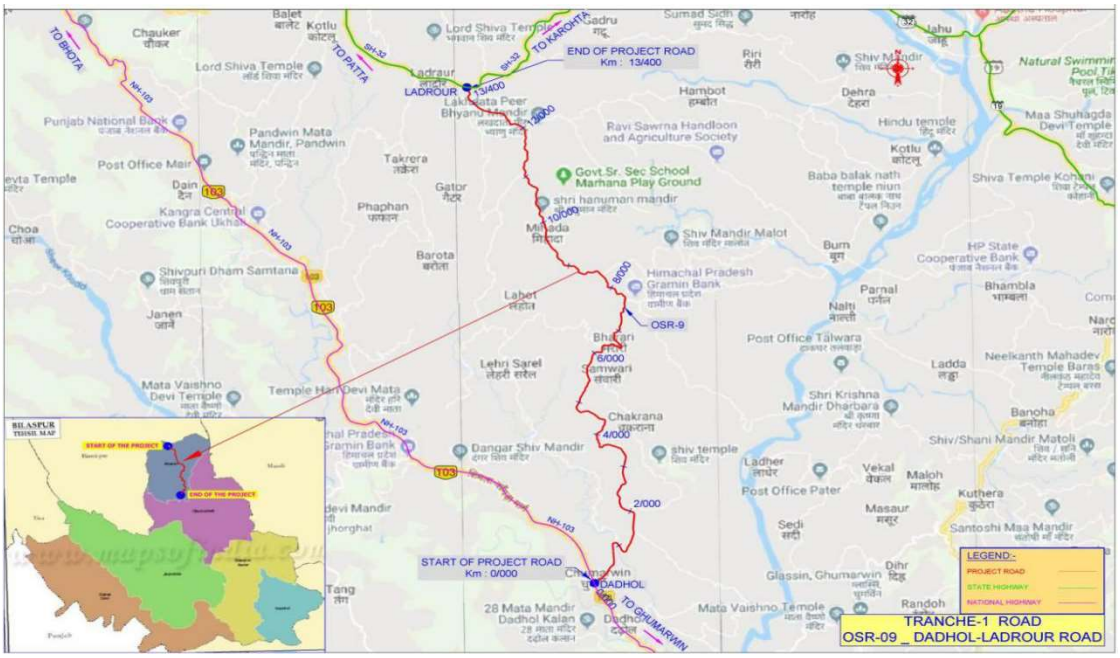



**Figure 1.2: Map indicating Dadhol - Ladrour Road**

14. 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.

15. 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[1]: 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.

16. 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.

17. 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[2] |
| 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 (Not applicable ) |
| ESS 7 | Indigenous-Peoples (Not applicable ) |
| ESS 8 | Cultural Heritage Plan (will be included as part of the ESMP) |
| ESS 9 | No Plan needed as no financial intermediaries are involved |
| ESS 10 | Stakeholder Engagement Plan |

## 1.3 Purpose of ESIA

18. 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.

19. 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

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

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

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

20. 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;

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

21. 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.

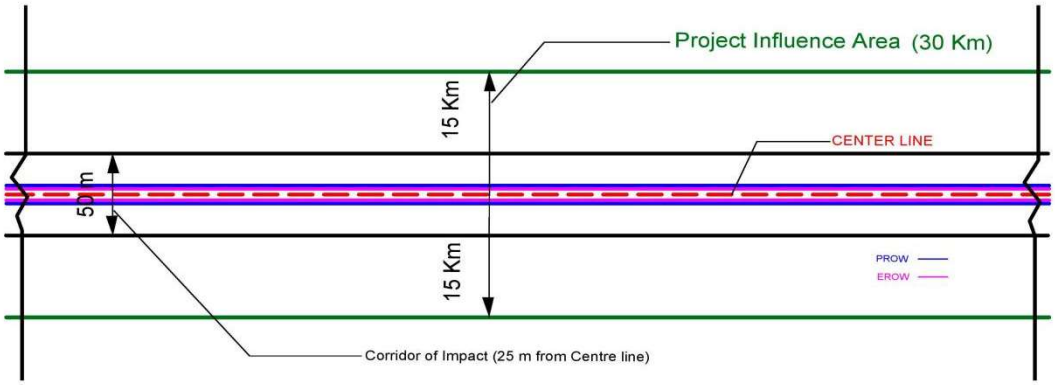



**Figure 1.3: Corridor of Impact and Project Influence Area**

22. 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.

23. 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.

24. 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.

25. 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. Based on baseline information impacts were identified and mitigation measures selected. Any actions required at later stage of the project is captured in Chapter 7, which will be reflected in ESCP. (See Appendix 9 :- Inventory Checklist and Environmental Screening Formats)

26. 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.); | Social impact (Land/EROW, Structure, CPR) |
| | Neighbouring communities; Disadvantaged and vulnerable Groups (women, children, person with disability, old age);Employees and Managers (Project Managers, Site Engineers, technicians, supervisors, safety staff, multipurpose staff); | Social Concern (Road Safety, accident spots, critical Junctions) |
| | Village panchayat members/ local NGO's and Community Organization | Rural Roads (Slow moving vehicles, importance of the road, Fair/Festival |

| Table 1.3 – Tools of Consultations | | |
|---|---|---|
| **Tools of Consultation** | **Stakeholders** | **Purpose** |
| | | Traffic; Environmental improvement Social Concern (Road Safety, accident spots, critical Junctions; role in the area) |
| | Community workers, Sarpanch, ANMs etc. | Social Concern (Road Safety, accident spots, critical Junctions) |

27. 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.

28. 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.

29. 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.

30. 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

31. 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

32. 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 other district road and it does not fall under the category of state Highway (7f of the schedule, EIA notification) and thus is outside the preview of EIA, 2006 Notification).<br>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. | No. |
| 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. | Yes, permission is needed for cutting 75 affected trees. |
| 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) |

| Table 2.1 Summary of Applicable E&S Regulations of GOI/GoHP | | | |
|---|---|---|---|
| **S.No.** | **Act / Rules** | **Key provisions and purpose** | **Applicability to 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) Act 1957 | For opening new quarry. | Yes (During construction only, if any new quarries are opened, contractor shall avail the permission/license from competent agencies) |
| 13 | The Ancient Monuments and Archaeological Sites and Remains Act 1958 | Conservation of cultural and historical remains found in India | No |
| 14 | National Resource Efficiency Policy, 2019 (Draft) | To create a facilitative and regulatory environment to mainstream resource efficiency across all sectors by fostering cross-sectoral collaborations, development of policy instruments, action plans and efficient implementation and monitoring frameworks. | Yes (During construction Phase) |
| 15 | Municipal Solid Waste (Management & Handling) Rules, 2000 (MSW Rules) | Segregation, Handling & safe disposal of domestic solid waste | 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.) |

| Table 2.1 Summary of Applicable E&S Regulations of GOI/GoHP | | | |
|---|---|---|---|
| **S.No.** | **Act / Rules** | **Key provisions and purpose** | **Applicability to Project Road** |
| 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) |
| 20 | Public Liability and Insurance Act 1991 | To provide through insurance, immediate relief, by you who control or handle hazardous chemicals.<br>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) |

| Table 2.1 Summary of Applicable E&S Regulations of GOI/GoHP | | | |
|---|---|---|---|
| **S.No.** | **Act / Rules** | **Key provisions and purpose** | **Applicability to Project Road** |
| 25 | State Groundwater Acts and Rules | These provide for regulating extraction of ground water for construction/industrial and drinking and domestic purposes. | Contractors will need to obtain permission from Central/State Groundwater Boards prior to groundwater abstraction through either new/existing tube well or through any other means; and will to ensure full compliance to all applicable rules and any conditions imposed in the permit by competent authority. |
| 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.<br>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<br>i) Acquisition by private negotiation.<br>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 infrastructure; iii) raise any permanent, temporary or movable structure on or from road infrastructure; | Applicable to all roads in HP specifically to address the issue of encroachments |
| 31 | The Himachal Pradesh roadside land control act 1968 | Act has provisions for restriction on buildings etc., in a controlled area no person shall erect or re-erect any building or make or extend any excavation or lay out means of access to a road in a controlled area. | Applicable to all roads in HP specifically to address the issue of encroachments |
| 32 | The Right to Information Act, 2005 | The Act provides for setting out the practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, the constitution of a Central Information Commission and State Information Commissions | Applicable to the project as a whole. |

| Table 2.1 Summary of Applicable E&S Regulations of GOI/GoHP | | | |
|---|---|---|---|
| **S.No.** | **Act / Rules** | **Key provisions and purpose** | **Applicability to Project Road** |
| | | and for matters connected therewith or incidental thereto. | |
| 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 for those who are physically challenged |

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

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

| Table 2.2 – Relevance of World Bank E&S Policy, ESS, Directive and guidance notes to the sub-project | | | |
|---|---|---|---|
| **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 project workers with accessible means to raise workplace concerns. | Requirements for the Borrower to prepare and adopt labor management procedures. Provisions on the treatment of direct, contracted, community, and primary supply workers, and government civil servants. Requirements on terms and conditions of work, non-discrimination and equal opportunity and workers organizations. Provisions on child labor and forced labor. Requirements on occupational health and safety, in keeping with the World Bank Group's Environmental, Health, and Safety Guidelines (EHSG). | Project will following types of workers:<br>i) Direct workers will include the project managers and supervisors, who are employees of HPRIDC, deployed for HPSRTP; ii) All the work force deployed by the Contractors and the Project Management Consultant (for all packages) under the HPSRTP will be deemed to be contracted workers. The Contractor(s) might further engage multiple subcontractors; iii) Influx of migrant labor from other states for construction works has been a norm in the state and is likely to continue in this project; iv) Community workers may be employed by the contractor in relation to this Project from local sources particularly for supporting bio-engineering solutions towards slope stabilization workers. |

| Table 2.2 – Relevance of World Bank E&S Policy, ESS, Directive and guidance notes to the sub-project | | | |
|---|---|---|---|
| **World Bank ESS Policy, Standards, Directive** | **Objectives** | **Requirements** | **Relevance & Extent of Relevance to the sub-project/project** |
| **ESS-3**<br>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<br>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.<br>With respect to Pollution Management, based on past road project experiences, the project will develop, as part of the ESA process, prevention and management measures to offset risks and impacts of pollution from potential<br>sources such as dust and emission from operation of hot-mix and batching plants, crushers, construction and haulage<br>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. |

| Table 2.2 – Relevance of World Bank E&S Policy, ESS, Directive and guidance notes to the sub-project | | | |
|---|---|---|---|
| **World Bank ESS Policy, Standards, Directive** | **Objectives** | **Requirements** | **Relevance & Extent of Relevance to the sub-project/project** |
| **ESS-4**<br>Community-Health-and-Safety | Anticipate or avoid adverse impacts on the health and safety of project-affected communities during project life-cycle from routine and non-routine circumstances. Promote quality, safety, and climate change considerations in infrastructure design and construction, including dams. Avoid or minimize community exposure to project-related traffic and road safety risks, diseases and hazardous materials. Have in place effective measures to address emergency events. Ensure that safeguarding of personnel and property is carried out in a manner that avoids or minimizes risks to the project-affected communities. | Requirements on infrastructure, taking into account safety and climate change, and applying the concept of universal access, where technically and financially feasible. Requirements on traffic and road safety, including road safety assessments and monitoring.<br>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, 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;<br>and iv) influx of migrant workers could potentially cause local discomfort or potential conflicts with local people. |
| **ESS-5**<br>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 | 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<br>including structures, trees and crops within existing and proposed ROW is likely. Physical and economic displacement too is very likely. |

| Table 2.2 – Relevance of World Bank E&S Policy, ESS, Directive and guidance notes to the sub-project | | | |
|---|---|---|---|
| **World Bank ESS Policy, Standards, Directive** | **Objectives** | **Requirements** | **Relevance & Extent of Relevance to the sub-project/project** |
| | housing, access to services and facilities, and security of tenure. Conceive and execute resettlement activities as sustainable development programs. | | |
| **ESS-6**<br>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**<br>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, knowledge, and practices of Indigenous Peoples, and to provide them with an opportunity to adapt to changing | 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 3 tribal households might be impacted across the 13.5 km corridor these households do not meet the characteristics outlined in this Standard. Hence no differential provisions will be required to address the impacts on these households. |

| Table 2.2 – Relevance of World Bank E&S Policy, ESS, Directive and guidance notes to the sub-project | | | |
|---|---|---|---|
| **World Bank ESS Policy, Standards, Directive** | **Objectives** | **Requirements** | **Relevance & Extent of Relevance to the sub-project/project** |
| | conditions in a manner and in a timeframe acceptable to them. | | |
| **ESS-8**<br>Cultural-Heritage | Protect cultural heritage from the adverse impacts of project activities and support its preservation. Address cultural heritage as an integral aspect of sustainable development. Promote meaningful consultation with stakeholders regarding cultural heritage. Promote the equitable sharing of benefits from the use of cultural heritage. | Requires a chance finds procedure to be established. Recognition of the need to ensure peoples' continued access to culturally important sites, as well as the need for confidentiality when revealing information about cultural heritage assets that would compromise or jeopardize their safety or integrity. Requirement for fair and equitable sharing of benefits from commercial use of cultural resources. Provisions of archaeological sites and material, built heritage, natural features with cultural significance, and moveable cultural heritage. | The alignment of the project road does not have any ancient monuments and/or archaeological site(s), protected but it has 1 religious structures/shrines of local importance that is partially impacted by the proposed road improvement activities |
| **ESS-9**<br>Financial-Intermediaries | Sets out how Financial Intermediaries (FI) will assess and manage environmental and social risks and impacts associated with the subprojects it finances. Promote good environmental and social management practices in the subprojects the FI finance. Promote good environmental and sound human resources management within the FI. | Financial Intermediaries (FIs) to have an Environmental and Social Management System (ESMS) - a system for identifying, assessing, managing, and monitoring the environmental and social risks and impacts of FI subprojects on an ongoing basis. FI to develop a categorization system for all subprojects; with special provisions for subprojects categorized as high or substantial risk. FI borrowers to conduct stakeholder engagement in a manner proportionate to the risks and impacts of the FI subprojects. | Not relevant as there is no financial intermediary involved. |
| **ESS-10**<br>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 | 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 | 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 |

| Table 2.2 – Relevance of World Bank E&S Policy, ESS, Directive and guidance notes to the sub-project | | | |
|---|---|---|---|
| **World Bank ESS Policy, Standards, Directive** | **Objectives** | **Requirements** | **Relevance & Extent of Relevance to the sub-project/project** |
| | throughout the project life-cycle. Ensure that appropriate project information is disclosed to stakeholders in a timely, understandable, accessible and appropriate manner. | consultation. | |
| Environmental and Social Directive for Investment Project Financing | This Directive applies to the Bank and sets out the mandatory requirements for the implementation of the Environmental and Social Policy for Investment Project Financing (IPF). | It lays down the following responsibilities of the Bank to manage ES risks and impacts as below: a) undertake its own due diligence of the ES risks and impacts related to the Project; b) support the Borrower to engage in meaningful consultation with stakeholders, in particular affected communities, and in providing Project-based grievance mechanisms; c) assist the Borrower in identifying appropriate methods and tools to assess and manage the potential ES risks and impacts of the Project; d) agree with the Borrower on the conditions under which the Bank is prepared to provide support to the Project, as set out in the ESCP; and e) monitor the ES performance of a Project in accordance with the ESCP and the ESSs. | Applies to Bank in addressing E&S aspects of this project |
| Bank Directive Addressing Risks and Impacts on Disadvantaged or Vulnerable 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<br>(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 | The document provides guidelines to address issues and risks arising from | 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 |

| Table 2.2 – Relevance of World Bank E&S Policy, ESS, Directive and guidance notes to the sub-project | | | |
|---|---|---|---|
| **World Bank ESS Policy, Standards, Directive** | **Objectives** | **Requirements** | **Relevance & Extent of Relevance to the sub-project/project** |
| impacts on communities from temporary project induced labor influx, 2016 | influx of migrant labor leading to gender-based violence, forced labor etc. | | in Himachal Pradesh |

The project will also adhere to all the applicable labor laws of GoI. The list of laws is presented in **Appendix 5**

## 2.3 Comparative Analysis of key national, state and Bank policies

34. 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.

35. 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

36. 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.<br>However, Environmental Impact Assessment Notification-2006 is not applicable to the project road. |
| 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<br>Air (Prevention and Control of Pollution) Act, 1981;<br>Water (Prevention and Control of Pollution) Act, 1974, for Pollution-Prevention-and-Management;<br>The Noise Pollution (Regulation And Control) Rules, 2000<br>National Resource Efficiency Policy, 2019 (Draft) | Gap exists for Resource efficiency as the policy is in draft stage and yet to take off.<br>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. |

## 2.4 Institutional Framework

37. 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.

38. 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,

39. 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

40. 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.

41. 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.

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

43. HPRIDC has established a system dealing with external complaints on procurement, fraud/corruption and construction quality. This system will include maintaining files to monitor status of follow up of each received comments, suggestions and grievances. The implementation of the system will be monitored by Chief Vigilance Officer of the PWD (who shall act Vigilance Officer (VGO) for the HPRIDC). The mechanisms will include provision for follow up investigations of substantial complaints to ensure independency and reliability of the system. For the complaint mechanism to function efficiently, the information concerning the alternative conduits for complaint (dedicated email address and physical mailing box) are being publicized. Complaints, suggestions and grievances handling system have been included at HPRIDC website: *http://admis.hp.nic.in/himachal/hpridc.* An Information Officer who has been designated by HPRIDC as a full-time Assistant Public Information Officer under the RTI Act is responsible for monthly updates of the system on the website

44. 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.

45. There is no specific GRM to systematically receive, record and redress complaints from project affected persons.

# CHAPTER 3 – BASELINE DATA

46. The baseline environmental profile of project influence area covering 15 km radius of the project as well as Bilaspur district as a whole has been described in the following sections. The environmental profile includes key attributes like physiography, drainage, geology, soil, 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.

47. In order to assess the baseline environment, the data has been accessed from authentic and verifiable sources as given in Table 3-1. Due attempt has been made to source and access only the latest available data from authentic and verifiable sources.

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

| Environmental Attribute | Source of data / Information | Date and Year of the Data |
|---|---|---|
| Climate/Weather Parameters like Temperature, rainfall, wind speed and other similar climatological parameters | IMD (Indian Metrological Department), Shimla and New Delhi | Last 5 years (2014-2018) data has been used |
| Soil & Geology | Geological Survey of India, Central Ground Water Board, State Mining Department, GoHP | District Ground Water Brochure of Bilaspur District published by the central ground water board (Northern Himalayan region-Dharamshala), in year 2013 and Ground Water Year Book of Himachal Pradesh (Northern Himalayan region-Dharamshala), in Feb – 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 Bilaspur District published by the central ground water board (Northern Himalayan region-Dharamshala), in year 2013 and Ground Water Year Book of Himachal Pradesh (Northern Himalayan region-Dharamshala), in Feb – 2016.<br>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.<br><br>Also, Monitoring of the surface and ground water quality along the project road | District Ground Water Brochure of Bilaspur District published by the central ground water board (Northern Himalayan region-Dharamshala), in year 2013 and Ground Water Year Book of Himachal Pradesh (Northern Himalayan region-Dharamshala), in Feb – 2016.<br>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- |

| Environmental Attribute | Source of data / Information | Date and Year of the Data |
|---|---|---|
| | | 2019). |
| Ambient Air Quality and Ambient Noise levels | Monitoring of the ambient air quality and ambient noise level measurements along the project road was carried out. | Monitoring of the ambient air quality and ambient noise level measurements along the project road was carried out by Star Analytical Services, an NABL Accredited Laboratory during ESIA Studies (Sept-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.<br>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.<br>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***

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

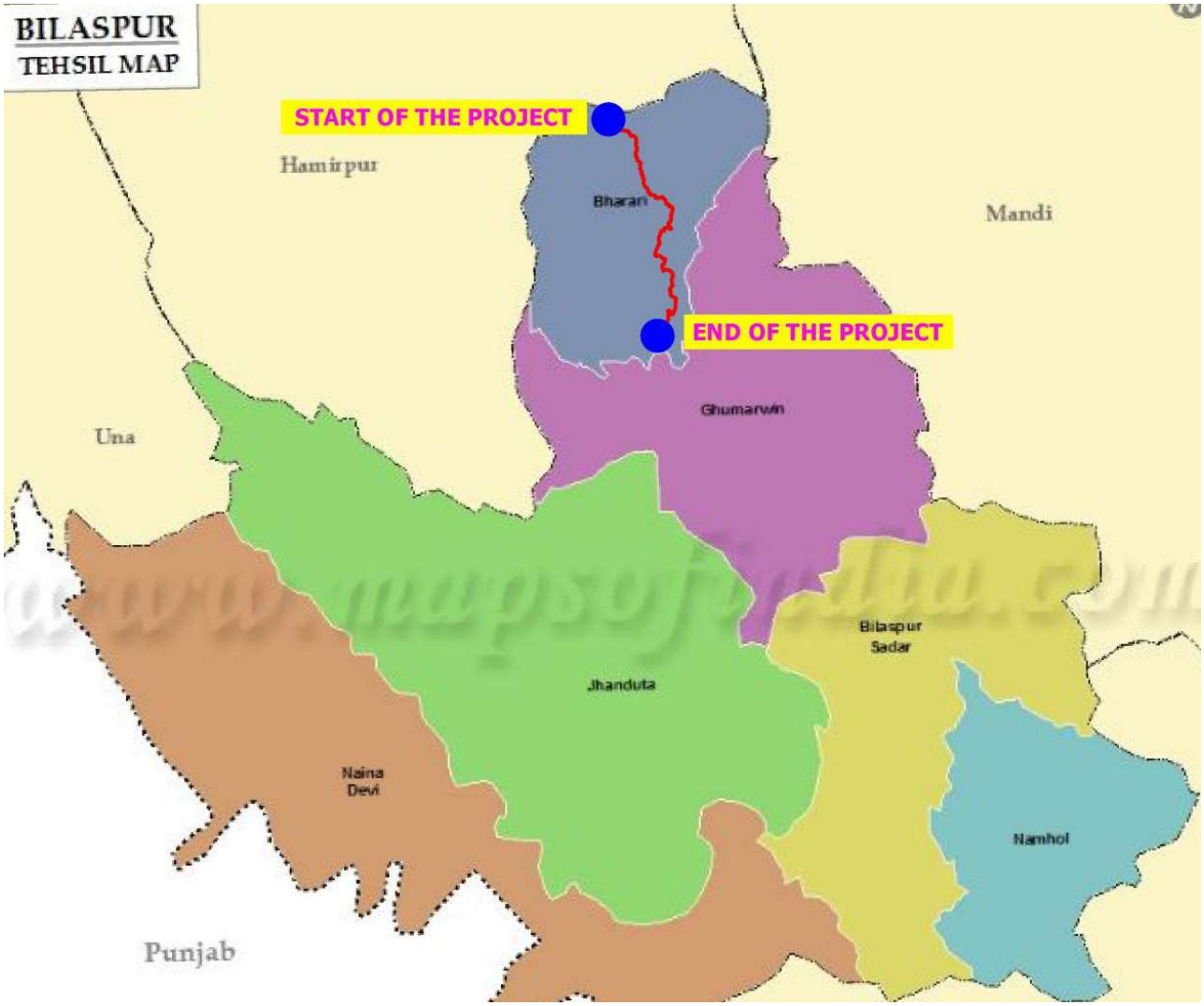



**Figure 3.1: Tehsils of Bilaspur District**
**(*Source:- https://www.mapsofindia.com/maps/himachalpradesh/tehsil/Bilaspur.html)***

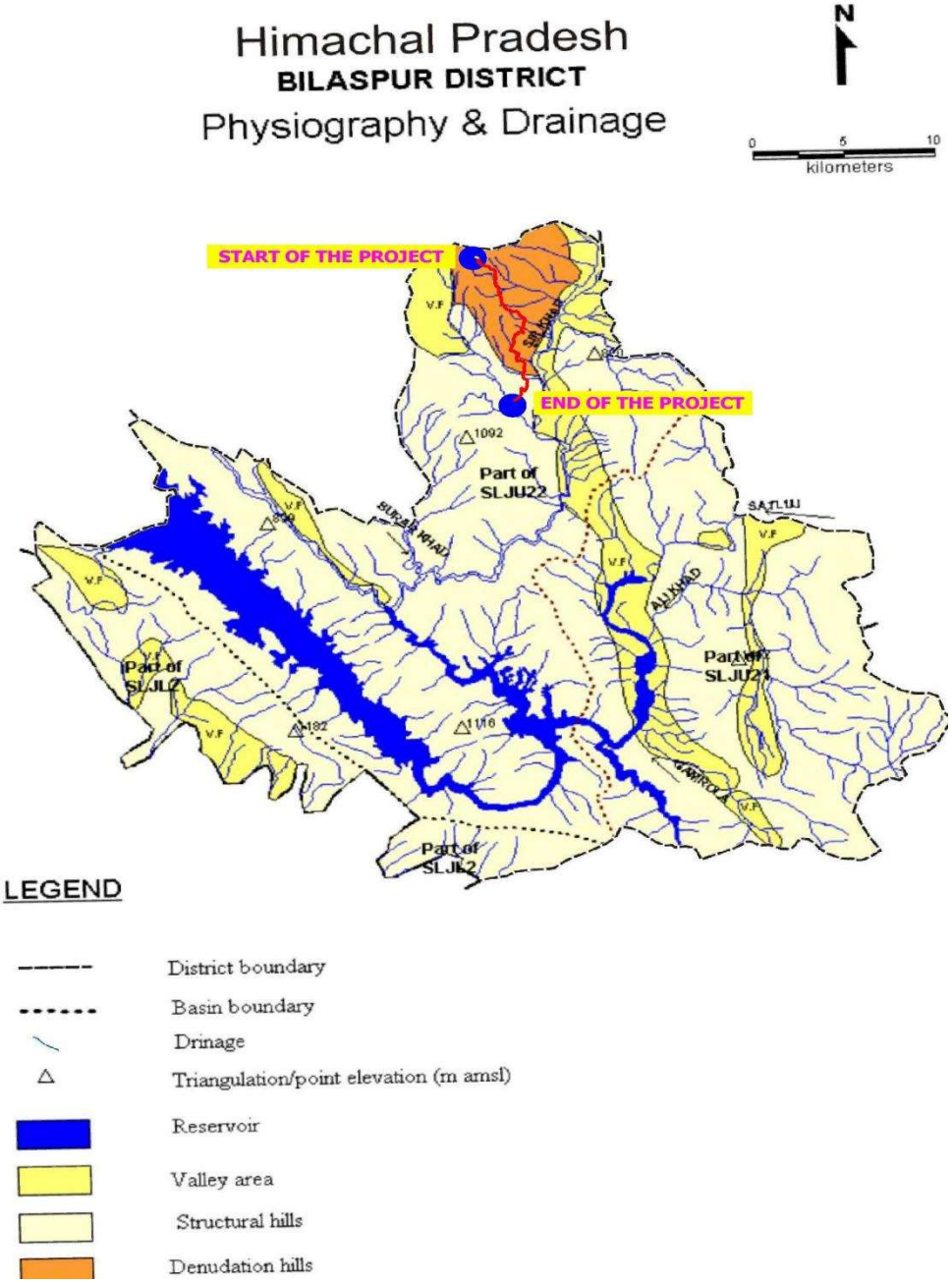



**Figure** Error! No text of specified style in document.**.1: Physiography & Drainage Pattern of Bilaspur District**

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

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

***Elevation***

50. As per the elevation map of Himachal Pradesh, the project road lies in the range of 248-1141 m. The maximum and minimum elevation of the project road is 981m at km 13+300 and 697 m at Km 0+900. The elevation profile of Bilaspur district showing the project road is given in Figure 3.2.

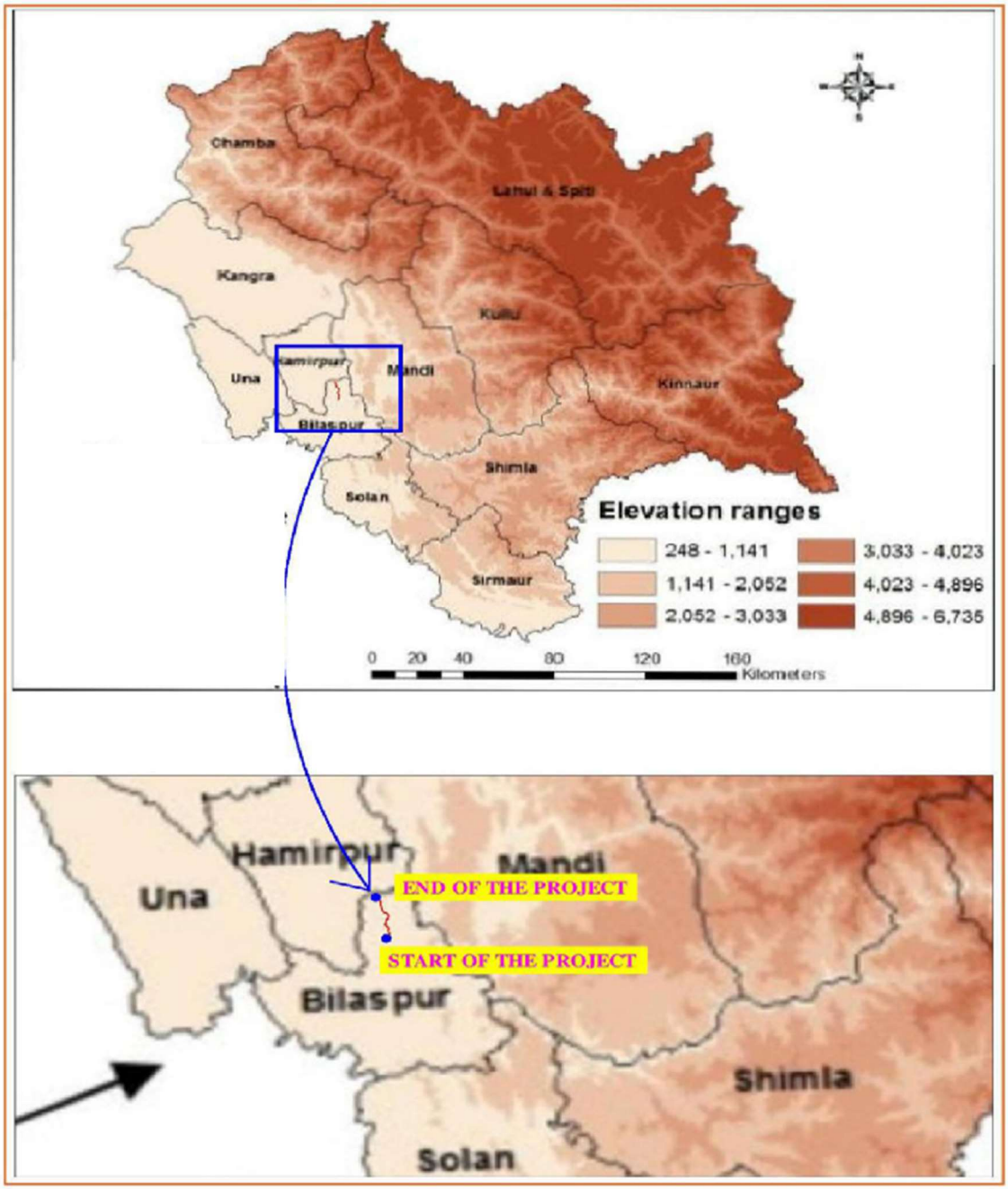



**Figure** Error! No text of specified style in document.**3.2: Elevation Profile of project road within Bilaspur District**
***(Source:-* https://www.researchgate.net/figure/Elevation-map-of-Himachal-Pradesh-state*)***

***Geo-morphology and Soils***

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

***Soil Moisture and Fertility Levels***

52. Two types of soils are observed in the Bilaspur district viz, alluvial soil and non-calcic brown soil. Most of the area in the district is covered with alluvial soil and only hilly area in the district is

covered with non-calcic brown soil. Soil is rich in nutrients and is fertile. The soil moisture of Bilaspur district showing the project road is given in Figure Error! No text of specified style in document..**4**.

53. Also, the soil fertility along the adjoining areas of project corridor is reported to have High fertility level. The soil fertility of Bilaspur district showing the project road is given in **Error! Reference source not found.**.

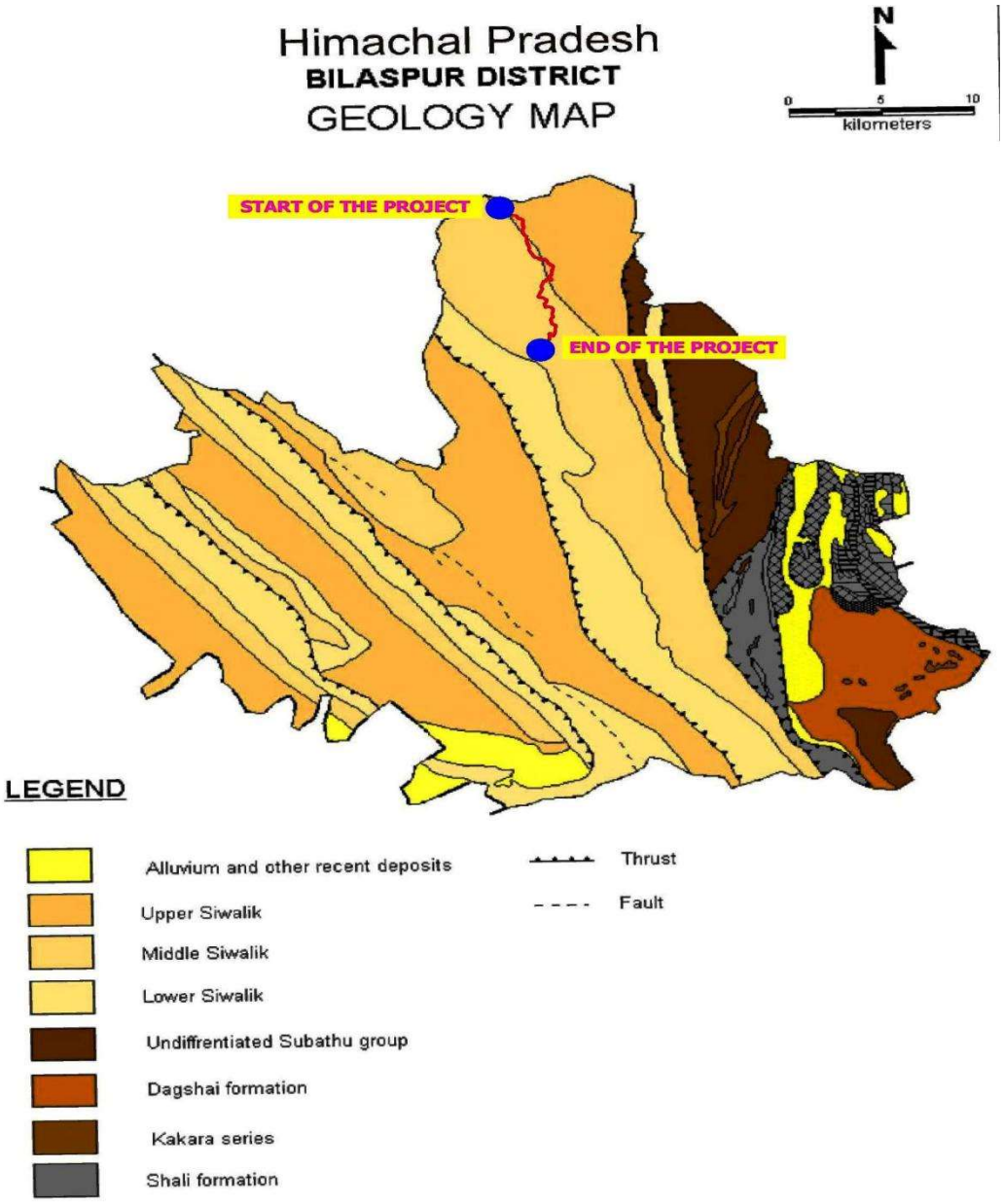



**Figure3.3: Geology Map of Bilaspur District**
***(Source:- Geological website of Bilaspur district.)***

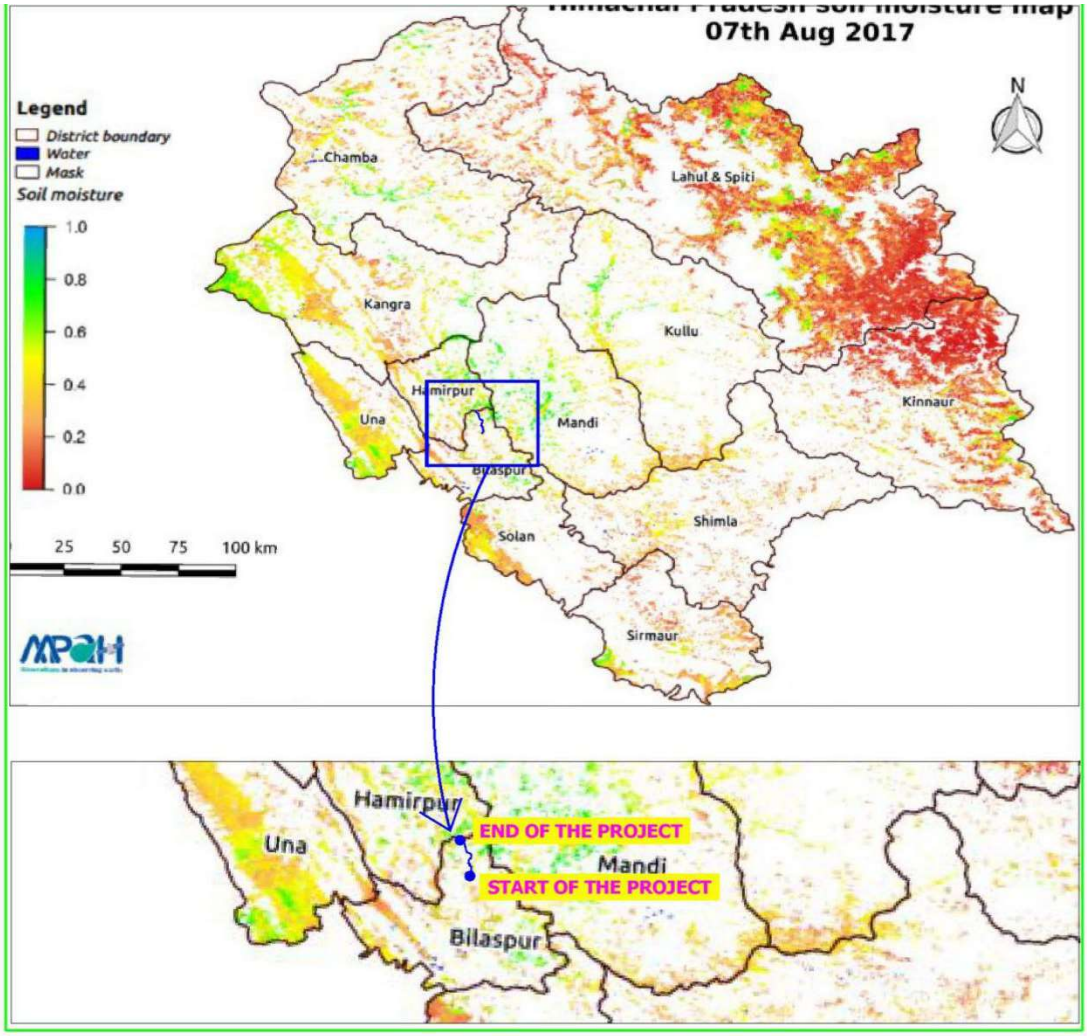



**Figure** Error! No text of specified style in document..**4: Soil Moisture of Bilaspur District (*Source:- http://www.aapahinnovations.com/soil-moisture-map-state-himachal-pradesh*)**

***Soil Monitoring Data***

54. The soil quality along the project corridor was tested near Mojoti. The test results of the soil quality are given **Error! Reference source not found.**2. The soil fertility (NPK value) of Bilaspur district as a whole is given in Figure 3.6, which indicates N as High, P as high and K as low.

**Table** Error! No text of specified style in document.**-2: Soil Test Results along Project road**

| S.No | Parameters | Units | Test Value |
|---|---|---|---|
| 1 | pH | -- | 7.68 |
| 2 | Electrical Conductivity | µS | 152.3 |
| 3 | Bulk Density | g/cc | 1.23 |
| 4 | Phosphates | Kg/Ha | 6.42 |
| 5 | Potassium | Kg/Ha | 128.4 |
| 6 | Nitrogen | Kg/Ha | 196.2 |
| 7 | Total Organic Carbon | % | 0.86 |
| 9 | Copper | mg/ kg | 2.03 |
| 10 | Zinc | mg/ kg | 0.97 |
| 11 | Nickel | mg/ kg | 0.25 |

| | | | |
|---|---|---|---|
| 12 | Chromium | mg/ kg | 2.49 |
| 13 | Lead | mg/ kg | 4.80 |
| 14 | Cadmium | mg/ kg | <0.50 |
| 15 | CEC | meq/100gr | 1.36 |
| 16 | SAR | meq/100gr | 0.58 |
| 17 | Texture and Composition of Soil | - | Sandy Loam |
| | Sand | % | 64.5 |
| | Silt | % | 15.9 |
| | Clay | % | 19.6 |

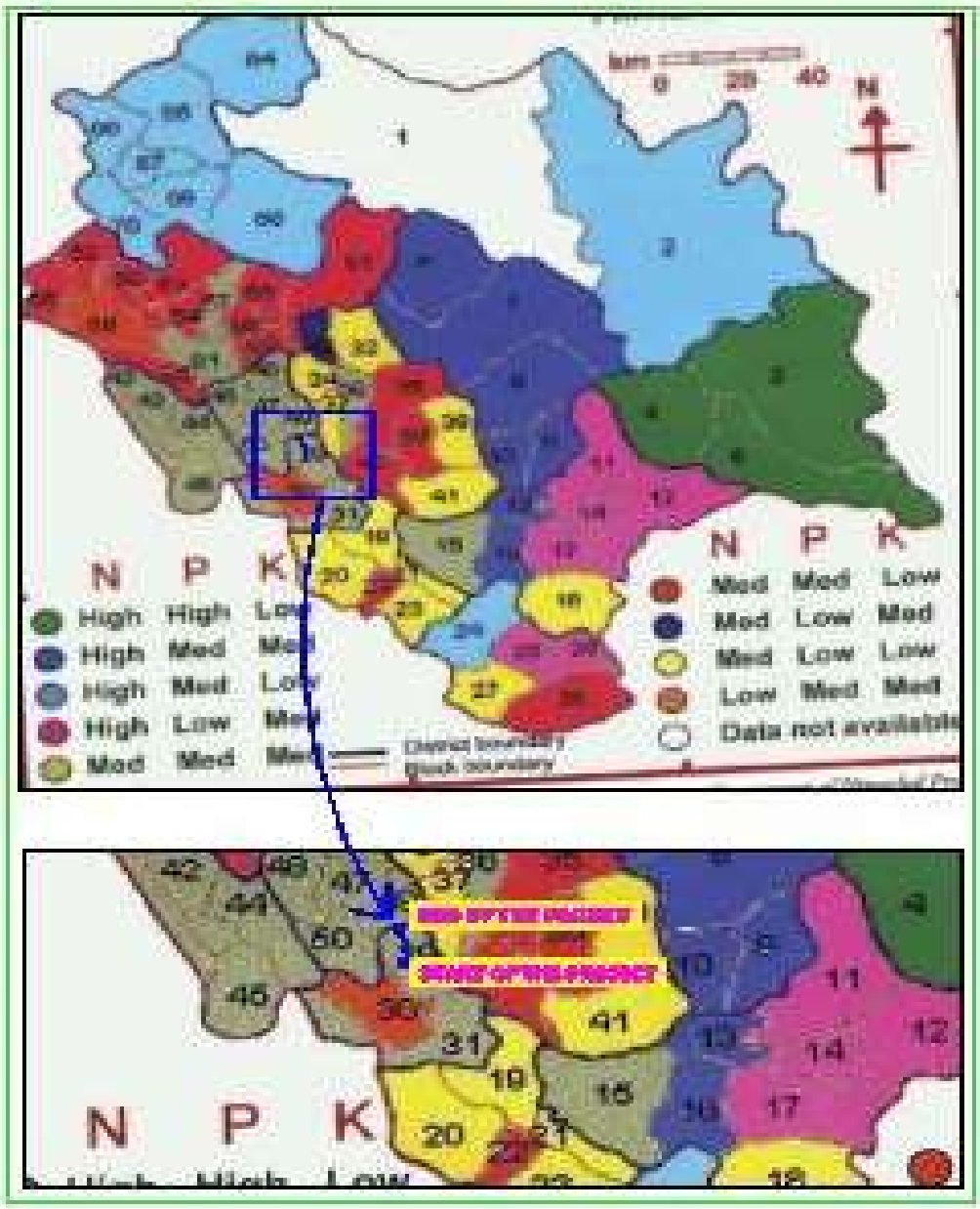



**Figure** Error! No text of specified style in document.**.5: Soil Fertility of Bilaspur District**
***(Source:- http://www.aapahinnovations.com/soil-moisture-map-state-himachal-pradesh/)***

***Land Use***

55. The project road traverses majorly along agricultural lands. The land use map of Himachal Pradesh along with the project road is shown in Figure Error! No text of specified style in document..7.

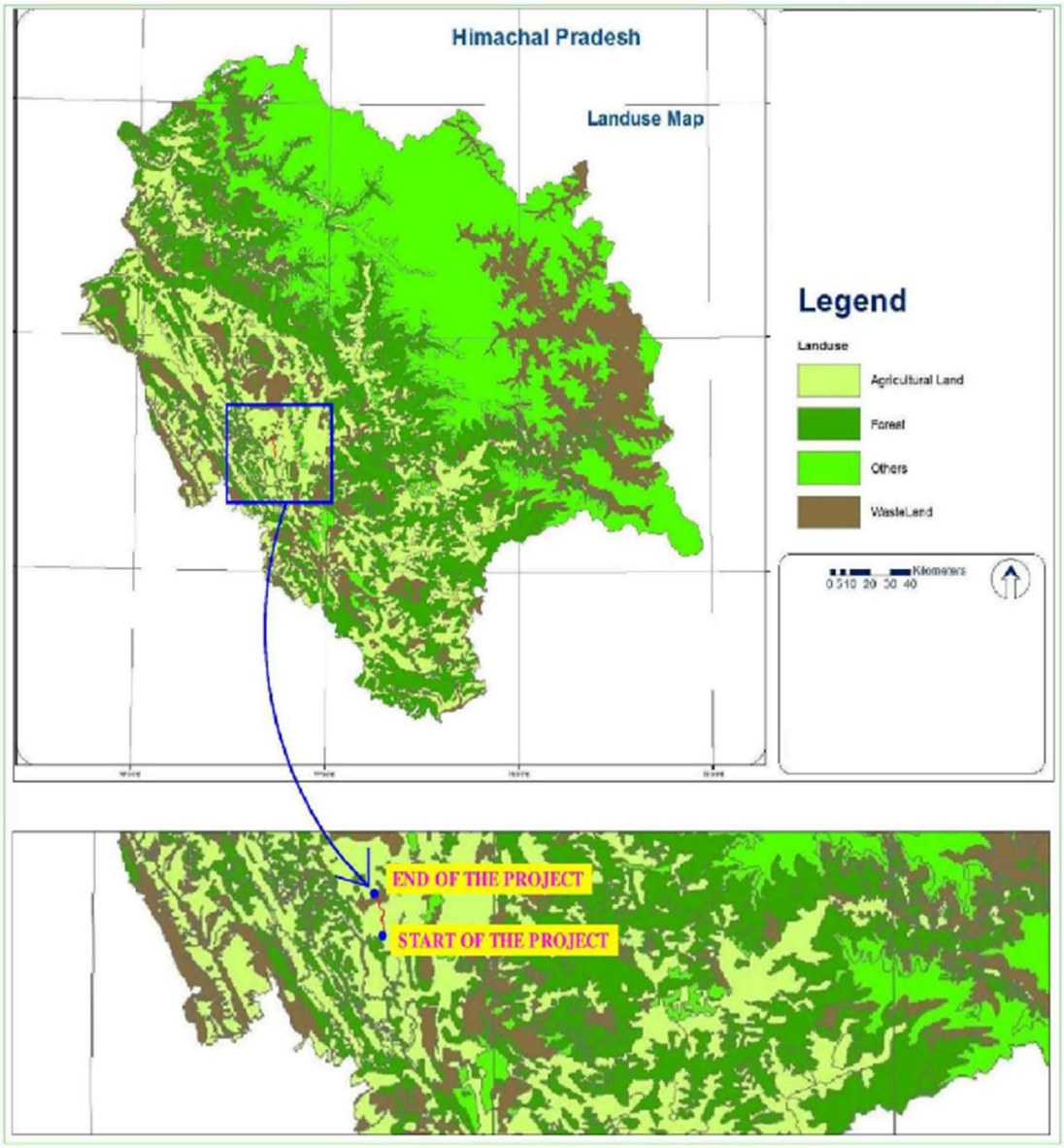



**Figure** Error! No text of specified style in document.**.7: Land use Map of Bilaspur District**
***(Source:- Forest department of Himachal Pradesh)***

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

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

57. The land use / land cover with in the Project Influence Area (15km) is given in Figure Error! No text of specified style in document.**.**8. The Built –up land occupies about 19.11 Sq km, Forest Plantation land occupies 219.05 Sq km, Water bodies around 10.01 Sq km, Agriculture Crop Land 201.32 Sq km, Forest Land around 41.31 Sq km, Barren land around 28.76 Sq km.

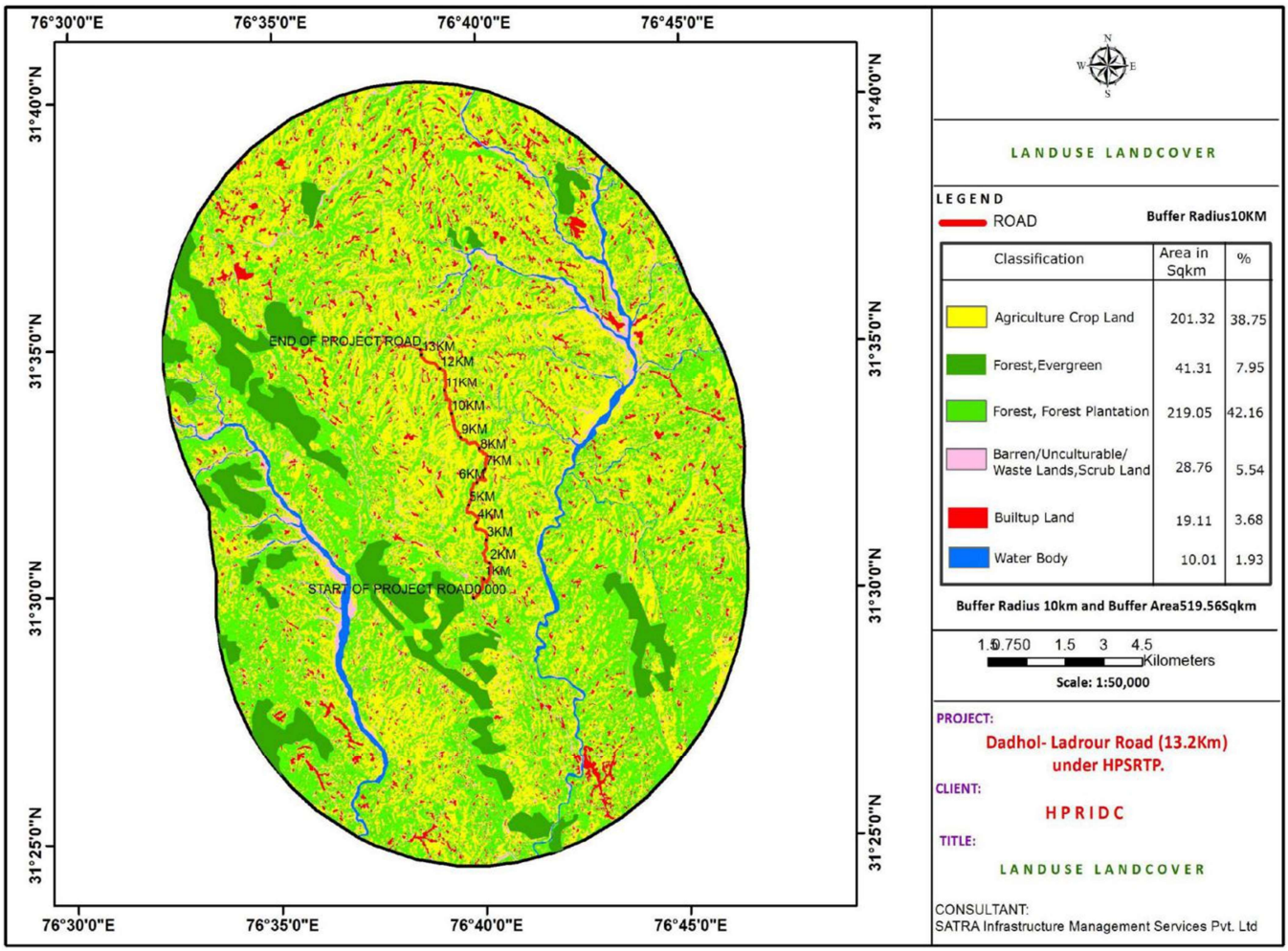



**Figure** Error! No text of specified style in document..**8: Land Use/Land Cover of Project Road**

### *Agriculture*

58. In Bilaspur district, millets are the most dominant agricultural crop, which can also be seen in cultivable lands along the project road. The agriculture map along with the project road within the Bilaspur district is shown in Figure Error! No text of specified style in document..9.


**Figure** Error! No text of specified style in document..**9: Agriculture Map of Bilaspur District**
***(Source:- https://www.mapsofindia.com/maps/himachalpradesh/himachalpradeshagriculture.html)***

## 3.2 Physical Environment

### *Climate and Rainfall*

59. The climate of the district is temperate to sub- tropical. The summer is invariably hot. The winter season starts from November and continues till the middle of March. The minimum and maximum temperature varies from 1.3 ° C in January to 34.7 ° C in May.

60. The hills and valleys along the khads are quite dry in summer. In rainy season, humidity increases and the weather become hot and sultry. The area receives rainfall during monsoon period extending from June to September and also non-monsoon period (winter months). The annual average rainfall in the area is about 1106.28 mm and about 81.5% rainfall occurs during monsoon period (June to September). The annual rainfall over a period 2014 to 2018 in Bilaspur district is given in Table 3.3. The annual average rainfall is given in Figure 3.10.

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

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

*Source:- Metrological centre, Shimla*

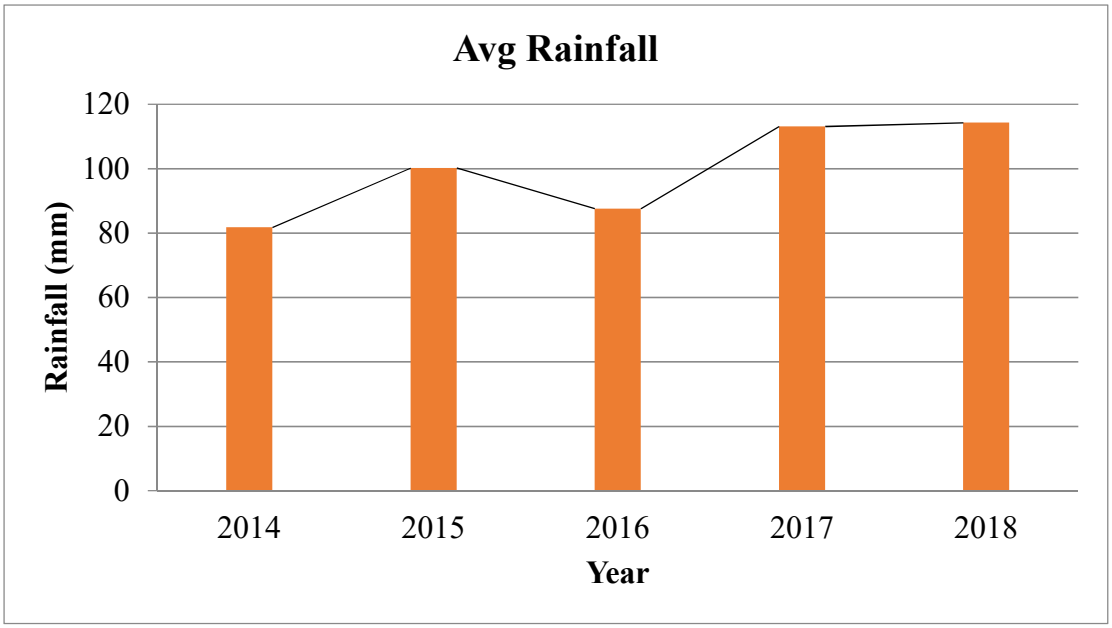
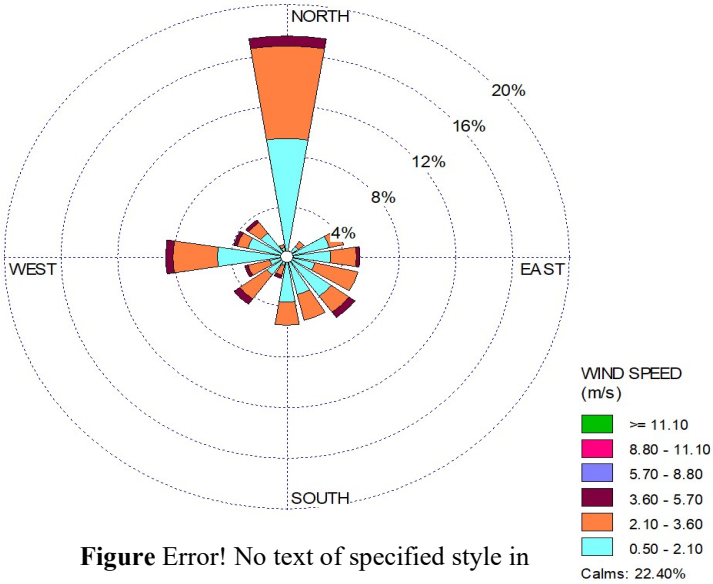



**Figure 3.10: Annual Average Rainfall**

***Wind Speed***

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

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***Ambient Air Quality***

62. The project area is devoid of any industries which contribute to air pollution. The only polluting source are vehicular emission and does not have large scale area base construction. The ambient air quality was established through air quality monitoring was carried at Dadhol and Ladrour locations along the project road. The test results are given in Appendix 12. It may be seen that the ambient air quality (for all tested parameters) at both the monitored locations are below the National Ambient Air Quality Standards as well as 24 hour values of EHS guidelines.

**Table** Error! No text of specified style in document.**-4: Ambient Air Quality Monitoring Data**

| Name of the Location & Code | Date of Monitoring | Week | PM $_{10}$ | PM $_{2.5}$ | $SO_2$ | $NO_X$ |
|---|---|---|---|---|---|---|
| **Dadhol- AAQ1** | 19.09.2019 | 1 | 57.8 | 19.5 | 6.9 | 13.5 |
| | 20.09.2019 | 1 | 61.5 | 21.1 | 13.5 | 12.8 |
| | 23.09.2019 | 2 | 58.3 | 20.3 | 7.2 | 13.6 |
| | 24.09.2019 | 2 | 59.1 | 18.6 | 7.5 | 12.4 |
| | 27.09.2019 | 3 | 58.9 | 21.6 | 6.4 | 11.5 |
| | 28.09.2019 | 3 | 60.2 | 19.2 | 7.8 | 12.2 |
| **Ladhror-AAQ2** | 17.09.2019 | 1 | 58.6 | 14.5 | 7.5 | 14.1 |
| | 18.09.2019 | 1 | 57.2 | 15.2 | 7.1 | 13.6 |
| | 21.09.2019 | 2 | 60.2 | 15.8 | 14.1 | 19.9 |
| | 22.09.2019 | 2 | 58.9 | 14.9 | 6.9 | 14.5 |
| | 25.09.2019 | 3 | 56.6 | 15.5 | 7.8 | 13.2 |
| | 26.09.2019 | 3 | 55.4 | 14.6 | 6.3 | 13.9 |
| | 29.09.2019 | 4 | 56.3 | 15.1 | 6.8 | 13.4 |
| | 30.09.2019 | 4 | 57.1 | 15.9 | 7.3 | 12.3 |
| Limits as per NAAQS | | | 100µg/m$^3$ | 60µg/m$^3$ | 80µg/m$^3$ | 80µg/m$^3$ |
| EHS Guideline Values (24 hour, guideline value) | | | 50 | 25 | 20 | 200 (hourly) |

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

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

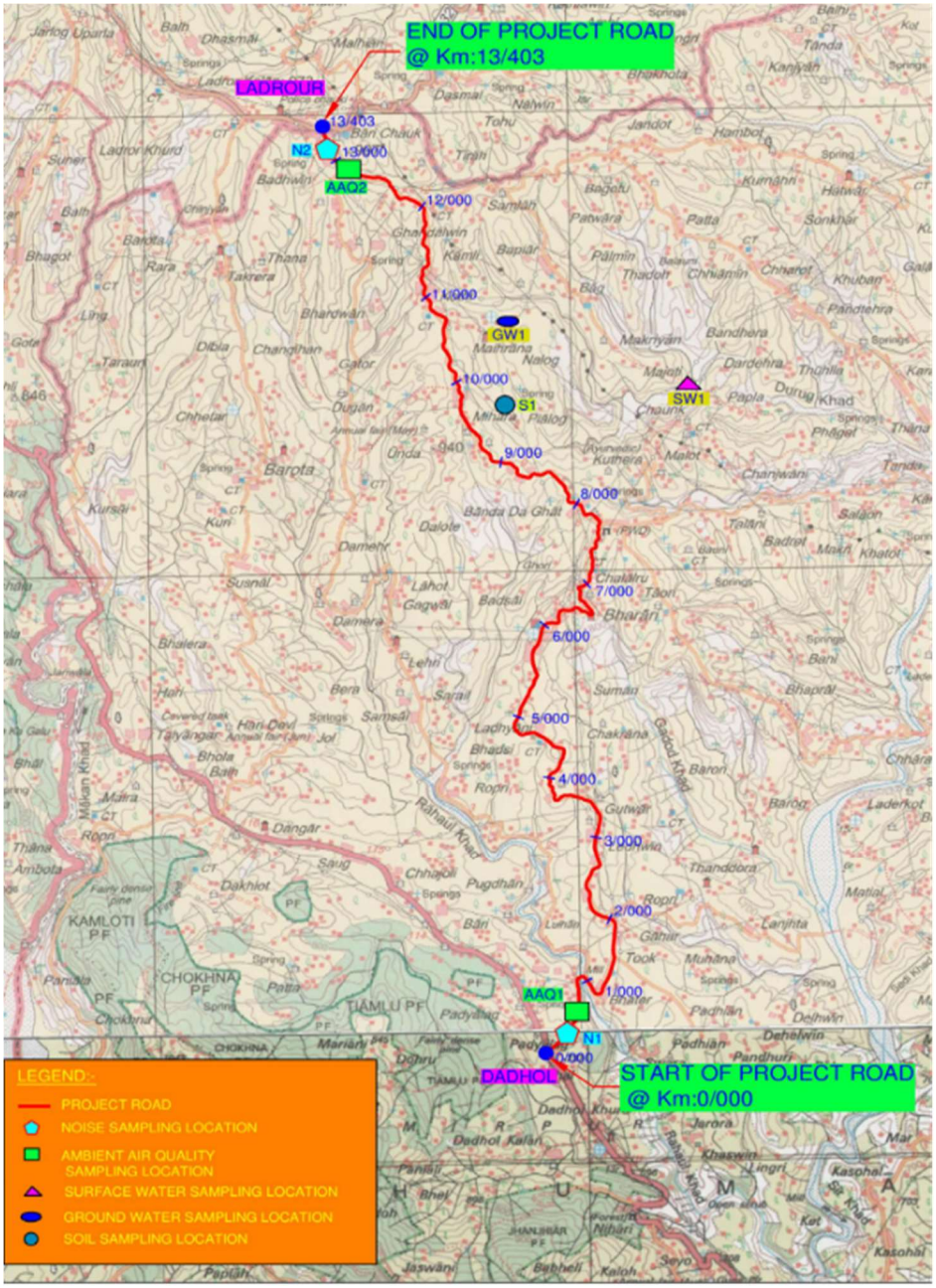



**Figure 3.62: Map Showing Monitoring Locations along project Road**

*Ambient Noise Levels*

63. Ambient Noise levels monitoring was carried at Dadhol and Ladrour locations along the project road. The test results are given in Table 3-6. 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 well as one-hour values of EHS guidelines.

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

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

*Surface Water*

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

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

| S.No | Parameter | Unit | Method | Result | IS 10500 Test limits |
|---|---|---|---|---|---|
| 1 | pH | -- | APHA 23rd Edition; 4500 $H^+$ B | 8.21 | No Relaxation |
| 2 | Turbidity | NTU | APHA 23rd Edition; 2130 B | < 1.0 | 5 |
| 3 | Conductivity | µMho/ Cm | APHA 23rd Edition; 2510 B | 211.8 | -- |
| 4 | Total Dissolved Solids | mg/L | APHA 23rd Edition ; 2540 C | 136 | 2000 |
| 5 | Color | CU | APHA 23rd Edition ; 2120 B | < 1.0 | 15 |
| 6 | Odor | -- | -- | Agreeable | Agreeable |
| 7 | P-Alkalinity as $CaCO_3$ | mg/L | APHA 23rd $^t$ Edition ; 2320 B | < 10.0 | -- |
| 8 | Alkalinity as $CaCO_3$ | mg/L | APHA 23rd $^t$ Edition ; 2320 B | 78.6 | 600 |
| 9 | Total Hardness as $CaCO_3$ | mg/L | APHA 23rd Edition ; 2340 C | 109.5 | 600 |
| 10 | Calcium as Ca | mg/L | APHA 23rd Edition ; 3500 Ca B | 22.3 | 200 |
| 11 | Magnesium as Mg | mg/L | APHA 23rd Edition ; 3500 Mg B | 13.52 | 100 |
| 12 | Sodium as Na | mg/L | APHA 23rd Edition ; 3500 Na B | 3.96 | -- |
| 13 | Potassium as K | mg/L | APHA 23rd Edition ; 3500 K B | < 1.0 | -- |
| 14 | Chlorides as $Cl^-$ | mg/L | APHA 23rd Edition ; 4500 $Cl^-$ B | 8.99 | 1000 |
| 15 | Sulphates as $SO_4^{-2}$ | mg/L | APHA 23rd Edition ; 4500 $SO_4^{-2}$ E | 28.63 | 400 |

| S.No | Parameter | Unit | Method | Result | IS 10500 Test limits |
|---|---|---|---|---|---|
| 16 | Nitrate Nitrogen as N | mg/L | APHA 23rd Edition; 4500 $NO_3^-$ B | < 1.0 | No Relaxation |
| 17 | Fluorides as $F^-$ | mg/L | APHA 23rd Edition ; 4500 $F^-$ D | < 0.1 | 1.5 |
| 18 | Iron as Fe | mg/L | APHA 23rd Edition ; 3500 Fe B | < 0.1 | No Relaxation |
| 19 | Manganese as Mn | mg/L | APHA 23rd Edition ; 3500 Mn B | < 0.01 | 0.3 |
| 20 | Phenolic Compounds as Phenols | mg/L | APHA 23rd Edition; 5530 D | < 0.001 | 0.002 |
| 21 | Copper as Cu | mg/L | APHA 23rd Edition ; 3111 B | < 0.01 | No Relaxation |
| 22 | Cadmium Cd | mg/L | APHA 23rd Edition ; 3111 B | < 0.001 | 1 |
| 23 | Zinc as Zn | mg/L | APHA 23rd Edition ; 3111 B | < 0.5 | No Relaxation |
| 24 | Lead as Pb | mg/L | APHA 23rd Edition ; 3111 B | < 0.001 | 1.5 |
| 25 | Mineral Oil | mg/L | APHA 23rd Edition ; 5520 B | < 0.001 | No Relaxation |
| 26 | Mercury | mg/L | Instrument Manual Method | < 0.001 | 15 |
| 27 | Silver as Ag | mg/L | Instrument Manual Method | < 0.5 | No Relaxation |
| 28 | Selenium as Se | mg/L | APHA 23rd Edition ; 3111 D | < 0.05 | No Relaxation |
| 29 | Dissolved Oxygen | mg/L | APHA 23rd Edition 4500-O C | 8 | No Relaxation |
| 30 | Chemical Oxygen Demand | mg/L | APHA 23rd Edition 5220 B | 5.3 | No Relaxation |
| 31 | Biochemical Oxygen Demand(3day's at 27°C) | mg/L | IS : 3025(Part-44) :2009 | 1 | Not specified |
| 32 | Total Coli forms | MPN/100 ml | IS:1622 | 38 | Not specified |
| 33 | Fecal Coli forms | MPN/100 ml | IS:1622 | 14 | Not specified |

*Source:- Field Investigations*

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

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

| Designated Best Use | Class of Water | Criteria |
|---|---|---|
| Drinking water source (with conventional treatment) | A | Total Coliforms Organism MPN/100ml shall be 50 or less |
| | | pH between 6.5 and 8.5 |
| | | Dissolved Oxygen 6mg/l or more |
| | | Biochemical Oxygen Demand 5 days 20C 2mg/l or less |
| Outdoor bathing (organised) | B | Total Coliforms MPN/100ml shall be 500 or less |
| | | pH between 6.5 to 8.5 |
| | | Dissolved Oxygen 5 mg/1 or more |
| Drinking Water Source (without | C | Total Coliforms MPN/100 ml shall be 5000 or less |

| Designated Best Use | Class of Water | Criteria |
|---|---|---|
| conventional treatment) | | pH between 6 to 9 |
| | | Dissolved Oxygen 4 mg/l or more |
| | | Biochemical Oxygen Demand (BOD) 5 days 20°C 3 mg/1 or less |
| Propagation of Wild life and Fisheries | D | pH between 6.5 to 8.5 for Fisheries |
| | | Dissolved Oxygen 4 mg/l or more |
| | | Free Ammonia (as N) 1.2 mg/l or less |
| Irrigation, Industrial Cooling, Controlled Waste Disposal | E | pH between 6.0 to 8.5 |
| | | Electrical Conductivity at 25°C Max 2250µ mhos/cm |
| | | Sodium absorption ratio Max. 26 |
| | | Boron, Max. 2 mg/l |

***Ground water***

65. Hydro geologically, both the unconsolidated valley fill and alluvial formation are occurring in the valley area and semi-consolidated sediments belonging to Siwalik Group form aquifer system in the district. Porous alluvial formation forms the most prolific aquifer system in the valley area where as the sedimentary semi-consolidated formation forms the aquifer of low yield prospect.
66. 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). The Hydrogeology of Bilaspur District showing the project road is given in Figure 3.13. The ground water development scenario in Bilaspur district has not been assessed but is expected to be under safe category and moreover the district has numerous springs and nallahs which are perennial in nature for most part of year.

***Ground Water Quality***

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

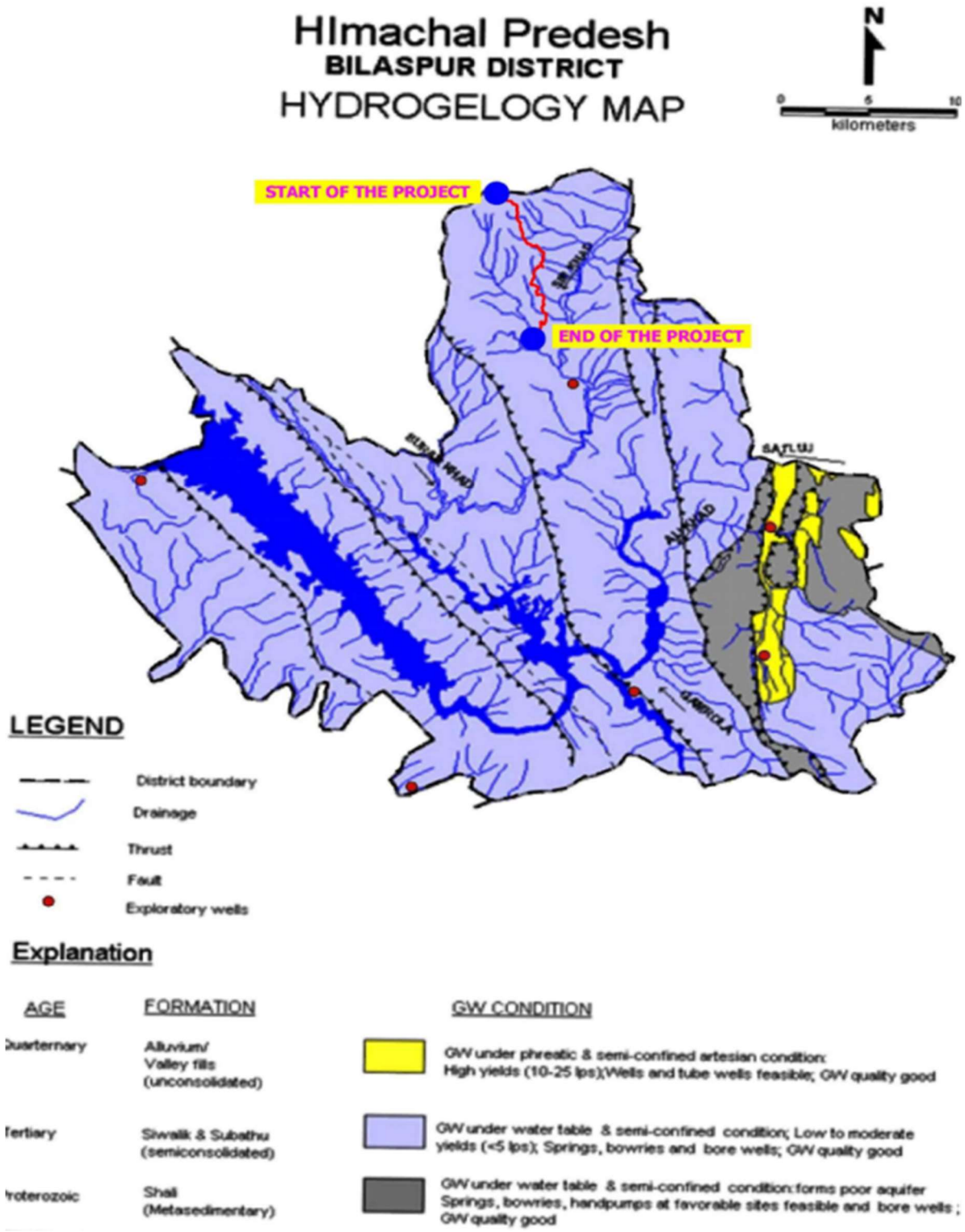



**Figure 3.13: Hydrogeology of Bilaspur District**
***(Source:-* https://www.researchgate.net/figure/Elevation-map-of-Himachal-Pradesh-state*)***

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

| S.No | Parameter | Unit | Method | Result | IS 10500 Limits | |
|---|---|---|---|---|---|---|
| | | | | | Acceptable | Acceptable |
| 1 | pH | -- | APHA 23rd Edition; 4500 $H^+$ B | 7.65 | 6.5-8.5 | No Relaxation |
| 2 | Turbidity | NTU | APHA 23rd Edition; 2130 B | < 1.0 | 1 | 5 |
| 3 | Conductivity | µMho/ Cm | APHA 23rd Edition; 2510 B | 869.1 | -- | -- |
| 4 | Total Dissolved Solids | mg/L | APHA 23rd Edition ; 2540 C | 562 | 500 | 2000 |
| 5 | Color | CU | APHA 23rd Edition ; 2120 B | < 1.0 | 5 | 15 |
| 6 | Odor | -- | -- | Agreeable | Agreeable | Agreeable |
| 7 | P-Alkalinity as $CaCO_3$ | mg/L | APHA 23rd $^t$ Edition ; 2320 B | < 10.0 | -- | -- |
| 8 | Alkalinity as $CaCO_3$ | mg/L | APHA 23rd $^t$ Edition ; 2320 B | 380 | 200 | 600 |
| 9 | Total Hardness as $CaCO_3$ | mg/L | APHA 23rd Edition ; 2340 C | 425 | 200 | 600 |
| 10 | Calcium as Ca | mg/L | APHA 23rd Edition ; 3500 Ca B | 40.08 | 75 | 200 |
| 11 | Magnesium as Mg | mg/L | APHA 23rd Edition ; 3500 Mg B | 79.07 | 30 | 100 |
| 12 | Sodium as Na | mg/L | APHA 23rd Edition ; 3500 Na B | 3.47 | -- | -- |
| 13 | Potassium as K | mg/L | APHA 23rd Edition ; 3500 K B | 1.24 | -- | -- |
| 14 | Chlorides as $Cl^-$ | mg/L | APHA 23rd Edition ; 4500 $Cl^-$ B | 24.99 | 250 | 1000 |
| 15 | Sulphates as $SO_4^{-2}$ | mg/L | APHA 23rd Edition ; 4500 $SO_4^{-2}$ E | 16.46 | 200 | 400 |
| 16 | Nitrate Nitrogen as N | mg/L | APHA 23rd Edition; 4500 $NO_3^-$ B | 2.16 | 45 | No Relaxation |
| 17 | Fluorides as $F^-$ | mg/L | APHA 23rd Edition ; 4500 $F^-$ D | 1.06 | 1 | 1.5 |
| 18 | Iron as Fe | mg/L | APHA 23rd Edition ; 3500 Fe B | < 0.1 | 0.3 | No Relaxation |
| 19 | Manganese as Mn | mg/L | APHA 23rd Edition ; 3500 Mn B | < 0.01 | 0.1 | 0.3 |
| 20 | Phenolic Compounds as Phenols | mg/L | APHA 23rd Edition; 5530 D | < 0.001 | 0.001 | 0.002 |
| 21 | Hexavalent Chromium as Cr+6 | mg/L | APHA 23rd Edition, 2012; 3500 Cr B | < 0.01 | 0.05 | No Relaxation |
| 22 | Residual Chlorine as Cl | mg/L | APHA 23rd Edition ; 4500 Cl B | < 0.01 | 0.2 | 1 |
| 23 | Total Cyanide | mg/L | APHA 23rd Edition ; 4500 $CN^-$ C, E | < 0.01 | 0.05 | No Relaxation |

| S.No | Parameter | Unit | Method | Result | IS 10500 Limits | |
|---|---|---|---|---|---|---|
| | | | | | Acceptable | Acceptable |
| 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 | 2 | Shall not be detectable in any 100 ml Sample | |
| 33 | Fecal Coli forms | MPN/100ml | IS:1622 | Absent | | |

*Source:- Field Investigations*

## 3.3 Biological Environment

### Forest

68. 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** |

*Source:- https://hpforest.nic.in*

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

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

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

***Forest Area along Project Corridor***

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

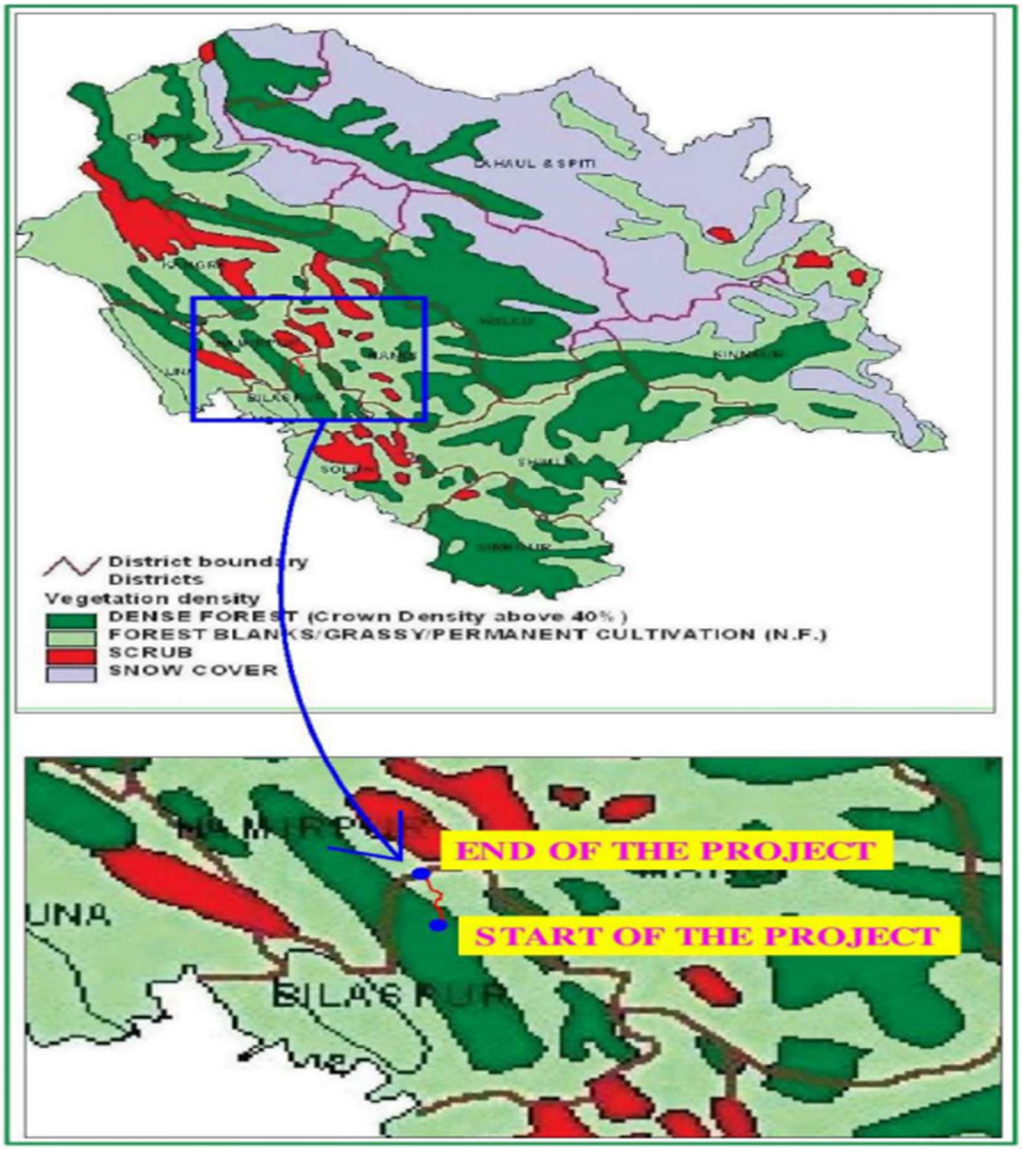



**Figure 3.14: Forest Cover of Bilaspur District (*Source: https://hpforest.nic.in/*)**

***Protected Area***

71. There are no National Park, Wildlife Sanctuary, Biosphere Reserve and any other notified sensitive area within 15km on either side of the project road.

72. Although, the project road falls within the jurisdiction of Bilaspur division, but there are no forest areas along the 13.5km long Dadhol-Ladrour road. Further, no wildlife crossing corridors are reported along the project corridor. The Wildlife Protected areas in Himachal Pradesh are shown in Figure 3.15.

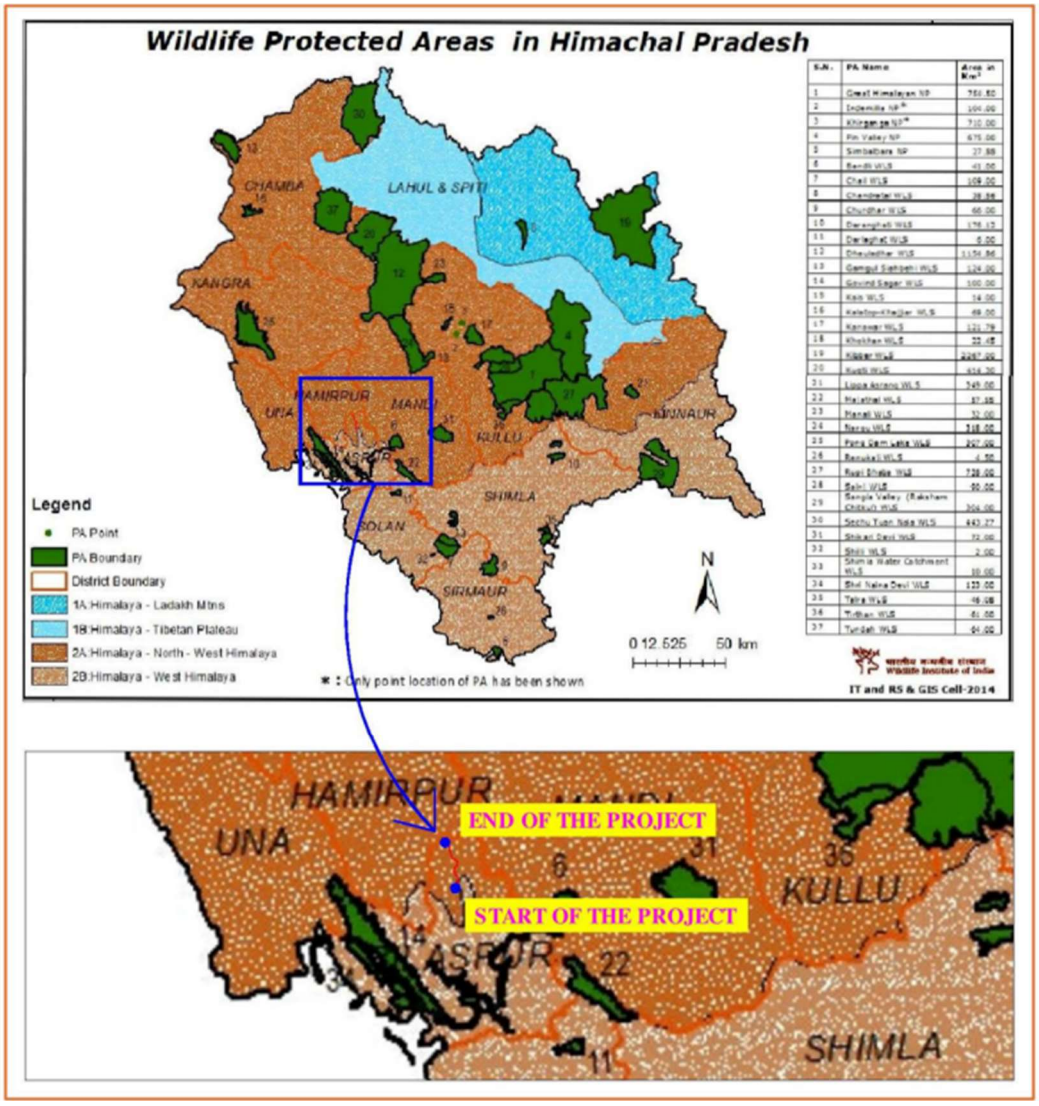



**Figure 3.15: Himachal Pradesh Wildlife Protected Area Map**
**(*Source: https://hpforest.nic.in/*)**

### *Biodiversity*

73. 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*

74. *Acacia catechu*, *Dalbergia sissoo, Morus alba*, and *Grawia optiva* found regularly distributed in tree layer throughout the project road/corridor. Dominant shrub species

recorded along the project road are *Murraya koenigii*, *Adhatoda vasica, Lantana camara* and *Carissa opaca*. A predominance of herb species like *Ageratum conyzoides, Parthanium hysterophoros, Bidens biternata* and *Tridax procumbens* was recorded in the study area along with various grass species.

75. The project road corridor has a luxuriant growth of 60 angiosperm taxonomic group, which include invasive species like *Ageratum conyzoides, Eupatorium adenophorum, Lantana camara, Parthanium hysterophoros,* among others. The list and number of taxonomic groups found along the project road are in Table 3-10. *Acacia catechu, Adhatoda vasica, Agave Americana, Asparagus adscendens, Barleria cristata Bombax ceiba, Bauhinia vahlii, Cassia fistula, Dendrocalamus strictus, Emblica officinalis, Murraya koenigii, Solanum nigrum, Tinospora cordifolia* are some of the flora having medicinal value and recorded along the project corridor.

**Table 3-10: List of Taxonomic group species along the project road**

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

### *Endemic & RET Species*

76. 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 RoW of the project road. Oroxylum indicum was the only species recorded from the study area comes under threatened category (CAMP, 2010).

### *Trees, Shrubs and Herbs along the Project road along the project Road*

The ecological investigations along the project corridor as indicated the presence of variety of trees, shrubs and herbs as given in **Table 3-11**.

**Table 3-11: List of Trees, Shrubs and Herbs along the Project road**

| Location | Tree | Shrub | Herb |
|---|---|---|---|
| **Location-I** | *Acacia catechu*, *Dalbergia sissoo, Morus alba* | *Carissa opaca*, *Murraya koenigii*, *Adhatoda vasica* | *Ageratum conyzoides, Parthanium hysterophoros, Bidens biternata* |
| **Location-2** | *Dalbergia sissoo*, *Morus alba*, *Grawia optiva* | *Adhatoda vasica*, *Murraya koenigii*, *Lantana camara* | *Ageratum conyzoides, Tridax procumbens*, *Parthanium hysterophoros* |

Apart from the above, the flora reported in the project area is summarized here under: -

**Trees:** *Annogeissus latifolia, Lannea grandis, Acacia catechu, Stephegyne parviflora, Aegle marmalos, Bombax ceiba, Syzygium cumini, Feronia limonia, Ehretia leaves, Flacourtia indica, Zizyphus zuzuba, Mangifera indica, Cassia fistula, Wendlandia exerta, Emblica officinalis, Ficus religiosa, Ficus bengalensis Terminalia tomentosa, Bauhinia variegata, Lucaenia leucocephala, Grewia optiva, Dalbergia sisso, Pinus roxburghii, Albizia lebbek, Albizia chinensis, Eucalypus*

*grandis, Grevillea robusta, Callistemon lanceolatus, Jacaranda mimosaefolia, Toona ciliata, Populus alba, Melia azadirachta, Morus alba* and *Broussonetia papyrifera.*

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

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

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

During the baseline assessment, enumeration of trees with in RoW was carried out and the numbers of trees were found to be 3614 as given in Table 3-12.

**Table 3-12: Enumeration of trees within RoW**

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

## *Fauna*

There are no National Park, Wildlife Sanctuary, Biosphere Reserve and any other notified sensitive area within the 15 Km radius of the project road. Also, there are no forest areas (of any category) and no wildlife crossing corridors are reported along the project corridor. Local consultations along the project corridor indicate that they frequently face attacks from monkeys near Ladhiyani village.

As per monkey hotspot map of himachal Pradesh (Figure 3.16) prepared by department of Forests, GoHP, the project road is in low density monkey hot spot areas.


**Figure 3.16 – Monkey Hot Spot map of Himachal Pradesh**

*Source. HP Forest Department.*

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

**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.

**RET Mammals:** No species has been reported in the project area which is under Schedule-I category of Indian Wildlife Protection Act-1972. During primary survey, no such endangered species encountered which comes under the Rare and endangered category of IUCN.

### *Avifauna*

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

**Black Drongo**

**Jungle Babbler & Squirrel**

**Oroxylum indicum**

**Plum Headed Parakeet**

**Vegetation Sampling**

**Amla (Emblica officinalis)**

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

### 3.4 Social Environment

77. 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.

78. The proposed project is located in District Bilaspur of Himachal Pradesh state. The project road passes through 15 villages of Bharari sub-tahsil (administrative unit). The adjacent tehsil is Ghumarwin tehsil. In order to make clarity in data analysis the socio-economic data from secondary sources has been collected and analysed from Bharari sub-tehsil and Ghumarwin tehsil and it has been called as "project influence area". Another set of socio-economic data collection has been conducted through primary household survey to understand the impact on proposed road improvement considering the available RoW as per Government record.. This set of data will provide the idea on negative impacts on various types of private assets, community assets, livelihood etc. Due to social stigma, people were hesitant to answer the questions relating to sexual orientation. The inventorization on impact of assets with in the available RoW of the proposed project road has been called as "Project Impact Zone".

79. Socio-Economic Profile of Project Influence Area: The demographic profile of Bharari, Ghumarwin tehsils and Bilaspur district as a whole is given in **Error! Reference source not found.**.

**Table: Demographic Profile of Project Road Tehsils/Sub-Tehsil and District**

| S.No | Demographic Parameters | Bharari Sub-Tehsil | Ghumarwin Tehsil | Bilaspur District (as a whole) |
|---|---|---|---|---|
| 1 | Total Households | 10,174 | 19,593 | 80,485 |
| 2 | Total Population (Male & Female) | 45,713 | 89,516 | 3,81,956 |
| 3 | Sex ratio (Females per 1000 Males) | 1063 | 1007 | 981 |
| 4 | Schedule Caste Population (%) | 22.66 | 24.98% | 25.92 |
| 5 | Schedule Tribe Population (%) | 0.93 | 1.16% | 2.8 |
| 6 | Literacy rate (Male & Female) | 78.72 | 77.89 | 84.59 |
| | *Source: Primary Census Abstract, Census of India, 2011* | | | |

80. The **Demographic profile** include human settlements, demography, and social strata such as Scheduled Castes (SCs) and Scheduled Tribes (STs) and literacy levels besides infrastructure facilities available in the project influence area/district.

81. Bilaspur district is endowed with two economic resources viz. agricultural land and fishery. The district is a well-known centre of pilgrimage. Naina Devi Ji and Shah Talai are the famous pilgrimage centres. Fair and festivals are interwoven in the daily lives of the people of this district. Bhakra Dam, the highest straight gravity dam in the world is situated in Naina Devi sub Tahsil. Kandror Bridge, the second highest bridge in the Asia and Gobind Sagar Lake occupies the predominant position amongst the places of tourist interest. Limestone is available in abundance. One

cement plant has been set up by the A.C.C. Pvt. Ltd., at Barmana. Gold, pyrite and gypsum are found in Malyawar forests Quartzite's in Sungal, Bandla and Chamlok etc. Livestock is the main wealth next to agricultural of a large chunk of rural population. Road transport is the life of the economy of the district. All the important places are linked with roads. Bilaspuri or Kahluri is principal mother tongue of about 80 per cent of the population. The inhabitants of the district have their staple food is maize, rice and occasionally wheat. Bilaspur being situated in temperate zone, the clothing requirement is light.

82. Population: According to Census 2011, the total population of Bilaspur district is 381,956 comprising 192,764 males and 189,192 females. This population of the district forms 5.56 per cent of the state population and ranks at 10th place among the districts. Out of total population of the district, 93.4 per cent is distributed in rural areas while 6.6 per cent lives in urban areas. The rural population of the district is distributed among 4 tahsils (GHumarwan, Jandatta, Naina Deviji and Bilaspur-Sadar) and 2 sub-tahsils(Bharari and Namhol), and urban population is spread over in 4 towns.

83. Density: The density of population in Bilaspur district is 327 persons per sq. km. against the state average of 123 persons. In rural areas, the density of population works out to 310 persons per sq. km. while the density of 1,433 persons per sq. km. has been worked out in urban areas.

84. Sex Ratio: There are 981 females per 1,000 males in Bilaspur district. The Sex Ratio figures for rural and urban areas of the district are 986 and 917 respectively. It is also seen that the proportion of females in rural areas is higher than that of urban areas. Sex ratio in age-group 0-6 comes to 900 females per 1,000 males in the district, as a whole. In rural areas this proportion is 903 females while in urban areas the sex ratio of child population comes to 843.

85. Work participation rate: The work participation rate is defined as percentage of total workers to total population. Similar procedure has been adopted to define main workers and marginal workers. According to Census 2011, the total workers including main & marginal workers come to 53.9 per cent of the total population of the district. Of the total workers, 27.1 and 26.8 per cent is shared by the main and marginal workers respectively. The remaining 46.1 per cent of total population is occupied by the category of non-workers. As per Census 2011, the main workers participation among males is 38.1 and for females is 15.9 per cent. Males and females have 19.8 and 34.0 per cent in the category of marginal workers. The proportion of female marginal workers is considerably higher than that of males as the females are attending to one or more economic activities in addition to their household duties to increase the family income. It is observed that the proportion of male main workers is higher than that of female main workers in the district.

86. Literacy: A person who can read and write in any language is considered a literate in Census. All the children of age-group 0-6 years have been recorded as illiterate. As per Census 2011, Bilaspur district reported 287,620persons as literates constituting 84.6 per cent of the total population. The proportion of male and female literates in the district is 91.2 and 78.0 per cent, respectively. The literacy rate of males is higher than females in the district. The total literacy rates of rural and urban areas are 84.1

and 91.8 per cent. The proportion of male & female literates in rural areas is 90.9 and 77.2 per cent, respectively. The proportion of male & female literates in urban areas is 94.3 and 89.0 per cent. It is observed from the above statistics that females are better educated in urban areas than that of rural areas.

87. Religion: Hindu is the most dominating religious community in Bilaspur district with 3,71,973 Hindu persons (1,87,567 males and 1,84,406 females) which constitutes 97.39 per cent of the total population. After Hindu, Muslim religious community represents 6,984 persons in comparison to Census 2001which was 5,938 Muslims. The in other major religious communities include Sikhs with 2,387 persons in comparison to Census 2001 which constitutes 2,696 Sikhs.

88. Scheduled Castes and Scheduled Tribes population: Of the total population of 3,81,956 persons recorded in Bilaspur district, 25.9 per cent population belongs to Scheduled Castes and only 2.8 per cent to Scheduled Tribes. The Scheduled Tribes population in the district is mainly concentrated in Ghumarwin (T), Jhandutta (T) and Naina Devi (T).

89. **Salient Features along the Project Road:** The salient features along project road and details of amenities within the project influence area/district are given in **Error! Reference source not found.** respectively.

**Table: Salient features along Project Road**

| S.No | Description | Details |
|---|---|---|
| 1 | Project Road Length in Km | 13.4 |
| 2 | District | Bilaspur |
| 3 | Connecting Places | Dushadka – Bhated –Bharari –Gandalwin -Ladraur |
| 4 | Near By NH/SH | Road bifurcates from Mataur – Shimla National Highway (NH-88) at Dadhol (Padyalag) Km/ RD. End at Ladraur MDR 32 connects Mundkhar – Juha. |
| 5 | Attractive Places | Baba Nehar Singh Mandir , Mata Sohni Devi Ji Temple, Bharthari temple |
| 7 | Wild Life Sanctuaries and Protected Areas | None |
| 8 | Water Bodies | Seer Khadd Branches, Kunah khaad River, Dehra lake |
| 9 | Common Property Resources (CPR) | Schools – Primary – 171, Middle – 82, Secondary School – 37. Government Collages – 2, Community Health Center – 3, PHC – 17, Maternity and Child Welfare – 10, Veterinary – 22 |
| 10 | Protected Archaeological/ Historical Monuments | None |
| 11 | Industries | None |
| 12 | Mines and minerals | None |
| 13 | Airport/Railway | None |

*Source: Census-2011, Amenities- District Household Census*

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

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

*Source: Census-2011, Amenities- District Household Census*

90. **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;

91. Demography, socio-economic profile and social amenities: The sociological aspects of this study include human settlements, demography, and social strata such as Scheduled Castes and Scheduled Tribes and literacy levels besides infrastructure facilities available in the study area. The economic aspects include occupational structure and income levels of workers. The profile comprises of the study area.

- The total population of 15 villages which are within Bharari tehsil is 8552, in which the male population is 4185 (48.49%) and the female population is 4367 (51.06%). This shows that the female population slightly higher in ratio. In the villages of Dadhol & Lehri Sarail, female population is 11% higher than the male population as per census 2011.
- The male and female ratio of the study area is 1043 females per every 1000 males.
- Of the total study area population, 0.04% (3) consists of Scheduled Tribes, 21.19% (1812) are of the Scheduled caste population and 78.77% (6737) people belong to other castes.
- The schedule tribe population along the project road is just 0.5% and at the district level it is 2.80%. The ST population is already in main stream society with urban life styles and cultures, good living standards, high literate rate and occupation. Hence, there is no Indigenous population in this corridor and IPDP is not warranted.
- Among the total population, 88.21% (6749) of the people are literate and 11.79% (1803) of the people are illiterate. This shows that more than half of the population is literate.
- Among the literates 48.72% (3728) are males and 51.27% (3923) are females. This shows that the female literates are more than the male literates.

- Totally the illiterate constitute 21.08% (1803) of which the female 12.94% (1107) and the male 8.14% (696) of the population. This shows that the female illiterates are more than the male illiterates.

**Table : Details of the Revenue Villages in the Study Area**

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

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*

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

93. **Social Amenities:** There are 6 primary schools, 8 Middle schools and 4 Secondary schools with no degree colleges. For the Degree collages and professional courses students visit Ghumarwin and Hamirpur located 10-15 Kms away. There are two community Health centers, three Primary health sub center and two Maternity and child welfare centers. For animal husbandry care there 5 veterinary hospitals. There are 13 number of hand pump functional all around the year. The village wise amenities along the project road are given in table.

**Table: Details of Social Amenities in Villages along Project Road**

| S.No | Social Amenities | No |
|---|---|---|
| 1 | Primary School | 6 |
| 2 | Middle School | 8 |

| S.No | Social Amenities | No |
|---|---|---|
| 3 | Secondary School | 4 |
| 5 | Community Health centres | 2 |
| 6 | Primary Health centres | 3 |
| 7 | Maternity and Child Welfare | 2 |
| 8 | Veterinary Hospital | 5 |
| 9 | Hand Pumps | 13 |
| 10 | Post Offices | 4 |

94. Socio-economic Status of Project Villages: The socio-economic and census surveys were conducted in month of August and September, 2019 for primary data collection. Field survey helped collect the fairly reliable data with respect to the major livelihood source, family income and expenditure, education and health status, basic amenities availability, lifestyle and standards of living etc of the residents in the project impact zone. It also helped in eliciting information about the environmental and socio economic impacts for ancillary works of the project in the area and the measures initiated by them to mitigate those impacts.

95. Field survey was carried out in the influence zone containing a total of about 136 households. The potential respondents in the households were contacted personally by the field investigators who explain the purpose of the visit and seek their participation by sharing relevant information impartially. The field investigators also clarified the doubts and apprehensions expressed by the respondents. Once the responded were willing and ready to participate, household level socio economic questionnaire was administered with the help of interview based structured questionnaire. A number of questions were open ended questions to facilitate capturing perceptions of the respondents objectively.

96. 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.

97. 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

98. **Profile of the likely Project Affected Families**: The total numbers of likely impacted families surveyed are 132. The survey has been carried out as per the requirements of social impact assessment.

99. Most of the households are staying along the roadside from a long time where in nearly 78.03% of them are living since more than 10 years. About 21.97% of them are found to have settled in the last 5-10- years. Details are presented in table below. Analysis on literacy level of the head of the affected household shows that all of them are literates except around a negligible percent 12.12 percent is illiterates. The average household size for the project affected population is 3.6.

100. During the survey, some of the owners/occupants of the structures were not available and the respondent was not in a position to give the correct/complete details of the concerned head of the Household. The summary of the Socio-cultural characteristics of structures affected population is given in table.

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

| Item | Description | No | % of total |
|---|---|---|---|
| **Population** | Male | 212 | 44.44 |
| | Female | 265 | 55.56 |
| | Total | 477 | 100.0 |
| **Religious Group** | Hindu | 128 | 96.97 |
| | Muslim | 4 | 3.03 |
| | Total | 132 | 100.0 |
| **Social Group** | General | 108 | 81.82 |
| | BC | 18 | 13.64 |
| | SC | 5 | 3.79 |
| | ST | 1 | 0.76 |
| | Total | 132 | 100.00 |
| **Family Type** | Joint | 111 | 84.09 |
| | Nuclear | 13 | 9.85 |
| | Individual | 8 | 6.06 |
| | Total | 132 | 100.00 |
| **Years of stay** | Up to 10 year | 29 | 21.97 |
| | 10 to 20 Years | 22 | 16.67 |
| | 21-50 Years | 48 | 36.36 |
| | Above 50 | 33 | 25.00 |
| | Total | 132 | 100.00 |
| **Education level of HH** | Illiterate | 16 | 12.12 |
| | New-literate | 1 | 0.76 |
| | Primary | 2 | 1.52 |
| | Middle | 14 | 10.61 |
| | High school | 42 | 31.82 |
| | Intermediate | 25 | 18.94 |
| | Graduate | 18 | 13.64 |
| | Post graduate | 8 | 6.06 |
| | Professional | 1 | 0.76 |
| | Others | 5 | 3.79 |
| | Total | 132 | 100.00 |

*Source: Primary data Collection, 2019*

101. Economic Profile: The work participation rate is 37.26 per cent in the study area is higher than the national work force participation of 39.1 per cent. Distribution of Occupation wise details, most of them are engaged into commercial activity of Trade/business, Petty Shop Keeping, services (44.69%) followed by Agriculture, Non-Agriculture Labour (24.24%), Household industries consists 0.76 percent. The incidence of Govt. Employees, Private Employees and Others is around 16.67 percent, 13.64 percent respectively. Details are presented in **Error! Reference source not found.**.

102. The income levels of majority of the households fall under higher middle income category earning more than Rs. 4,00,000 per annum (81.77%). The incidence of lower-income families is about 3.32 percent who earn below 1,80,000 per annum. About 7.5 percent of them are middle income families who are earning Rs. 1,80,000 to 4,00,000 per annum.

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

| | | | |
|---|---|---|---|
| **Occupation of HH** | **Agriculture** | **20** | **15.15** |
| | **Trade/Business** | **25** | **18.94** |
| | **Petty shop keeping** | **15** | **11.36** |
| | **Agri labour** | **9** | **6.82** |
| | **Non-Agri labour** | **3** | **2.27** |
| | **HH Industries/Artisan activity** | **1** | **0.76** |
| | **Service** | **19** | **14.39** |
| | **Professional** | **4** | **3.03** |
| | **Self employed** | **0** | **0.00** |
| | **Retired** | **14** | **10.61** |
| | **Government services** | **4** | **3.03** |
| | **Others** | **18** | **13.64** |
| | **Total** | **132** | **100.00** |

103. The expenditure pattern of the affected household's show that majority of them have an average monthly expenditure above Rs.30,000 per month. The monthly expenditure of the Affected Population along Project Road details are given in **Error! Reference source not found.**

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

| | **Description** | **No of HH** | **% of HH** |
|---|---|---|---|
| **Monthly Expenditure (Rs)** | <10000 | 2 | 1.5 |
| | 10000 to 20000 | 3 | 2.27 |
| | 20000 to 30000 | 10 | 7.57 |
| | >30000 | 117 | 88.66 |
| | **Total** | **132** | **100** |

104. Household Assets: For inferring the standard of living of the households, their possession of various consumer durables was recorded during the survey. All the families have minimum standards of living which can be inferred from the assets owned, given in table.

105. It can be seen from the table 3-23, from the context of possession of Household assets, of the total 132 surveyed households, 80.30%, 74.24%, 62.12% and 98.48 % possess TV, Fridge, washing Machine and cell phones respectively.

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

| **S.No** | **No of HH with Assets** | **Total** | **% to total*** |
|---|---|---|---|
| 1 | TV | 106 | 80.3 |
| 2 | Fridge | 98 | 74.24 |
| 3 | Washing Machine | 82 | 62.12 |

| S.No | No of HH with Assets | Total | % to total* |
|---|---|---|---|
| 4 | Cycle | 26 | 19.69 |
| 5 | Motor Cycle | 35 | 26.51 |
| 6 | Car | 8 | 6.06 |
| 7 | Telephone (Land Line) | 4 | 3.03 |
| 8 | Mobile (cell Phone) | 130 | 98.48 |
| *Source: Primary data Collection* | | | |
| **Total Surveyed HH 132* | | | |

106. Savings & Indebtedness: The 132 households enumerated during socio economic survey, 33 households have long term deposits and only 2 have short term deposits in the banks and others are 19 has in form of insurances as given in table.

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

| Type of Deposit | Institution where deposited | No.s |
|---|---|---|
| Long Term | Bank, LIC | 33 |
| Short term | Bank, LIC | 2 |
| Others | LIC | 19 |
| **Total** | | **54** |

*Source: Primary data Collection, 2019*

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

**Table : Details of Indebtedness of Households**

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

*Source: Primary data Collection*

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

**Table : Health Status of PAFs**

| S. No | Health Status of PAFs | Number | % |
|---|---|---|---|
| 1 | Illness | 11 | 8.33 |
| 2 | No illness | 121 | 91.66 |

| | | |
|---|---|---|
| **Total** | **132** | **100** |

109. **Gender:** Over the last five decades, gender wise decadal population of females is increasing than the male population with an average of 19.97[3] per cent. Status of the women had made a good progress in Himachal Pradesh. Women complete higher level of secondary school than in many other states. The sex ration in the study area is 1043 females per thousand males, which is higher the district sex ration of 981. Women in this region also have a good literacy rate of 51.27% compared to male population.

110. A hill women's life is extremely busy from early morning to late evening and sometimes even till late at night. They work side by side with men in agriculture and their role is as important in the field as well as at home. From the affected population, it has been observed the males consists 44.44% and females are 55.56% reflects female population is slightly higher. While the health center nearby have informed women are aware about the health problems and do take advice on gynecological problems. There were no HIV subjects recorded during the survey.

111. 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.

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

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

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

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

**Distribution of Project Affected Women by Education**

| **Age Group** | **%** |
|---|---|
| Illiterate | 2.14 |
| Primary | 32.56 |
| Middle Class | 15.60 |

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

| | |
|---|---|
| SSC | 18.64 |
| Pre University | 14.21 |
| Degree | 7.26 |
| Post Graduate | 3.25 |
| Technical | 6.34 |

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

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

**Disability category and Population in Himachal Pradesh**

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

116. **Women's Role in Household:** Participation of women in economic activity and decision making process at house and community level is a sign of general socio-economic development of the women in particular and society in general. The survey tried to collect information about various activities in which the women members of family are participating. The analysis of data revealed that women in the surveyed families engaged in activities such as cultivation, Allied Activities (Dairy, Poultry, Sheep rearing, etc.), trade & business, household work, and agriculture labour. There are families in which women members are involved in more than one activity; hence, the total figure is more than the affected household figure of 132. All women (100%) member look after household activities like any other women member in the country.

117. There are about 72.32% of women member engaged in cultivation. Only 4.24% of women members are involved in other activities, 65.25% women are involve in collection of water, 21.21% are engaged as an agricultural labors. 13.74% are helping their family members in trade and business. Only 5.25% women are in service and merely 20.81% of women are worked as allied activities. Details are provided in the Table 3.13 below. Women were involved in multiple activities in the daily life and the percentage of their involvement in various activities is given in table..

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

| S.No | Activities women engaged | % Woman |
|---|---|---|
| 1 | Cultivation | 72.32 |
| 2 | Allie Activities, | 20.81 |
| 3 | Sale of forest products | 1.41 |
| 4 | Trade & business, | 13.74 |
| 5 | Agricultural labour, | 21.01 |
| 6 | Non Agricultural labour | 5.25 |
| 7 | HH Industries | 1.41 |
| 8 | Services | 5.25 |
| 9 | Household Work including cooking | 54.75 |
| 10 | Taking care of infants/children | 71.52 |
| 11 | Fetching water | 65.25 |

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

**Table** Error! No text of specified style in document.**-1: Involvement of women in family**

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

119. **Women Time Disposition:** This section highlights women's involvement in various activities throughout the day. As the table below shows, over nine hours in a day, a woman spends on household chores, and nearly 7 hours on relaxation. This leaves very little time for any other activity, which may be economically gainful. However, in rural scenario, number of activities is carried out simultaneously. As the table shows some women spend time in

wage earning or help family members in cultivation or in household industry. Table below presents average time spent by responding women in individual routes.

**Women – Time Disposition**

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

120. **Work Participation:** Himachal Pradesh has made good progress on gender issues. Women complete higher levels of secondary school than in many other states. Moreover, gender gaps in schooling are closing. It is important to note that female labor force participation in the state is the highest in the country. Despite these achievements, challenges remain. The state's ratio of girls to boys is below the national average, having improved only slightly in recent times. While female labor force participation in the state is high, it has declined after 2005. In rural areas, there are very few non-farm jobs for women. In contrast, urban women work less, but they have the same types of jobs as urban men. The female work participation rate on an average in 991 was 38.75 percent which has increased to 46.34percent in 2001. There has been remarkable improvement in the work force participation rate of women as evident from various censuses. Similarly the male work force participation rate on an average in 1991 was 53.20 percent which has increased to 56.95 percent in 2001.

121. **Literacy:** Literacy rates among women in the state risen dramatically from only 4.8 percent in 1951 (males 7.5 percent and female 2 percent) to 83.87 percent in 2011 (male 90.83 percent and female 76.6 percent). Health Status There is no doubt that women's health is affected in gender specific ways by environmental degradation and poverty.

122. **Mortality:** The depletion of environment leads to a scarcity of natural resources, which means women's workload is increased as they spend more time searching for fodder and fuel wood to meet their family's daily needs. Discrimination against a female child is evident from the fact that girls experience higher rate of mortality in younger age- groups as compared to the boys. In 2009, the female infant mortality rate was observed to be 45 as compared to male infant mortality rate of 44. Health of women is an important factor in determining the overall health of the society. If pregnant women are not well nourished they are more likely to give birth to weaker babies leading to higher infant mortality rate. It is also observed that where ever the infant and child mortality is higher, the birth rates are also higher. Women are exposed to a high risk of death due to pregnancy.

123. **Empowerment: A** good number of women have been elected to Panchayati Raj institution in Himachal Pradesh for the term 2011 -2016. In Himachal Pradesh there are 3243 Gram Panchyats, out of which 1639. (50.54 percent) seats have been occupied by women in 2011 panchyat elections. Out of total seats occupied by women 987 (60.21 percent) occupied by

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

### 3.5 Cultural Environment

***Archaeological and Historical Monuments***

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

***Common Property Resources***

125. The Common properties along the project road are listed in table..

**Table: Details of Common property resources within RoW**

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

***Utilities Within Row***

126. The project road has 92 electric poles, 21 street lights/lamp poles, 76 telephone poles and 5 transformers within the right of way. The details of such utilities are given in table. As per the project road widening scheme most of these utilities, which are presently along the edge of the carriage way / shoulder will required to be shifted to the adjacent locations within the available RoW.

**Table : Utilities within Right of Way of the Project Road**

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

### 3.6 Hazard and Vulnerability Profile

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

***Landslide Prone Area Zones***

128. As per Landslide Vulnerability map of Himachal Pradesh, the project road traverses in severe to very high landslide zones as shown in Figure . During the field investigations, 2 stretches

with cumulative length of 390m along the project road have been identified, which are prone to landslides and slippages. Chainage wise landslide locations are listed in table.

**Table: Landslide locations along the project road**

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

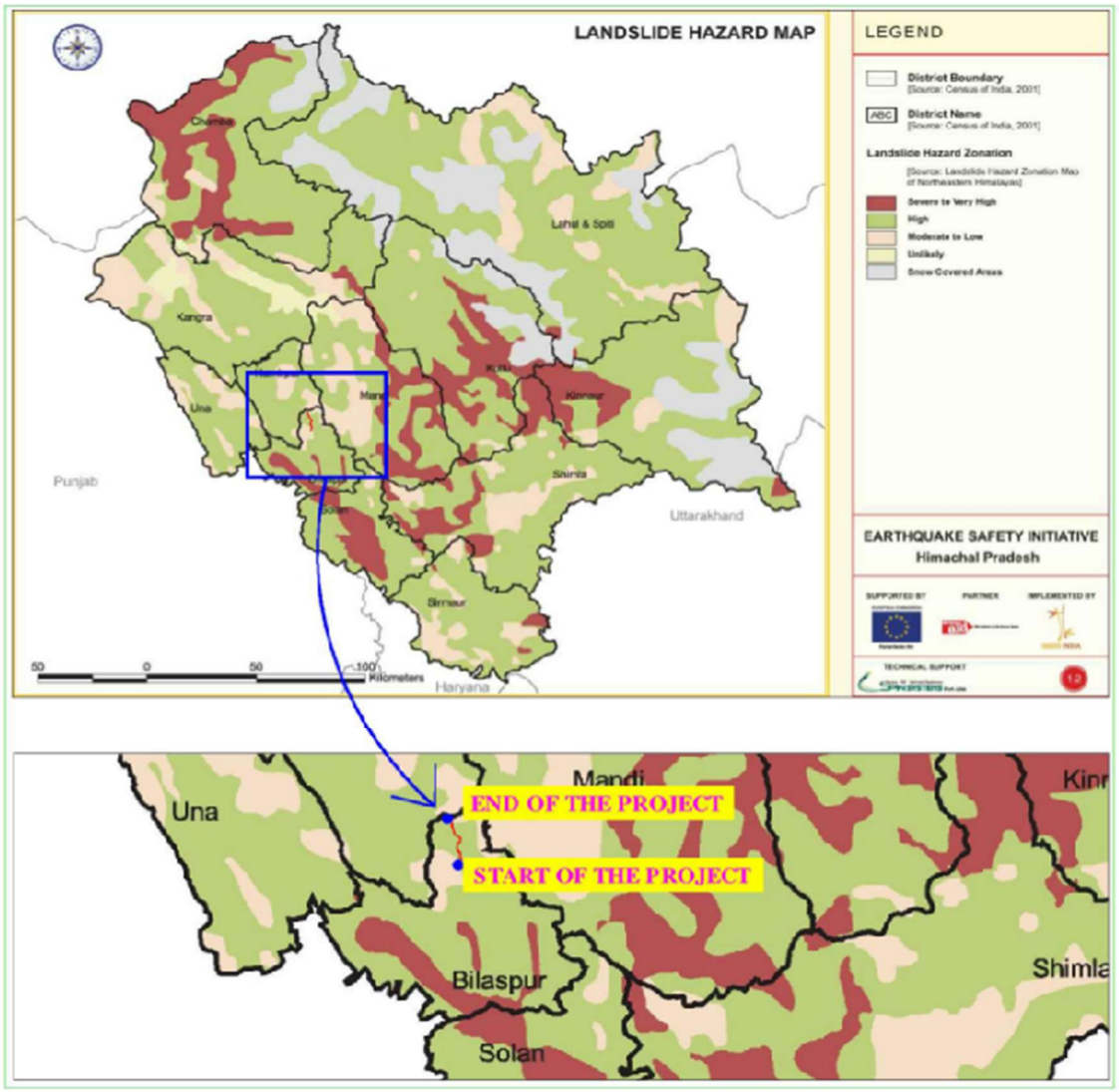



**Figure 3.18: Landslide Hazard Map**
**(*Source :- https://ndmahimachalpradesh.*)**

***Wind Hazard***

129. As per wind hazard map of Himachal Pradesh, the project road completely traverses in moderate damage risk zone-II. The wind hazard map along the project road is shown in Figure

3.19.

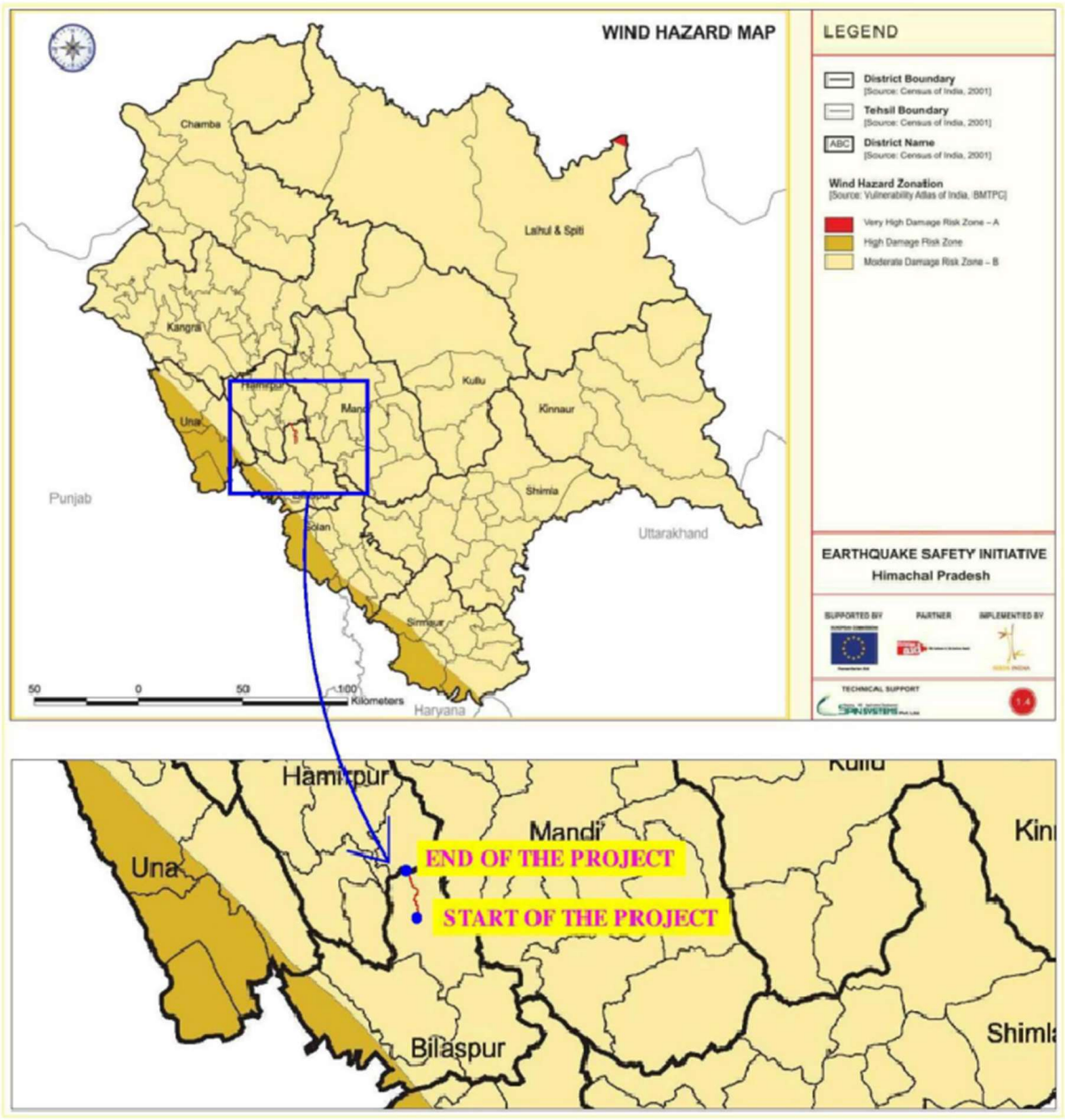



**Figure 3.19: Wind Hazard Map of Bilaspur District**
***(Source :- https://ndmahimachalpradesh.)***

### *Flood Zones*

130. As per flood zone map, the project influence area is not prone to flash floods as can be seen in Figure 3.20.

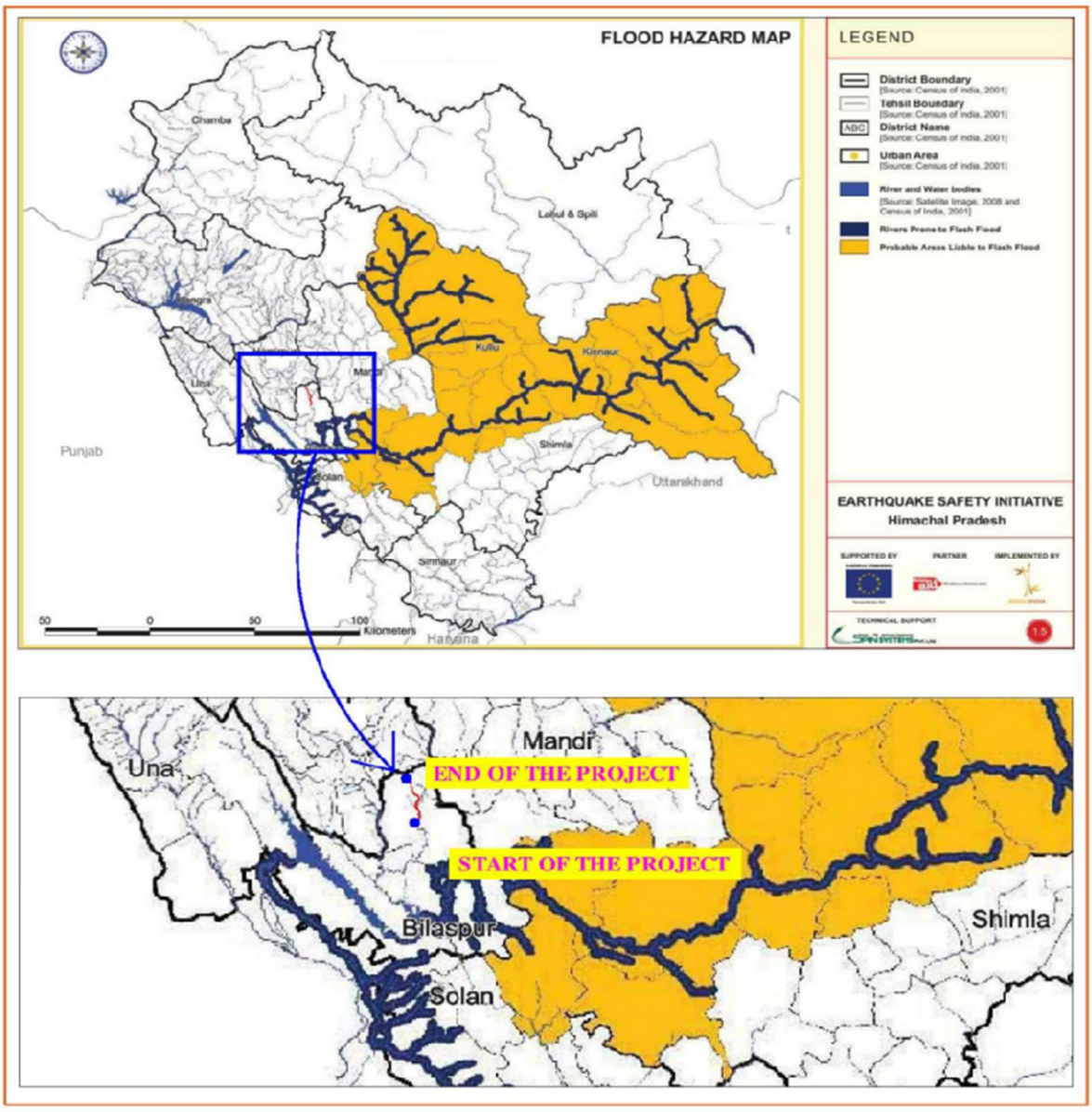



**Figure 3.20: Flood Hazard Map**
***(Source :- https://ndmahimachalpradesh.)***

131. The project road has 3 seasonal streams, which flows across and drains the water during rainy seasons. The chainage wise details of these seasonal streams are given in table.

**Table: Seasonal Streams along the Project Road**

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

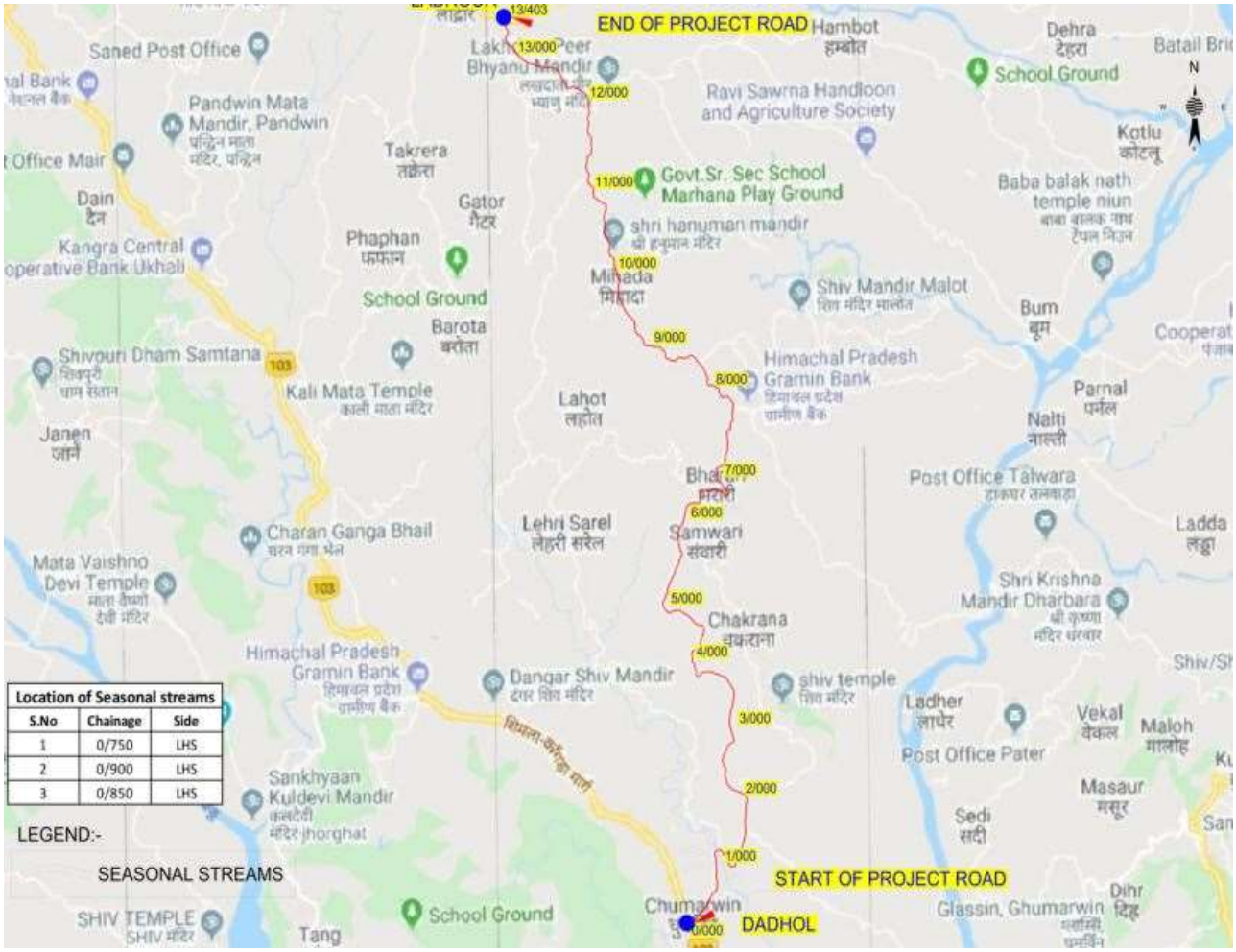



**Figure 3-21 : Map Seasonal Streams locations**

### *Earthquake Zones*

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

**Table: Earthquake Zones of India**

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

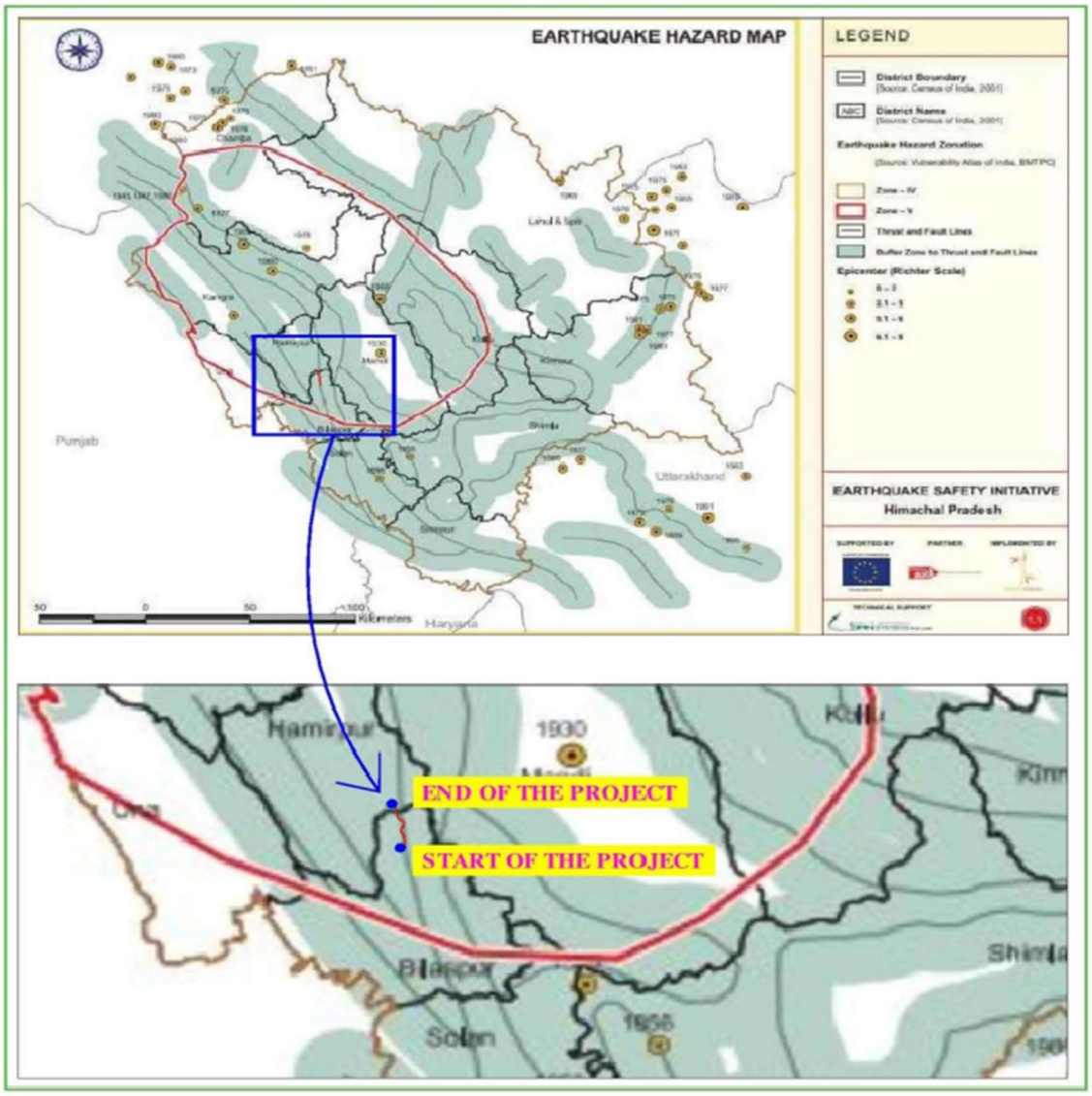



**Figure 3.22 Earthquake Hazard Map**
***(Source: - https://ndmahimachalpradesh.)***

### *Vulnerability Status of Project*

133. 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 and **Error! Reference source not found.**.

**Table: Over all Vulnerability of Project road**

| S.No | Name of Road | District | Hazards | | | Over all Vulnerability |
|---|---|---|---|---|---|---|
| | | | Earthquake | Flood | Landslide | |
| 1 | Dadhol-Ladrour | Bilaspur | Zone – V (Very High Damage Risk Zone) | - | High | Moderate |

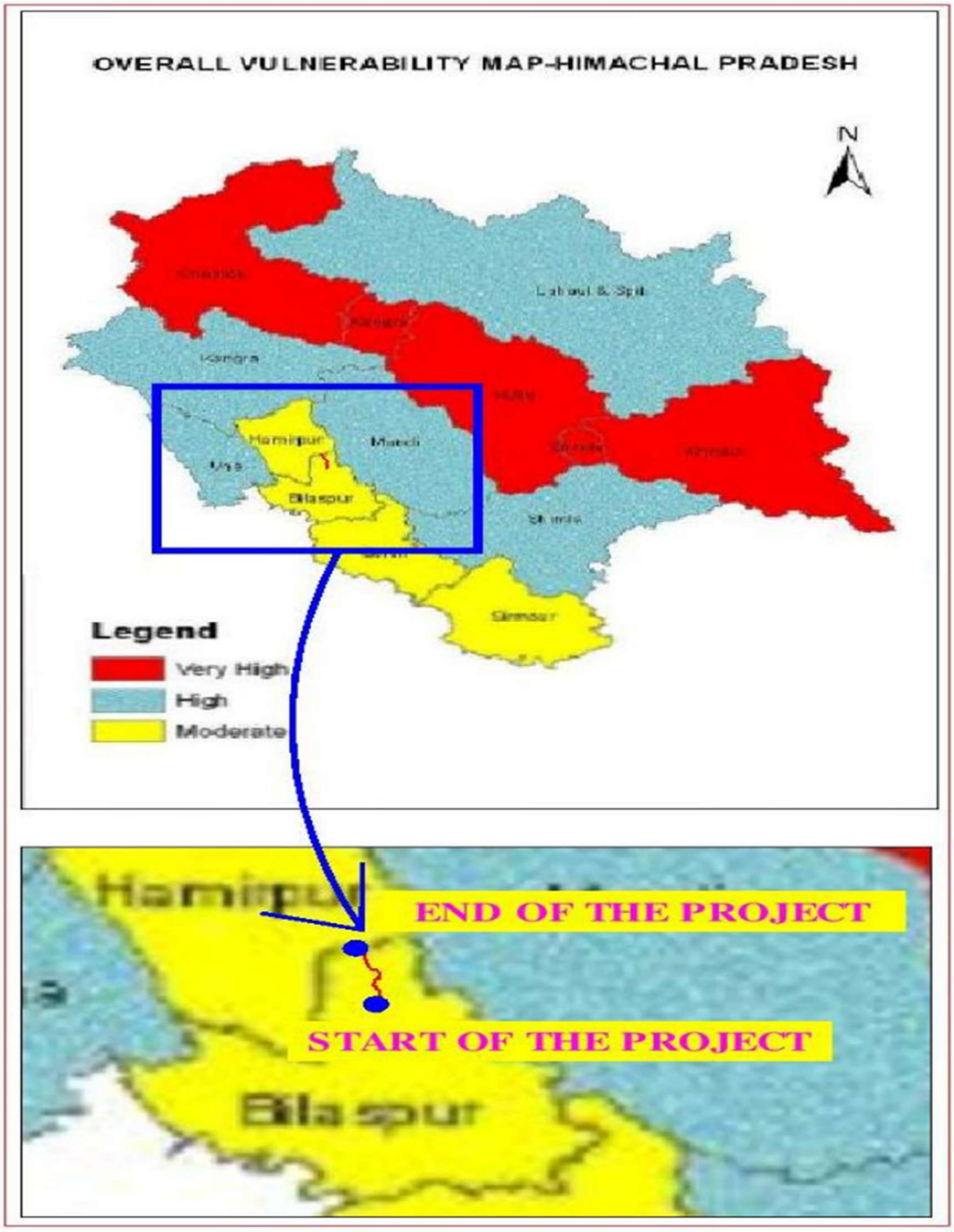



**Figure 3.23: Overall Vulnerability Map**
**(*Source:- https://www.hpsdma.nic.in/*)**

# CHAPTER 4 – STAKEHOLDER CONSULTATIONS & INFORMATION DISCLOSURE

134. This chapter summarizes public/stakeholder consultations conducted as part of environmental and social impact assessments for the proposed road construction between Dadhol to Ladrour. Consultations were also held with communities at congested locations with impacts on buildings and where major common property resources are getting affected- such as any religious structures etc., besides institutional stakeholders were consulted. Appendix 3 presents the list of stakeholders consulted.

135. 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

136. 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.

137. 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.

| S.No | Public Consultations Date, Place and No. of participants | Summary of Queries, Concerns and suggestions | Responses provided |
|---|---|---|---|
| 1 | Place : Dadhol Chowk<br>Date: 12.09.2019<br>**No. of Participants: 21, Male 21, Female 0.** | • People wanted to widen the road equally from the centerline. They wanted know what compensation will be paid to title holder and non title holders<br>• Those losing house wanted to know what alternative would be provided by the project. Most of the people asked for alternative house/site.<br>• The people asked the project authority not to impact the temple located at the chowk, as it was considered holy place in the village, and was used for various religious and community purposes.<br>• The people asked the project authorities to consider available open land wherever it was available instead of impacting their house and land.<br>• The people asked for safety measures in hospital and school zones.<br>• In Dadhol Chowk there are about 15 houses getting affected. The people asked to minimize the impact.<br>• People said that if the existing road is maintained there will be no problem. However, they mentioned that sufficient land is available on both side of the alignment.<br>• The Road is congested and requires improvement.<br>• The temple in the middle of road must not be damaged, rather should be enhanced by provisions of some sitting arrangements and drainage pipe from water sink. Almost people from 50 different villages come | • Communities were informed that designs will be worked out to avoid and/or minimize impacts on structures. Compensation will be paid to title holder as per the provisions of RFCTLARR Act 2013 in case land is taken using the act and in case of direct purchase, it will be decided as per the Private Negotiations committee. For non-titleholders, assets on the land will be compensated at replacement cost.<br>• Suitable relocation spots would be identified for such purpose. However, all effort is being to avoid impacts and or only partially affect structures.<br>• Communities were informed that their concern was noted and duly passed on Design team.<br>• Communities were informed that designs are being so as to use all available empty land but complete avoidance may not be possible. However all efforts are being made to minimize impacts through analysis of alternatives<br>• Communities were informed that their concern was noted and duly passed on Design team.<br>• Communities were informed that their concern was noted and duly passed on Design team<br>• Communities were informed that their concern was noted and duly passed on Design team<br>• The Road is congested and requires improvement.<br>• Communities were informed that their concern was noted and |

| S.No | Public Consultations Date, Place and No. of participants | Summary of Queries, Concerns and suggestions | Responses provided |
|---|---|---|---|
| | | to visit temple.<br>• There should be no loss to the properties of the people, as adequate width is already available on roadside.<br>• Road development will improve the socio-economic conditions of the people. During construction phase also people will be benefitted as they will get jobs.<br>• Provisions for parking are must in the city area.<br>• There must be a provision of street lights upto 300 m, where a controlled atmospheric system (CAS) is under construction by HPMC (HP Horticulture Produce Marketing & Processing Corporation).<br>• The quality of the material used for road construction should be good and there must be a proper supervision.<br>• Drainage must be provided on upgraded road.<br>• Bus stops including bus lays must also be provided on improved road.<br>• Executing agency should take up the structural works (bridges and culverts) in priority during the early phase of the project cycle or otherwise these works mostly gets delayed.<br>• Junction at Dadhol must be developed. | duly passed on Design team<br>• Communities were informed that designs are being so as to use all available existing ROW. In addition, only structures or properties in the Corridor of Impact would be affected. Analysis of alternatives is being carried out for this purpose.<br>• Efforts would be made to ensure maximum opportunities would be available for local persons.<br>• Communities were informed that their concern was noted and duly passed on Design team and such aspects can be incorporated provided there is adequate space.<br>• Communities were informed that their concern was noted and duly passed on Design team.<br>• Project authorities will ensure these aspects in their contract with the construction contractor. There will be construction supervision agency that will support the department in monitoring.<br>• Drainage will be definitely included in the road designs<br>• Provisions are being made for improved bus stops including toilets. Bus lays would be possible where empty land is available.<br>• Project authorities will ensure these aspects in their contract with the construction contractor. There will be construction supervision agency that will support the department in monitoring.<br>• Communities were informed that their concern was noted and duly passed on Design team. |
| 2 | **Place:** Gahar High School **& Bharari** | • The school campus will become prone to an accident during construction and operation phase. Some measures must be provided to | • Measures would be taken to avoid that. |

| S.No | Public Consultations Date, Place and No. of participants | Summary of Queries, Concerns and suggestions | Responses provided |
|---|---|---|---|
| | **Date:** 13.09.2019<br><br>**No. of Participants:** Male 4, Female 2, Total 8 | avoid that.<br>• Noise barrier would be required to minimize the noise pollution.<br>• Debris can be disposed off in the ground and it can be raised up but decision for the same will be taken by SMC (School Management Committee).<br>• Presently school has two small pits for solid and wet waste disposal, but it needs to be widened if funds are available in project road. Compost made of wet waste will be used to raise new/existing plants grown by school's eco club members. | • Noise barriers would be provided in the road design wherever required.<br>• SMC (School Management Committee) were informed that their concern was noted and duly passed on Design team.<br><br>• SMC (School Management Committee) were informed that their concern was noted and duly passed on Design team. |
| 3 | **Place:** Police Station Bharari<br>**Date:** 13.09.2019<br><br>**No. of Participants:** 3. Male 3, Female 0 | • accident reported are very less<br>• most of the cases registered under women related crime pertains to dispute in land<br>• The bridge near Dadhol is an accident prone area.<br>• Sometimes, a level difference on black top (bituminous coat) and shoulder become big in due course of time and this also leads to accidents. | • Noted<br>• Noted<br><br>• Communities were informed that their concern was noted and duly passed on Design team.<br>• Communities were informed that their concern was noted and duly passed on Design team. |
| 4 | Place: Model School Bharari<br>**Date:13.09.2019**<br>**No. of Participants:** 6, Male 6, Female 0 | • The Road is congested and requires improvement.<br>• This school is very old and has been existing for 60 years. Any property of the School, if damaged must be restored.<br>• There is a problem of noise pollution and it needs to ensure that noise barrier be provided to control the same<br><br>• Strength of the school is about 400 hundred and in front of the school gate there is a hospital. This has made the junction very prone to an accident. To ensure safe access of the people into school and hospital, it is required that a foot over bridge be provided here. | • Precisely for this purpose the project is being taken up and will<br>• Project will replace/rebuild such impacted structures<br><br>• Noise barriers would be provided in the road design wherever required.<br>• Foot over bridge to go across 4 meter road might not be feasible; alternatives such as shifting the current bus stop further away, providing speed breakers would be required |

Consultations outcomes with communities on specific issues at the select locations are presented in Table below:-

| S No. | Location/Date | Issue Raised and Suggestions | Recommendations/ Mitigation Measures |
|---|---|---|---|
| **1.** | At Gram Panchayat **Padyalag** 11.09.2019<br>Total Participant 17,Male 13,Female-4 | **Relocation of Religious Structure at Padyalag**<br>• The Religious Structure at the Dadhol junction attracts pilgrims from 50 villages and requested not to disturb.<br>• Participants suggested that every affected religious property (partially or fully) must be modified/ relocated and enhanced properly prior to the commencement of work. | • Religious structure at the junction will not be disturbed and improvements will be proposed within the existing ROW and additional developments will be planned.<br>• It was recommended that all the structures likely to be affected need to be modified or relocated at new places as the case is in consultation with local community. The cost of construction/ relocation will be borne through project. |
| **2.** | At all locations including (at **Bharari Panchayat**<br>12.09.2019<br>Total Participant 22,Male 16,Female-6 | **Relocation of the Households/ PDF's**<br>**At Bharari Panchayat**<br>• They have requested not to disturb the settlements in the build-up area and proposed to take bypasses. As per the social survey there are approximately 500 persons getting affected. The people requested to avoid the widening.<br>• There have been issues raised on the compensation not given to some families for the acquired lands. | • The buildup location in the rolling hilly terrain has environmental constraints and indulges in heavy costs during constructions.<br>• As suggested the widening will be consider in view of social constraints.<br>• Resettlement site will be identified and developed. Compensation for land, structure and other properties shall be paid as per RFCTLARR Act 2013.<br>• It is requested by the project proponent to address the old compensation issues by the concerned authority of Revenue Department of Himachal Pradesh. |
| **3.** | At all locations<br>04.09.2019 | **Compensation payment procedure:** The compensation rates should be as par at market rates | Compensation for land, structure and other properties shall be paid as per RFCTLARR Act2013 and Government of Himachal Pradesh Land Acquisition Rules. |
| **4.** | At all locations<br>03.09.2019 | **Road safety:** 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. |
| **5.** | At all locations<br>04.09.2019 | **Provision for under pass / foot over bridges at junctions, school zones, pedestrian crossing, cattle crossing:** 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. |

| S No. | Location/Date | Issue Raised and Suggestions | Recommendations/ Mitigation Measures |
|---|---|---|---|
| **6.** | At all the locations<br>12.09.2019 | **Provision of employment/ income restoration to the affected household:** 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. |
| **7.** | At all location<br>12.09.2019 | **Provision of road side drains, retaining walls:** 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. |
| **8.** | At all location<br>03.09.2019, 04.09.2019 | **Consultation and participation:** People want more consultation during project implementation and want to participate in the project | Public consultation will continue throughout the project cycle. |
| **9.** | At habitation site<br>03.10.2019, 04.09.2019 | **Relocation of Water Tank/ Well/ Hand Pumps:** Majority of the people living along the project corridor depend on water tank/ hand pump for drinking water and disposal of these will especially affect women folk. | Project authority will be informed about this and to carefully relocate/ install required number of water tanks/ well/ hand pumps at identified locations. |
| **9.** | At market places<br>04.09.2019 | **Public toilets at market places:** Lack of public toilets (ladies' toilets) at market places as well as near bus stops | Project authority and design team will be informed about this and make provisions |
| **10.** | At all locations<br>12.09.2019 | **Pollution and health risks at the time of construction work:** 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. |

# CHAPTER 5 – ANALYSIS OF ALTERNATIVES

## INTRODUCTION

138. This section discusses the analysis of alternatives that have been considered for the widening/upgradation of the project road. The analysis of alternatives considers both "With" and "Without" project road improvement scenarios. Further, within project road improvement scenario, various options/alternatives for minimization of both environmental and social impacts have been considered for the final design alternative.

### *WITH AND WITHOUT PROJECT ALTERNATIVES*

#### Without Project Scenario

139. The project road has many settlements on its either side, which is affecting the smooth traffic flow, causing severe conflicts between the local and the through traffic. This is further compounded by the increasing traffic volumes, poor pavement conditions, poor geometry, inadequate turning radius, land use conflicts, in terms of uncontrolled development along the road and the encroachments on to the RoW, at times extending upto carriage way. The population growth, increase in traffic volumes and the economic development along the corridor would continue to occur and will worsen the present situation, which is already critical. The existing unsafe conditions and the adverse social and environmental quality along the road would continue to worsen in the absence of any proposed improvements to the project road.
140. Moreover, if the project road improvement is not under taken, then the socioeconomic conditions will further degrade and therefore, development of this remote, relatively poorly connected area becomes warranted. Therefore, "no project road improvement" scenario is neither a reasonable nor a prudent course of action for the economic upliftment of the project region, as improved project road will contribute to overall development of the region including socio-economic aspects.
141. With the present road conditions, without any improvement would contribute to increased GHG emissions due to the decreased speed and deteriorating pavement conditions in future years.

#### With Project Scenario

142. The 'with project scenario' is anticipated to bring in beneficial impacts in the long run on social, environmental, economic, financial aspects of the region including reduced GHG emissions. Based on the present traffic and projected volumes and available RoW, widening of the present single lane road to an intermediate lane has been considered as the most feasible or warranted improvement configuration.
143. "With Project scenario" will be economically viable and would contribute to the development goals envisaged by the Government of Himachal Pradesh and enhance the growth potential of the region as a whole."With Project scenario" considers avoiding the large-scale acquisition of land and properties, and limits the improvement option to the existing ROW. Further, the scenario does not consider significant alteration in the existing vertical profile of the road, except at critical stretches for improvement of road safety and largely follows the existing profile.
144. A Comparative assessment of the "with and without" project scenarios along with anticipated benefits with project scenario are presented in Table 6-1.

**Table** Error! No text of specified style in document.**-2: "With and Without" Project Scenarios - A Comparative Assessment**

| Component | "With" Project Scenario | 'Without" Project Scenario |
|---|---|---|
| Highway Geometrics | Intermediate lane is being developed with geometric improvements | Existing Single lane carriageway with poor geometrics |
| Design Speed | 30/40kmph for Intermediate lane | 20-30 kmph entire project section. |
| Congestion in Settlements | Segregation of local and through traffic by the provision of service roads, if any. | Congestion In urban/rural areas due to mixing of local, pedestrian and through traffic. |
| Felling of road side trees | Felling of both old and weak trees along the road edge, which can a hazard. Thrice the number of saplings to be planted as compensatory plantation. | 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, road signage, speed breakers and pedestrian (zebra) crossings, foot paths with railings for pedestrian walk are provided. | Pedestrian safety and issue of major concern especially along the settlements and congested sections which can lead to frequent conflicts with local people and thorough traffic users. Safety of Pedestrians at settlement areas is at risk. |
| Road Safety Measures | Provision of better pavement surface, adequate road signage, road markings, zebra crossings, crash barriers and improvement of geometry to improve safety and reduce accidents. | Accident /incidents are likely to increase with the increased traffic volume over the time, reduction in average speed and in travel time. Safety of Pedestrians at settlement areas is at risk. |
| Environmental Quality | Development of road in urban settlements improves environmental quality within the urban areas due to lower pollution levels and relieving of congestion. Besides, tree plantation and provision of enhancement features shall not only provide aesthetics but also improve the air quality along both rural and settlement areas. | Poor environmental quality due to slow traffic speed, congestion and high emission levels. Further deterioration is expected due to increase in traffic volumes and congestion. |
| Drainage | Will be improved due to reconstruction of culverts / bridges/ side drains with adequate capacities for smooth passage of water. | These issues remain unaddressed without the project and can lead to erosion, slope stability issues due to improper/inadequate drainage. |
| Environmental Enhancement | Enhancement of water bodies, community and cultural properties will occur in an aesthetic manner. | No enhancement measures will occur. |
| Development | Due to improvement in access and better connectivity, higher potential for socio-economic development. | Development activities will be greatly hampered due to poor and degrading connectivity/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 will increase to cater to increasing traffic, Vehicle operating cost & travel time cost. |

| Component | "With" Project Scenario | 'Without" Project Scenario |
|---|---|---|
| GHG emissions | With improved pavement surface, increased speed, smooth flow of traffic, GHG emissions will reduce every year over its life cycle. | With deteriorating pavement surface, decrease in average speed, high fuel consumption, slow moving traffic, GHG emissions will increase every year over its balance life cycle |

## *ENVIRONMENTAL* AND SOCIAL *CONSIDERATIONS*

145. The various avoidance measures for minimizing the extent of environmental impacts and avoiding of sensitive environmental features have been worked out. The table 6-2 provides the measures that have been adopted for offsetting the impacts.

**Table** Error! No text of specified style in document.**-3: Alternative considerations for Minimization of Environmental Impacts**

| Environmental and Social considerations | Provisions considered in project road design |
|---|---|
| Sustenance of Design Speed for through traffic | Improved geometrics |
| Improvement of Road Safety | Intersection Improvements; Geometric improvements at curves, Signage etc., |
| Improved and 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 | 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 |

146. 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.

147. 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.

148. 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.

149. An attempt has been made to present the details of the critical areas which require a detailed study on ‘Alternatives’ at the detailed project report stage. With the help of the survey and consultations two broad alternatives has been worked out, those are summarized in Table 6.3.

| Table 6-3 – Analysis of Alternative- Input to Technical Design | | | | |
|---|---|---|---|---|
| **S.No** | **Chainage/Place** | **Alternative 1** | **Alternative 2** | **Remarks** |
| 1 | In dense Built up area- 5+700 - 6+860 (Ladhyani & Bharari) | The design is intermediate lane, concentric widening in the built up sections (9 – 10m) proposed. The impact in these locations reduces loss of assets and families from being displaced. Though encroached structures are about 350 within the existing ROW an effort have been made to minimize the impact to save 273 families from getting affected from the surveyed 500 households. As per design consideration the structures (Residential and Commercial) are partially being affected (minor impact) at few locations and only 80 families are involuntary displaced. Therefore, major negative impacts on structures and livelihood with these improvements measures have been minimized. | For two lane road design in the existing corridor within the available ROW of average 20-24m. There is a likely impact on about 500 families for a total displaced in proposed corridor. |   |
| 2 | Lehri sarel , Kothi (Chainage 7+300 – 9+300) | For improvement of horizontal alignment at these locations have constraints of land acquisition. Hence curve improvements were proposed within the available ROW. | As per the design standards, the improvements of horizontal alignment at sharp curves requires for proposed realignments. Due to the land constraints Ex: one bigha at 15 lakhs/bigha. The additional land required for improvements and upgradation 20 bigha's. | |

| Table 6-3 – Analysis of Alternative- Input to Technical Design | | | | |
|---|---|---|---|---|
| **S.No** | **Chainage/Place** | **Alternative 1** | **Alternative 2** | **Remarks** |
| 3 | Bharari (6+700) Government Secondary School. | At this location, there is a senior secondary school on the LHS and Community Health Center RHS. The road is very narrow with sharp curves and land constraints for about 120 mtr length. The proposal of realignments affects 10 structures on the RHS and health center. | The design standards to improve the horizontal alignment and to smoothing the curves require an additional land, upon detailed consultation with school authority they agreed to give the land for upgradation of the corridor and safety measures at these silent zones. There is little impact on compound wall of the school and nil impacts on RHS structures. |  |

In order to minimise losses and impact on livelihood of the people in congested places where the likely impact would be high due to improvement of the road, alternatives/options arrived through public consultations and design consideration are given above Table . In order to minimise the impacts, Alternative – I has been preferred at all above-mentioned locations.

**Table 6.4 – Analysis of Alternatives**

| S.No | Chainage | Alternatives | Design Consideration and Recommendation for adoption of Alternative |
|---|---|---|---|
| 1 | Km. 0+000 to Km. 3+600 | **Option-1**<br><br>With existing RoW of 12 meters in these locations, there exists a strong public resistance because of more than 200 structures are getting affected.<br><br>People are insisting to confine the proposed road construction in minimum ROW to avoid the impact.<br><br>**Option -2**<br><br>Local Public have very less resistance to have restricted RoW in the built-up location, where the impact will be minimum.<br><br>People are ready with minimal demolition of encroached structure along with compensation for their project affected structure (encroachment). | • With option no.-2, there will be less demolition of structure in Built-up Zone. This proposal seems to be effective and economical than the Option –1.<br><br>• Under this, a Govt primary school at Gahar (Km 1+130) is adjacent to the right of way of the project road have a boundary wall with in adequate height. Therefore, re-construction of boundary wall of 5m height which can serve as both boundary wall and noise barrier will be required to limit the propagation of noise levels into school. |
| 2 | Km. 3+500 to Km. 4+600 | The Proposed ROW is eccentric to left as it is in the Rural zone | • The proposed development will follow the type-1. Section is applicable on most of the rural sections of the project, where the expansion/rehabilitation of carriage way is proposed eccentrically, typically on left side of the existing carriageway.<br><br>• Under this, school at Km 4+520 near Ladhyani is adjacent to the right of way and provision of Noise Barrier cum boundary wall will be required to limit the propagation of noise levels into school |

<table>
<tr><th>S.No</th><th>Chainage</th><th>Alternatives</th><th>Design Consideration and Recommendation for adoption of Alternative</th></tr>
<tr><td rowspan="4">3</td><td rowspan="4">Km. 4+600 to Km. 8+300</td><td>Option-1</td><td rowspan="4"><ul><li>With option no.-2, there will be less demolition of structure in Built-up Zone. This proposal seems to be effective and economical than the Option –1.</li><li>Under this, school at Bharari (Km 6+470) on RHS, is adjacent to the right of way of the project road, which does not have a boundary wall and the class rooms are adjacent to the right of way. Therefore, construction of boundary wall of 5m height, which can serve as both boundary wall and noise barrier, will be required to limit the propagation of noise levels into school.</li><li>Another school at Bharari (Km 6+470) on LHS, is adjacent to the right of way of the project road and 3m wide strip along with the school boundary wall is encroached into the RoW. The project design requires clearing the encroached land for design improvement of the project road. The school has constructed boundary cum retaining wall and school utility buildings like drinking water counter, kitchen of mid-day meal scheme, seating arrangement at basketball court and toilet blocks in the encroached RoW.</li><li>The school authorities at Bharari (Km 6+520) were consulted as part of stakeholder consultations and the authorities acknowledged that the school buildings have inadvertently extended into the right of way more than a decade ago. At present, the school authorities are willing to return the land, provided the existing facilities within such encroached RoW land are reconstructed elsewhere within the school complex but at no cost to school.</li><li>Provision of noise barrier cum retaining wall at Hospital near Bharari will be required.</li></ul></td></tr>
<tr><td>With existing RoW of 12 meters in these locations, there exists a strong public resistance because of more than 150 structures are getting affected.<br><br>People are insisting to confine the proposed road construction in minimum ROW to avoid the impact.</td></tr>
<tr><td>Option -2</td></tr>
<tr><td>Local Public have very less resistance to have restricted RoW in the built-up location, where the impact will be minimum.<br><br>People are ready with minimal demolition of encroached structure along with compensation for their project affected structure (encroachment).<br><br>
<table>
<tr><th>With out Project Scenario</th><th>With Project Scenario (Widening Option by taking land with in School Complex at Bharari)</th></tr>
<tr><td>No Additional land to be taken,</td><td>Additional land of about 3m to 5.5m for a length of 250m (3m for road component and 5.5m at the time of construction);</td></tr>
<tr><td>Follow existing Centreline</td><td>Centreline shifted by 2m towards school on RHS; Footpaths provided on both sides;</td></tr>
<tr><td>Provision of Footpath based on available width, accordingly footpath provided on LHS only;</td><td>Opportunity to re-build the Retaining Wall of School premises and provision of safety grill on top of retaining wall; and</td></tr>
<tr><td>No encroachment of land from adjacent schools; and</td><td>Restoration of affected structures like Washrooms, Water kiosks, etc in school premises.</td></tr>
</table>
</td></tr>
</table>

| S.No | Chainage | Alternatives | | Design Consideration and Recommendation for adoption of Alternative |
|---|---|---|---|---|
| | | About 8 shops on LHS affected | No impacts on Structures | |
| 4 | Km. 8+300 to Km. 8+800 | The available ROW is concentric and located in rural zone | | • The proposed development will follow the type-1. Section is applicable on most of the rural sections of the Project, where the expansion/rehabilitation of carriageway is proposed concentrically. |
| 5 | Km. 8+300 to Km. 9+300 | **Option-1**<br>With existing RoW of 12 meters in these locations, there exists a strong public resistance because of more than 150 structures are getting affected.<br>People are insisting to confine the proposed road construction in minimum ROW to avoid the impact.<br>**Option -2**<br>Local Public have very less resistance to have restricted RoW in the built-up location, where the impact will be minimum.<br>People are ready with minimal demolition of encroached structure along with compensation for their project affected structure (encroachment). | | • With option no.-2, there will be less demolition of structure in Built-up Zone. This proposal seems to be effective and economical than the Option –1. |
| 6 | Km. 9+300 to Km. 10+600 | The available ROW is concentric and located in rural zone | | The proposed development will follow the type-1. Section is applicable on most of the rural sections of the Project, where the expansion/rehabilitation of carriageway is proposed concentrically. |
| 7 | Km. 10+600 to 12+100 | The Proposed ROW is eccentric to left as it is in the Rural zone | | The proposed development will follow the type-1. Section is applicable on most of the rural sections of the Project, where the expansion/rehabilitation of carriageway is proposed eccentrically, typically on left side of the existing carriageway. |

| S.No | Chainage | Alternatives | Design Consideration and Recommendation for adoption of Alternative |
|---|---|---|---|
| 8 | Km. 12+100 to 12+700 | Semi Built up Zone | **Type 3,** section is applicable in semi built up / semi urban zone with a relatively low level of traffic congestion. Footpath drain proposed on either side for effective drainage of water. |
| | | **Option -1** | |
| | | Eccentric widening was affecting 50 structures and resisted by local people. | |
| | | **Option-2** | |
| | | Concentric widening with provision of footpath and drainage was suggested option to avoid the impact within available Row. | |
| 9 | Km. 12+700 to 13+208 | **Option -1** | Concentric widening with 8 m ROW will have nil impact with concentric widening. |
| | | It a market and junction place of State Highway with shops on both sides of project road with a temple on left side of the road. The widening will affect nearly 50 shops and they will lose the livelihood. | |
| | | **Option -2** | |
| | | Restrict the improvement of the road within 8m will save all the shops | |


**Figure : Evaluation of Alignments and impacts of Project road near Govt Model School at Bharari**

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

150. The project will have both positive and adverse social impacts on the project road population. Since the project involves the upgradation of the existing road. The improvement/up-gradation of 13.5 Km of road 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

151. 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

152. Under this project and in accordance with the ESF directive[4], 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(5Nos.), ST(1Nos.), disabled, handicapped, orphans, destitute persons and woman heading the household are also recognized as vulnerable persons.

153. **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.

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

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

154. 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.

155. The estimated work force requirement for completing all operations for construction of road will be about 560, with an additional 50 supervisory/management staff at all levels. Of the estimated labors requirement of 510, at least 355 will be source from local villages and settlement areas and rest could be migrant workers whom have to be accommodated for work force camps.

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

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

156. During the construction phase, land will be required to establish camp sites cum store yards to set up wet mix macadam plants, hot mix plants and batch mix plants for road and bridge construction purposes apart from other activities like handling and stacking/storage of construction materials viz. cement, sand, stone aggregates, storing excavated top soil and other construction materials as may be required. In addition, land will also be required to establish workforce camps, if warranted.

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

158. ***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.

159. ***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.

160. ***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.

161. The migrant workers are that, who are employed for the Project but does not belong to the Project region and are not normally expected to return to their places of residence after work shift hours. The number of migrant workers in any contract package, would depend on decisions made by contractors, based on the locally available workforce and their skills for Project construction requirements. The migrant workers could be at all levels and include unskilled and semiskilled construction labour and could even comprise combination of male and women labour force. The migrant workers are either directly engaged by the contractor or through labour contractors, who supply the work force to as per the needs of the contractors. As workers on infrastructure projects are likely to be predominantly young and male, who are either single or are separated from their family or spouse, and are outside their habitual sphere of social control, the risk of sexual harassment for local women (and co-women workers, if any), is likely to be higher, in particular for younger women and girls, but also boys. In addition, this influx of labor may affect the project area adversely in the terms of additional burden on public infrastructure such as health services, utilities such as water and electricity, housing and social dynamics. Other related issues could be increased risk of spread of communicable diseases, and increased rates of illicit behavior and crime.

162. ***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.

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

i. Safety issues, like injuries/accidents/ fatalities leading to even death, while at work;
ii. Short terms effects due to exposure to dust and noise levels, while at work
iii. Long term effects on life due to exposure to chemical /hazardous wastes
iv. Inadequate accommodation facilities at work force camps, including inadequate sanitation and health facilities
v. Non-payment of wages by Employer
vi. Non-payment of benefits (compensation, bonus, maternity benefits etc.) by Employer
vii. Discrimination in Employment (e.g. abrupt termination of the employment, working conditions, wages or benefits etc.)
viii. Engagement of child labour
ix. Sexual harassment at work
x. Forced labour trafficking
xi. Security of women work force
xii. Inadequate facilities for pregnant women and lactating mothers
xiii. Inadequate facilities for the children of the workforce at workforce camp sites

xiv. Possibility of Gender based violence as the road shall traverse through sensitive locations such as hospitals, schools, etc. that are near to habitations.
xv. Absence or inadequate or in accessible emergency response system for rescue of labour/workforce in situations of natural calamities like earthquake, caving in/landslides, fire outbreak, floods and cloud bursts etc.
xvi. Health risks of labour relating to HIV/AIDS and other sexually transmitted diseases

164. 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[5] 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

[5] 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.

Plan will provide a set of measures such as orientation to all categories of labor, communities' sensitization, signing of codes of conduct by the project personnel to be undertaken during implementation on a one-time basis or as periodic activity depending on its nature.

### 6.3 …relating to Resource Efficiency 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 to intermediate lane, following the existing ground profile and without significant alteration of existing vertical profile, except for improvement of geometrics objected to enhance road safety. Therefore, there will be no significant impact on physiography of the region due to road construction.

**Impact on Geology**

170. 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.

171. 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.

172. 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 6-2 : Estimated Construction Materials Requirement**

| S.No | Description | Unit | Quantity |
|---|---|---|---|
| **A** | **Road Works** | | |
| 1 | Earthwork Excavation and rock cutting | Cum | 166671 |
| 2 | Borrowing of Good Earthwork for sub grade and shoulders | Cum | 5255 |
| 3 | Stone Aggregates for Base and sub base layers | MT | 61792 |
| 4 | Bitumen for pavement | MT | 255 |
| 5 | Water for consolidation and dust suppression | Cum | 18690 |
| **B** | **Culvert/Bridge Construction** | | |
| 1 | Stone Aggregates for Cement concrete | MT | 71587 |
| 2 | Cement | MT | 20646 |

| S.No | Description | Unit | Quantity |
|---|---|---|---|
| 3 | Concrete | Cum | 49713 |
| 4 | Sand | MT | 33556 |
| 5 | Steel | MT | 591 |
| 6 | Water for mixing and curing of concrete | Cum | 8010 |

173. **Mitigation Measures:**

- The project's demand for boulders, stone aggregate and sand for road construction will be sourced from authorized/pre-existing quarries; and earth will be borrowed from 3 locations with a lead distance of 0 to 15 Km have been identified for borrowing the earth given in figure

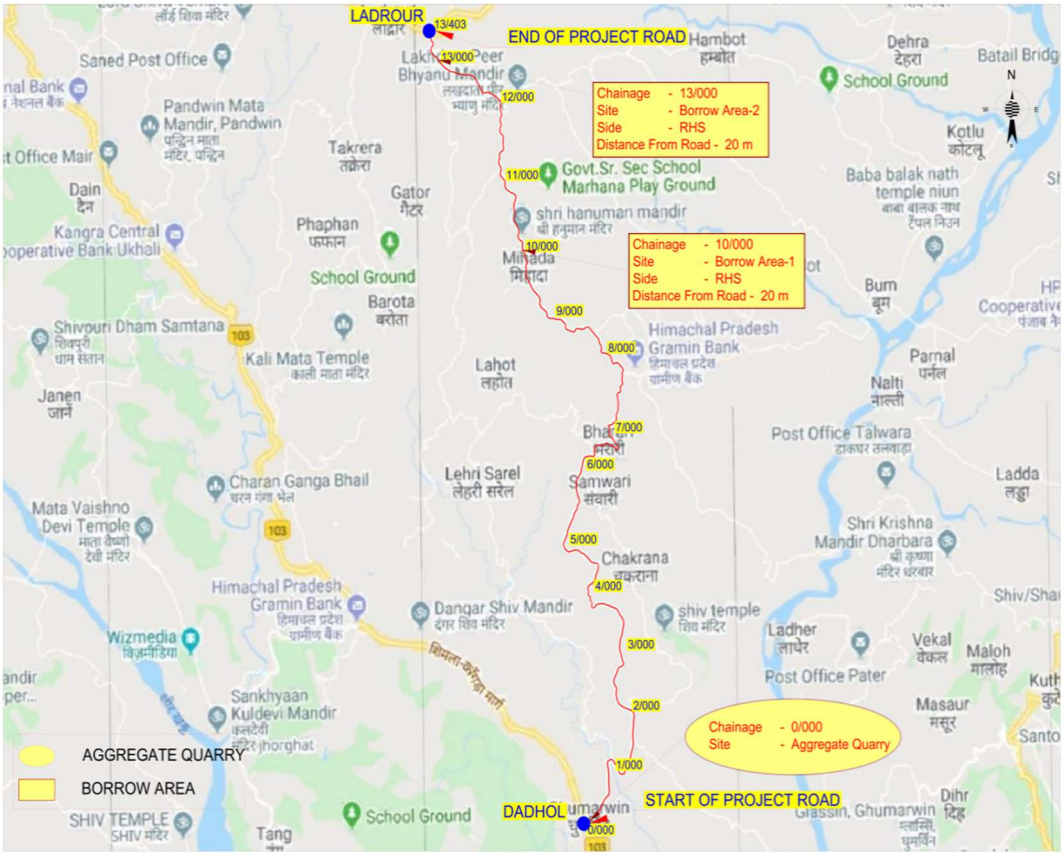



**Figure:- Maps showing potential borrow area details along project road**

- The borrowing of earth in an unregulated manner may lead to unstable slopes, erosion, loss of fertility, inundation of water, breeding areas for mosquitos and unhygienic environment. The transportation of earth from borrow and quarry areas in open/uncovered trucks can increase the dust levels and no borrowing of earth shall be permitted along the project road and within existing Right of Way. Borrow areas for importing earth for embankment/sub-grade construction shall be identified and assessed for suitability of material and likely environmental impacts and risks. Uplands shall be given a first choice while finalizing the borrow areas to reduce the foot print of the borrow areas

- Prior to commencing borrowing operations, Engineer shall approve borrow area based on compliance with existing regulations, suitability of earth, written agreement with land owner(s), likely potential environmental risks and safety hazards, and restoration/redevelopment plan. If government/panchayat land(s) have been chosen, then requisite approval/permissions from local self-government bodies shall be obtained prior to commencement of borrowing operations and conditions laid by the local bodies shall be complied thereof.
- The agreement for borrowing soil shall clearly state the lease duration, depth and land area and levels up to which the borrowing of earth shall be carried out, compensation for the agreed lease period, site restoration plan as desired/required by the landowner and any other condition mutually agreed upon between contractor and land owner. The agreement shall include a site restoration plan as agreed upon with the landowner.
- The Engineer shall conduct regular compliance audit during operation of borrow area and ensure prompt restoration of closed borrow area is in accordance with approved borrow area management plan.
- The contractor will ensure trucks are loaded only up to permitted capacities to prevent high emission, vehicle wear and tear, road surface damage due to overloading. All haul roads either paved or unpaved used for transportation of materials shall be subjected to surveillance at regular interval and rectify any type of surface damage till operation of borrow area.
- The contractor will ensure trucks used for transportation of material is covered by tarpaulin and provided tail board, so that en-route spillage and generation of fugitive dust are prevented. All haul roads (paved or unpaved) used for transportation of materials shall be subjected to daily surveillance especially settlement/residential areas for dust levels and carry out regular sprinkling of water to check air quality is compliant with NAAQS till operation of borrow area.
- Trucks in good condition shall only be deployed for operations and shall adhere to pre-determined routes. The contractor will resolve any conflict arising due to contractor activities with community or individual 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**

174. The land within the COI will be directly impact due to removal of topsoil, compaction and spillage of chemical. The compaction of soil due to plying of traffic, stockpiles, temporary facilities is also likely to impact soil structure with potential to impact organism activity, water retention capacity and nutrient retention. There is also possibility of contamination of soil from leakage and spillage during handling and storage of fuels and chemicals.

**Muck Disposal:**

175. 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.

176. The main activities that will generate excavated rock are hill cutting, excavation of existing pavements and reconstruction of culverts. The waste generation estimated is 179094 cubic meter from these activities are likely to be only from earth. Out of this, the project considers to reuse/recycle 6672 cubic meter of earth 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.

177. The reuse of 6672 cubic meter of excavated earth constitutes 4 % of the total quantity and thus only 96 % will need to disposed off in debris/muck disposal sites.

178. The extent of the identified muck disposal sites at 7 locations is 12 Ha, (as in given in Table), which is adequate to dispose the earth 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 6-3 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 | 0 | 0 | 0 | 0 | 13220 | 13220 | 87918 | 91176 | 0 | 0 | 0 | 0 | 2650 | 2360 | 3409 | 3263 |

| | | | | |
|---|---|---|---|---|
| Rock Reuse/Refill | 0 | Excess | 0 | 0 % Reuse |
| Earth Reuse/Refill | 6672 | Excess | 179094 | 4 % Reuse |

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

| S. No. | Chainage (Km) | Type of Land | Capacity (m3) | Remarks |
|---|---|---|---|---|
| 1 | 0+900 | Govt. Land | 14,000 | Villagers want this land to be developed for parking or other social activities. |
| | | | | L=70m; W=40m; H=5m (approx.) |
| 2 | 3+350 | Pvt Land | 3,600 | The owner of the land wants to develop land for agricultural purposes. |
| | | | | L=30m; W=20m; H=6m (approx.) |
| | | | | Owner details :- Shankar Ram & Contact no-7807454937 |
| 3 | 4+950 | Govt Land. | 7,200 | Villagers want this land to be developed for parking or other social activities. |
| | | | | L=30m; W=30m; H=8m (approx.) |
| 4 | 5+650 | Govt Land. | 2,400 | There exists a Govt Veterinary Hospital and depressions in the premises need to be filled up by debris. Debris disposal will level the surface which further will be used for parking purposes. |
| | | | | L=40m; W=30m; H=2m (approx.) |
| 5 | 5+900 | Govt. Land (PWD) | 1,920 | There exists a PWD's store house on existing land and depressions in the premises needs to be filled up by debris. The leveled surface will be used as parking facility. |
| | | | | L=40m; W=8m; H=6m (approx.) |
| 6 | 10+700 | Govt Land (Revenue department) | 80,000 | Land belongs to revenue department and want to develop and level it for parking and other uses. |
| | | | | L=160m; W=50m; H=10m (approx.) |
| 7 | 13+100 | Govt. Land (PWD) | 12,000 | The land near to Ladraur Market area is a vacant barren land now. People want it to be developed for parking purpose. |
| | | | | L=60m; W=20m; H=10m (approx.). |
| **Total** | | | **1,21,120** | |

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

- The authorities of schools in Gohar town shall be given advance notice about road construction schedule. The school's utility structures like drinking water counter, kitchen of mid-day meal scheme, seating arrangement at basketball court and toilet blocks will be dismantled only after new constructed structures or utilities are fully functional and handed over to school authorities.
- 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

180. As the project road completely traverse in hilly terrain and exists three seasonal streams and springs at different chainages. The streams are perennial with low to moderate seasonal fluctuation and drain water from hill side, which in absence of adequate cross drainage across the road can cause a tendency for flash floods on the downstream side.
181. The road construction inevitably is likely to alters, to a certain degree, the natural drainage regime by altering natural sheet run-off and stream hydrology. This will occur during construction from land clearance and construction of the road. In order to minimize the impacts, the following measures are considered. The drainage pattern along the project road with side drain flow direction to the nearest CD structures are given in Appendix -7.

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

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

6.3.3 Water Resources Depletion

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

184. The estimated water requirements is 21.3 million litre during project period for civil works like embankment, sub-grades, bituminous work, concrete, dust suppression and daily consumptive use at work force camp, site offices, among others. Since, depth of these bore wells range between 30 to 45m and considering ground water development status of the district, project demand could be meet with by ground water through construction of borewell.

**Table 6-4: Estimated Construction Water Requirement**

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

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

- Contractor can explore suitable locations with high water level for installing tube/bore well and abstracting water. However, tube/bore well should be installed after obtaining permission from irrigation and public health department, GoHP.
- identify and development of potential springs and seepage springs along hill sides, where collection chambers or tanks can be constructed to harness the water for meet construction demand. However, springs used by communities should be avoided.
- The Contractor shall consider renovation of existing surface water bodies new surface water bodies at suitable places in the vicinity of the project road for harvesting of water during rainy season. This water can be used for construction purpose and on completion of the construction the same can be handed over to the community for maintenance and use.
- During the pre-Construction stage the contractor should preferably identify local depressions along the alignment in consultation with the local panchayat to be developed as water storage areas.
- The water usage pattern with in the construction camps can be minimized by adopting following best practices:

    - Use buckets for washing purposes instead of using running water;
    - Use of auto shut off taps (without sensors) in labour accommodation;
    - Install water meters with main supply pipes/water tanks/bore well to assess quantity of consumed water.

### 6.3.4 Impacts on Water Quality

186. Road construction related pollution risks include accidental release of fuel, used oil or chemicals and contamination from poor waste practices that can affect surface and groundwater; contamination from construction machinery working near springs and seasons streams; discharges and disturbance of soil and sediment that drain into surface waters.
187. 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.
188. The details of waste generation during lean, average and peak construction phase is given in Table 6-6. If not treated properly, the liquid waste will potentially cause both surface and ground water contamination through surface run off and or through leaching through surface to groundwater aquifers.

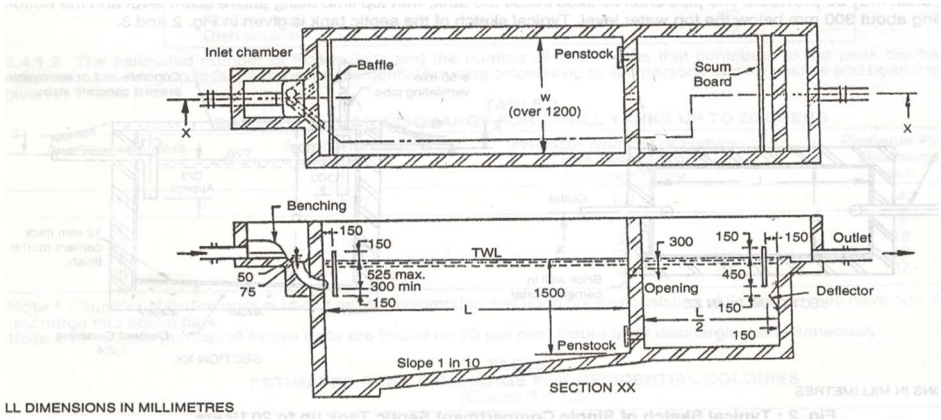
**Table 6-6 : Estimated Sanitary waste during construction phase**

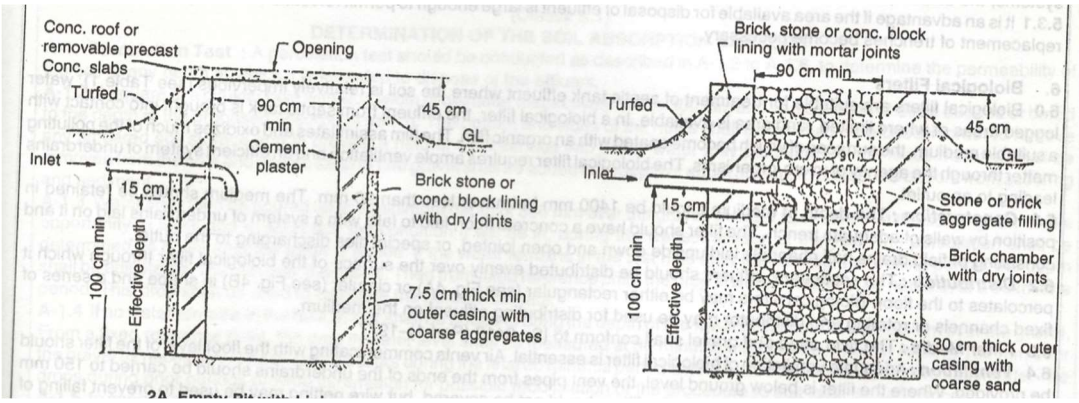
| Category | Nos | LPD | Quantity | Peak Sewage generation (80%) | Average | Lean |
|---|---|---|---|---|---|---|
| Supervision staff | 50 | 45 | 2250 | 1800 | 900 | 324 |
| Non local /Migrant labor at camp site | 155 | 90 | 13950 | 11160 | 5580 | 2009 |
| **Total** | | | | **12960** | **6480** | **2333**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

189. 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.

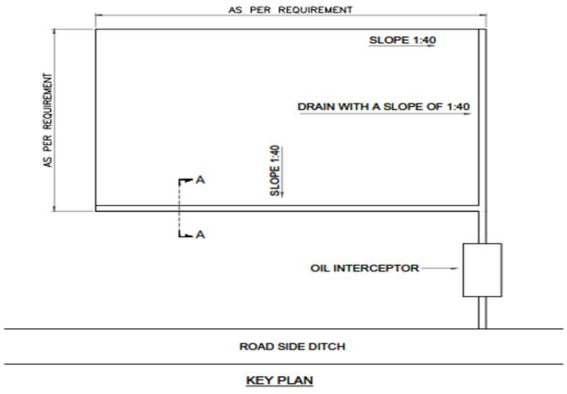
190. **Mitigation Measures:** Key avoidance and mitigation measures to avoid surface water pollution include:

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

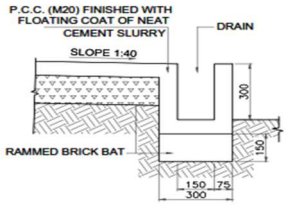




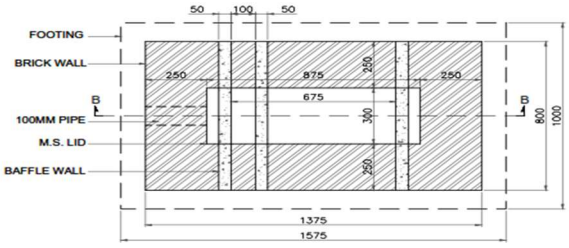

- The oil/lube storage shall be under roofed areas with impermeable cement concrete surfaces and provided with separate drainage system with oil separators. No discharge from oil/lube storage areas shall be directly discharged in to any open surface water channel/ streams.
- Oil interceptors shall be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



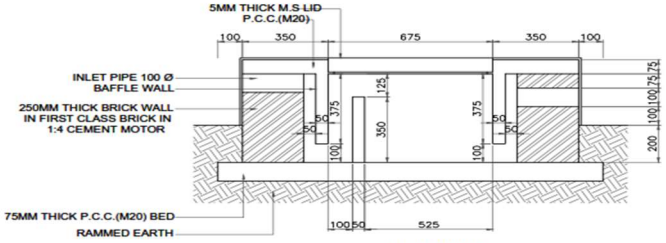
KEY PLAN



SECTION A-A



PLAN OF OIL INTERCEPTOR



SECTION B-B

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

6.4.1 Physical Environment

**Ambient Air Quality**

191. The baseline results of all air quality parameters ($PM_{10}$, PM2.5, SO2, NO2, HC, CO) monitored at Dadhol and Ladrour locations are below prescribed standards in NAAQS. This can be attributed to overall good pavement condition, less volume of traffic, and absence of polluting sources in project study area.

192. Construction activities can give rise to dust emissions under particular circumstances if not effectively managed. Road construction activities have the potential to affect receptors near to the main construction sites due to dust generated from site preparation, site excavation, hill cutting, construction activities and the tracking out of dust from Heavy Goods Vehicles (HGVs) onto the local road network. Earth works will result in exposed areas of soil which will potentially generate dust when it is windy, with dust potentially being generated when winds blow at all times of day or night, not just during active periods of construction. The level and distribution of dust will vary according to the duration and location of activity, weather conditions, and the effectiveness of suppression measures.

193. Gaseous emission during construction will be from road construction machinery, equipment and plants concrete batching plant, hot mix plant and wet mix macadam plant. The operation of vehicles, equipment and plant will result in emissions of carbon monoxide, sulphur dioxide, and oxides of nitrogen. In particular, all commercial vehicle driven with diesel fuel is often used in India. The greatest impact on air quality due to emissions from vehicles and plant will be in the areas immediately adjacent to site access. Generally, additional vehicle movements generated during the construction phase will have the potential to influence local air quality at sensitive receptors located at close proximity to road and pollutant concentration is likely to reduce with increase distance from road. The impacts will therefore apply mostly within the town/villages, though may also affect some isolated properties where they are located close proximity of construction traffic movements.

194. The GHG emissions per year, at the present traffic, road geometry and pavement conditions is using the International Vehicle Emission (IVE) modelling is estimated at 2143.569 tons of carbon dioxide equivalents (CO2) (which includes N2O as well as CH4.). The GHG estimates of the widened project road scenario (as of 2019) is 1283.428 tons of CO2, (which includes N2O as well as CH4.) Shows that the widened project road could reduce GHG emissions by 860.141 tons of CO2 as given in Table 6.7.

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

| Existing Project road at Present Traffic levels (2019) | | | | Widened Project at Present Traffic levels scenario (2019) | | | Change in emission | | |
|---|---|---|---|---|---|---|---|---|---|
| **Type of vehicle** | **$CO_2$** | **$N_2O$** | **$CH_4$** | **$CO_2$** | **$N_2O$** | **$CH_4$** | **Δ $CO_2$** | **Δ $N_2O$** | **Δ $CH_4$** |
| Two wheelers | 159.31 | 0 | 2.99 | 91.12 | 0 | 1.74 | -68.19 | 0 | -1.26 |

| Existing Project road at Present Traffic levels (2019) | | | | Widened Project at Present Traffic levels scenario (2019) | | | Change in emission | | |
|---|---|---|---|---|---|---|---|---|---|
| **Type of vehicle** | **$CO_2$** | **$N_2O$** | **$CH_4$** | **$CO_2$** | **$N_2O$** | **$CH_4$** | **Δ $CO_2$** | **Δ $N_2O$** | **Δ $CH_4$** |
| Three wheeler | 1.8 | 0 | 0 | 1.03 | 0 | 0 | -0.77 | 0 | 0 |
| LMV (4 Wheel) | 1215.56 | 0.02 | 0.01 | 694.97 | 0.01 | 0.01 | -520.59 | -0.01 | -0.01 |
| Bus | 631.88 | 0.05 | 0 | 361.34 | 0.03 | 0 | -270.54 | -0.02 | 0 |
| Heavy truck | 4.15 | 0 | 0 | 4.15 | 0 | 0 | 0 | 0 | 0 |
| Light truck | 130.76 | 0.01 | 0 | 130.76 | 0.01 | 0 | 0 | 0 | 0 |
| Total emission | 2143.47 | 0.08 | 3.01 | 1283.37 | 0.05 | 1.75 | -860.09 | -0.03 | -1.26 |
| **Total emissions (in terms of Co2 Equivalent )** | **2143.47** | **0.0238** | **0.0753** | **1283.37** | **0.0149** | **0.0438** | **-860.09** | **-0.0089** | **-0.0315** |

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

195. 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 | 2266.19 | 0.08 | 3.19 | Construction Stage | | | Construction Stage | | |
| 2021 | 2500.27 | 0.09 | 3.52 | | | | | | |
| 2022 | 2768.42 | 0.1 | 3.89 | | | | | | |
| 2023 | 3062.32 | 0.11 | 4.3 | | | | | | |
| 2024 | 3399.73 | 0.12 | 4.77 | 2036.19 | 0.07 | 2.77 | -1363.53 | -0.05 | -2 |
| 2025 | 3697.36 | 0.13 | 5.19 | 2213.97 | 0.08 | 3.01 | -1483.4 | -0.05 | -2.18 |
| 2026 | 4034.01 | 0.14 | 5.67 | 2415.42 | 0.09 | 3.29 | -1618.59 | -0.05 | -2.38 |
| 2027 | 4403.83 | 0.15 | 6.19 | 2637.83 | 0.09 | 3.59 | -1766 | -0.06 | -2.6 |
| 2028 | 4824.91 | 0.17 | 6.78 | 2888.15 | 0.1 | 3.93 | -1936.76 | -0.07 | -2.85 |
| 2029 | 5185.63 | 0.18 | 7.29 | 3104.12 | 0.11 | 4.23 | -2081.51 | -0.07 | -3.06 |
| 2030 | 5602.77 | 0.2 | 7.87 | 3355.62 | 0.12 | 4.57 | -2247.16 | -0.08 | -3.31 |
| 2031 | 6044.51 | 0.21 | 8.49 | 3619.39 | 0.13 | 4.93 | -2425.12 | -0.08 | -3.57 |
| 2032 | 6537.28 | 0.23 | 9.18 | 3913.95 | 0.14 | 5.33 | -2623.33 | -0.09 | -3.86 |
| 2033 | 7026.13 | 0.25 | 9.88 | 4209.92 | 0.15 | 5.73 | -2816.21 | -0.1 | -4.15 |
| 2034 | 7560.79 | 0.26 | 10.62 | 4527.34 | 0.16 | 6.16 | -3033.44 | -0.1 | -4.46 |
| 2035 | 8117.19 | 0.28 | 11.4 | 4860.04 | 0.17 | 6.61 | -3257.15 | -0.11 | -4.79 |
| 2036 | 8746.74 | 0.31 | 12.29 | 5236.33 | 0.19 | 7.13 | -3510.41 | -0.12 | -5.16 |
| 2037 | 9369.02 | 0.33 | 13.17 | 5609.42 | 0.2 | 7.64 | -3759.6 | -0.13 | -5.53 |
| 2038 | 10073.74 | 0.35 | 14.14 | 6032.06 | 0.22 | 0.82 | -4041.68 | -0.14 | -13.32 |
| Total | 105220.85 | 3.69 | 147.84 | 56659.76 | 2.02 | 69.72 | -37963.89 | -1.29 | -63.22 |
| **Total in Co2 Equivalents** | **105220.85** | **1.10** | **3.70** | **56659.76** | **0.60** | **1.74** | **-37963.89** | **-0.38** | **-1.58** |

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

196. 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.

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

198. Quantitative assessment for predicted level of pollutants concentration has been done using ISC-AERMOD, a recommended model by USEPA for prediction of air quality from point, area and line sources. It is based on Gaussian dispersion which incorporates the Pasquile-Gifford (P-G) dispersion parameters for estimating horizontal cross wind and vertical dispersion.

199. 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 | 1.03 | 1.31 | 2.11 |
| Year 2038 | 3.42 | 6.81 | 4.35 |

**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 | 4.16 | 6.65 | 495 | 9.14 | 16.64 | 825 |
| Dadhol | 0.8 | 1 | 100 | 3 | 3 | 300 |
| Ladrur | 1 | 5 | 200 | 5 | 10 | 500 |

**CUMULATIVE CONSTRICTIONS AT VARIOUS VILLAGES**

| Details | Baseline | | | Ground Level Constration | | | Cumulative | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2019 Parameter(µg/m$^3$) | | | 2019 Parameter (µg/m3) | | | 2019 Parameter (µg/m3) | | |
| | $PM_{10}$ | $PM_{2.5}$ | CO | $PM_{10}$ | $PM_{2.5}$ | CO | $PM_{10}$ | $PM_{2.5}$ | CO |
| Dadhol | 57.8 | 19.5 | 201 | 0.8 | 1 | 100 | 58.6 | 20.5 | 301 |
| Ladrur | 58.6 | 14.5 | 190 | 1 | 5 | 200 | 59.6 | 19.5 | 390 |

200. 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.

201. 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.

202. 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.

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

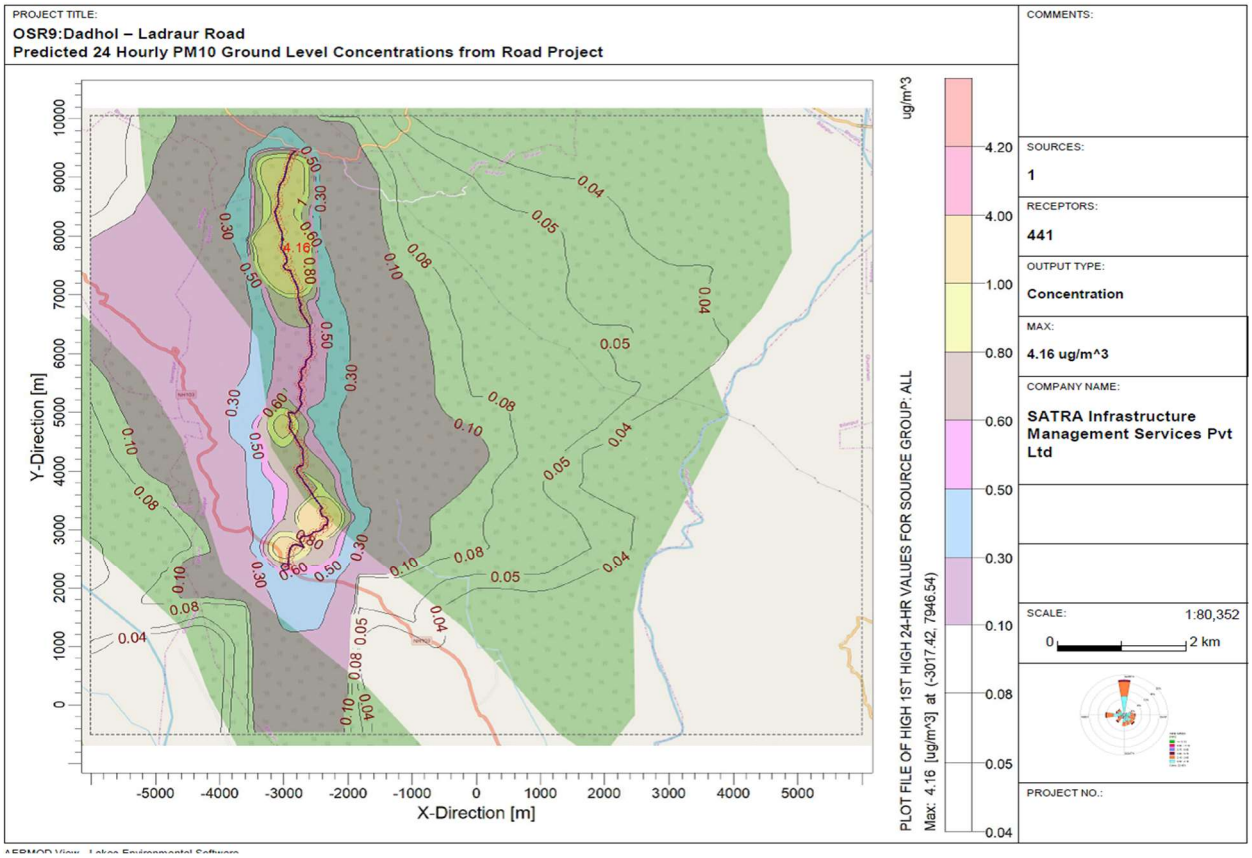



**Figure: Isopleth of Incremental GLC of Particulate Matter (PM10) from OSR9 (Dadhol – Ladrour ) Road Project for the year 2019**

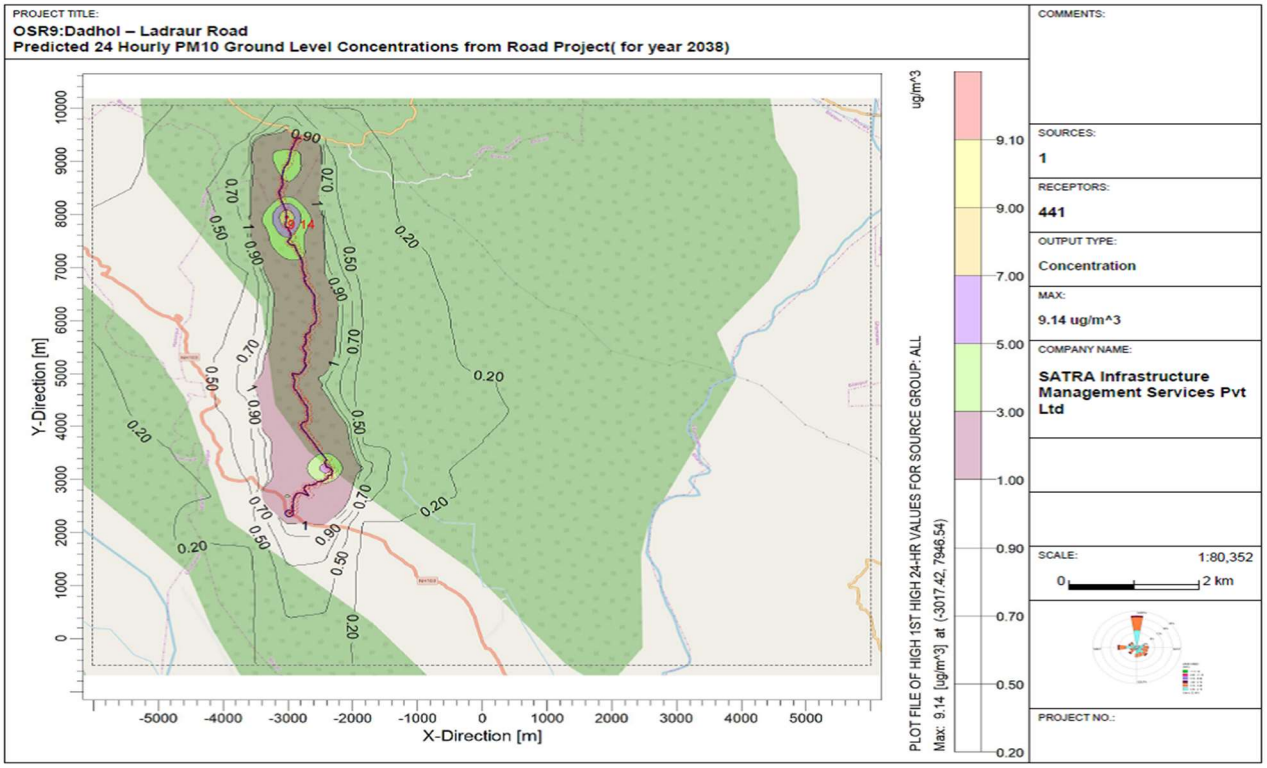



**Figure: Isopleth of Incremental GLC of Particulate Matter (PM10) from OSR9 (Dadhol – Ladraur ) Road Project for the year 2038**

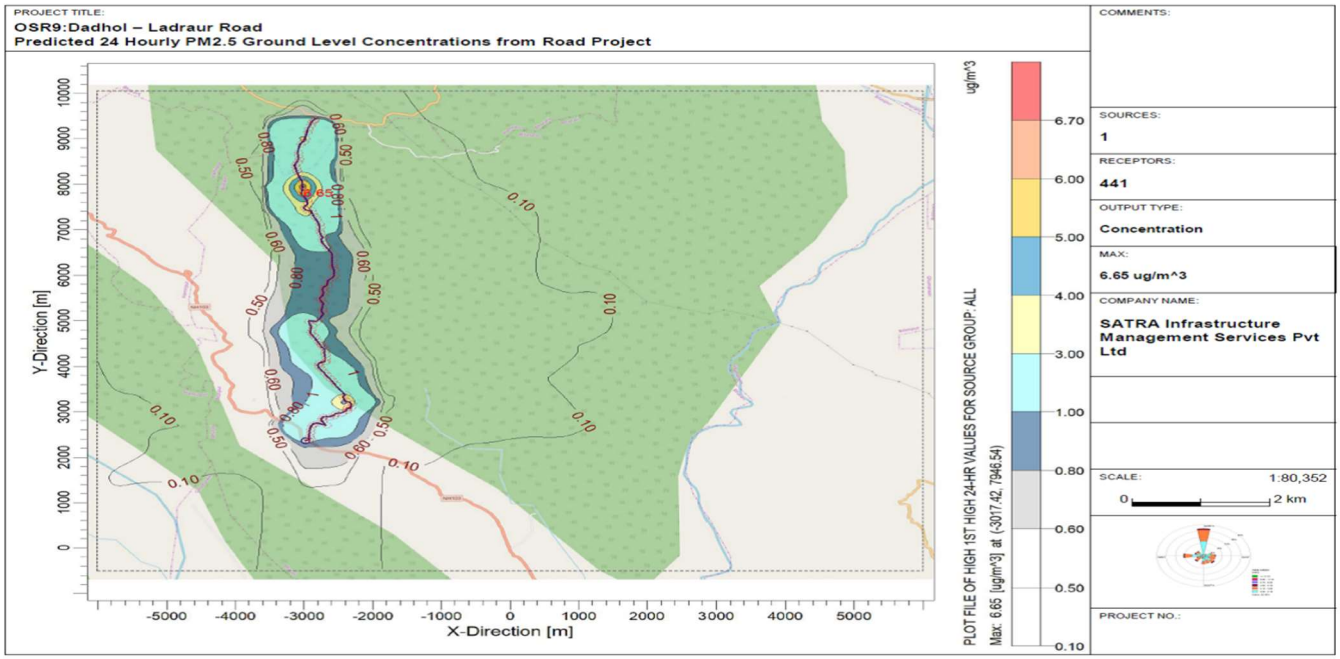



**Figure: Isopleth of Incremental GLC of Particulate Matter (PM2.5) from OSR9 (Dadhol – Ladrour ) Road Project for the year 2019**

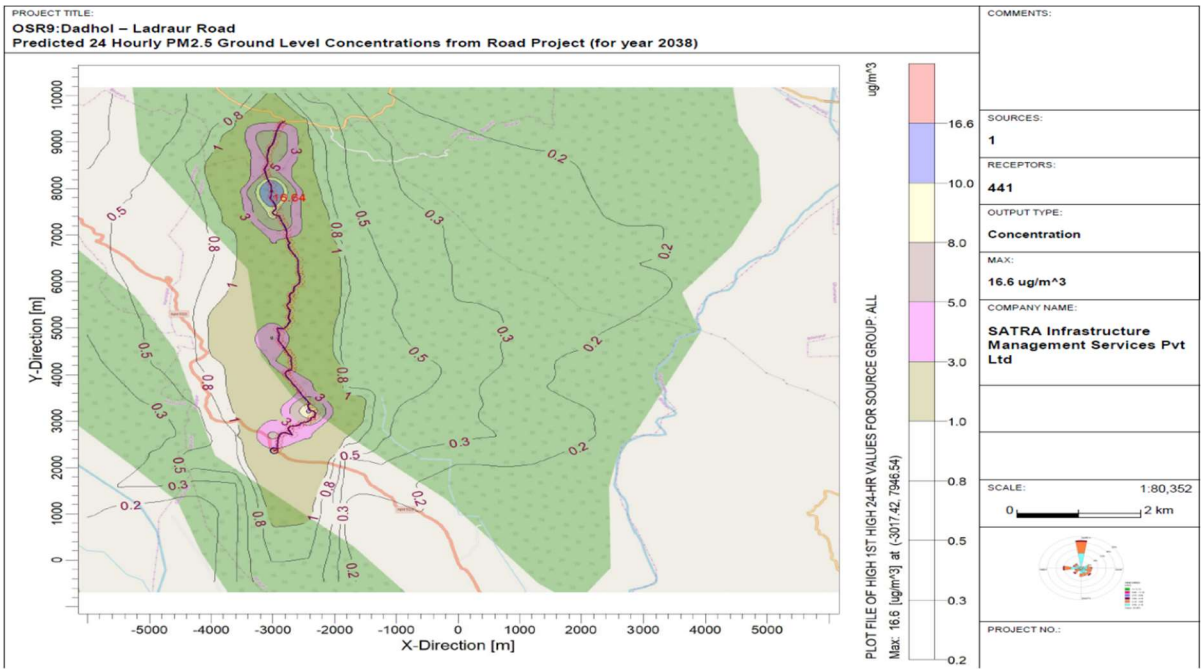



**Figure : Isopleth of Incremental GLC of Particulate Matter (PM2.5) from OSR9 (Dadhol – Ladraur ) Road Project for the year 2038**

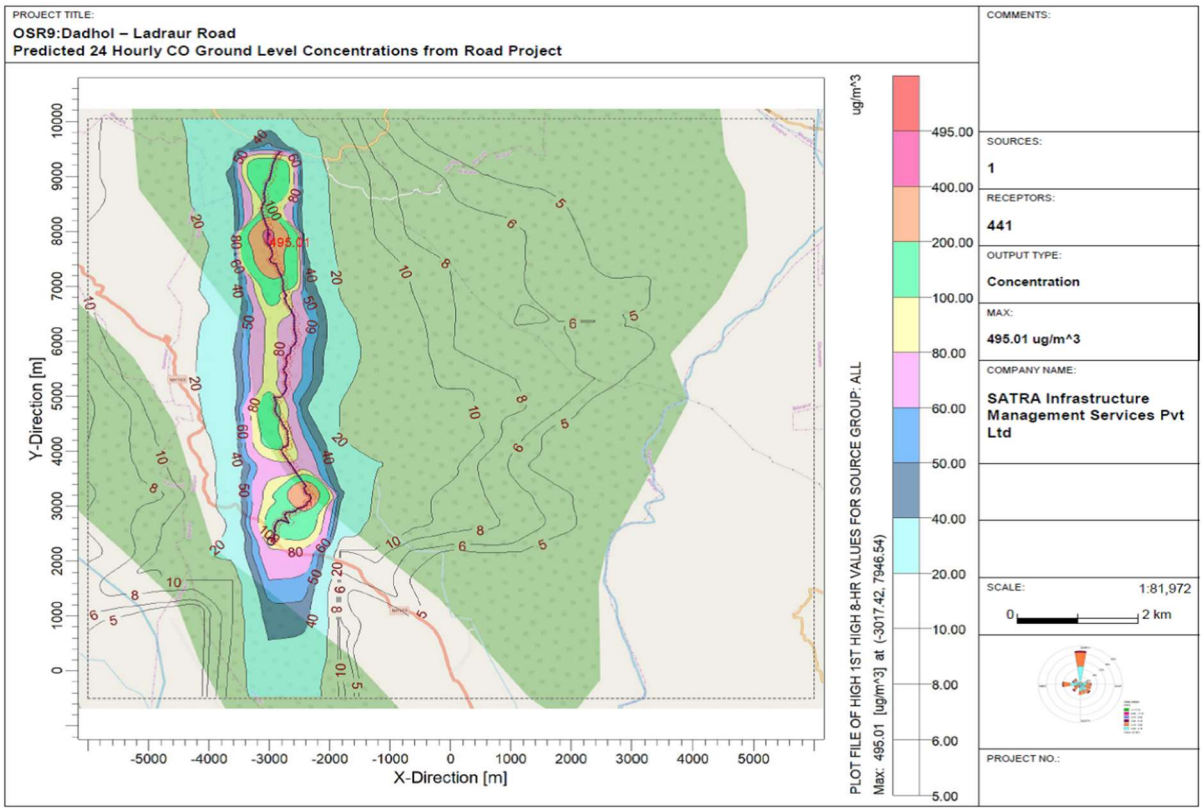



**Figure: Isopleth of Incremental GLC of Carbon Monoxide (CO) from OSR9 (Dadhol – Ladrour ) Road Project for the year 2019**

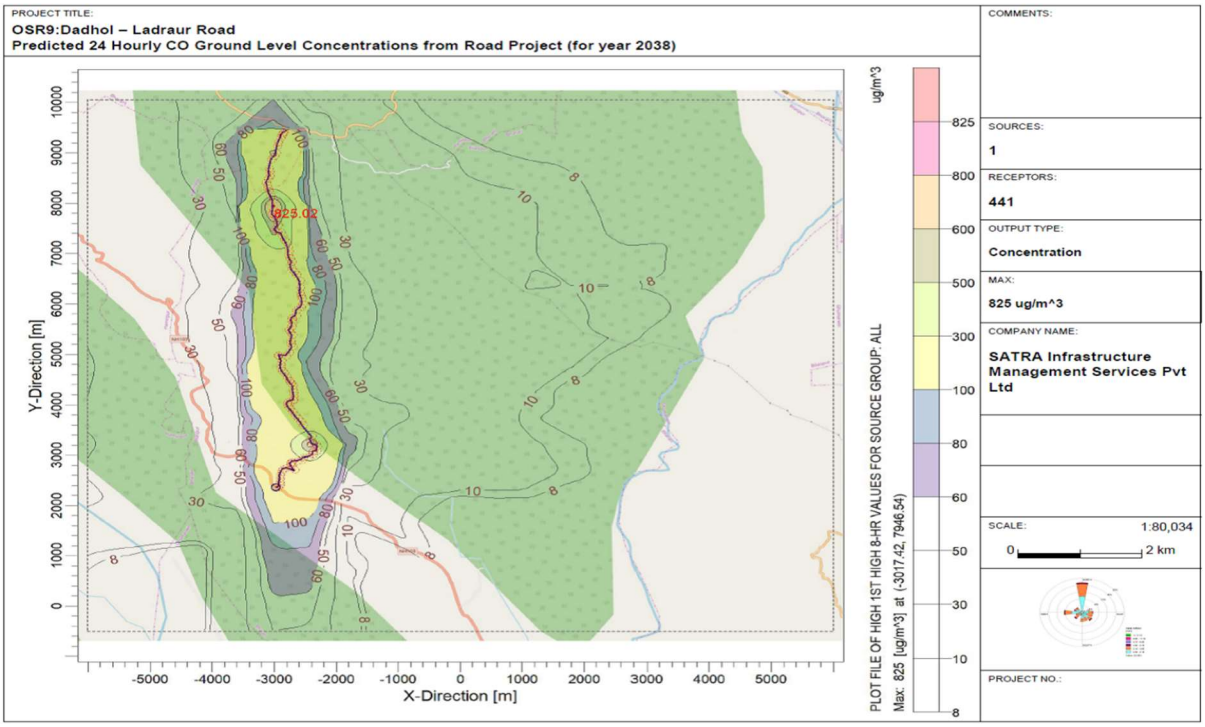



**Figure: Isopleth of Incremental GLC of Carbon Monoxide (CO) from OSR9 (Dadhol – Ladrour ) Road Project for the year 2038**

204. **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 Hot-mix plant shall be kept in working condition at all times. The plant shall not be operated, if the pollution control equipment is not functional.
- The contractor depending on most prevailing wind direction and presence of sensitive receptors at downwind side of material stack yard, shall provide wind barrier at perimeter of all plant site to arrest or blowing of suspended particle.
- The contractor shall obtain and submit to Engineer, all requisite permits (CTO and CTE) from the HPPCB for operation of the Hot Mix Plant, stone crushing operations, batching plants and captive quarry operations.

**Noise and Vibration**

205. 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.
206. There are 8 sensitive receptors i.e. schools (3), hospitals (1), religious structures (4 temples) are located along the road and within study area. Noise impacts are anticipated at 4 sensitive receptors, while it is not anticipated at 4 sensitive receptors (3 temples, 1 hospital).

207. 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.

208. 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. Dhwani PRO is used for noise modeling and following table presents the results.

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

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

209. 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.

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

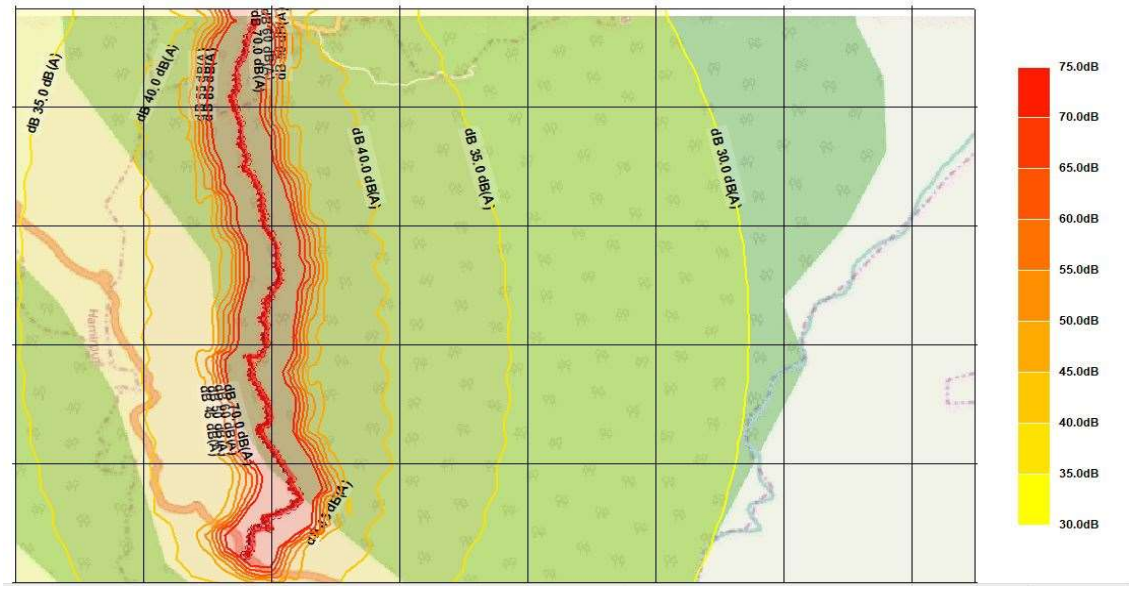



**Figure :- Contour map showing noise levels due to total traffic outcome of the Dadhol – Ladrour Road Project (OSR9) stretch for the Year 2019**

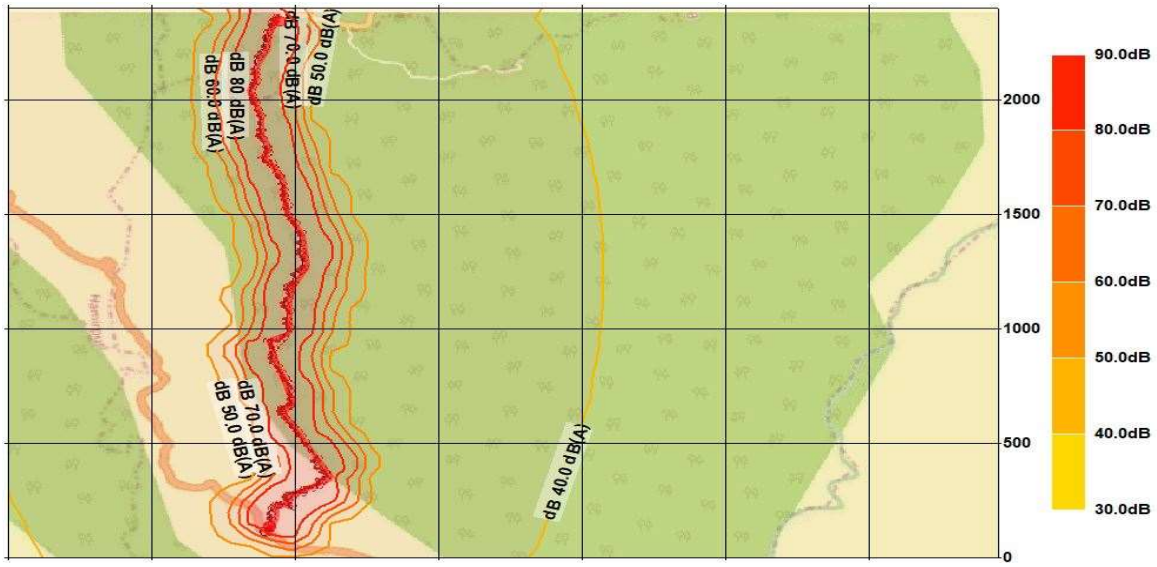



**Figure :- Contour map showing noise levels due to total traffic outcome at the Dadhol – Ladrour Road Project (OSR9) stretch for the Year 2038**

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

212. 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.

213. **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 4 sensitive receptors out of total 8 locations.
- Noise barriers shall be constructed in advance (Prior to commencement of road construction works) at every sensitive receptor like Schools, Hospitals which have been identified for providing the noise control measures.
- During the road construction near the sensitive receptors, appropriate traffic diversions are to implemented including the deployment of uniformed traffic wardens with reflective hand battens.
- Road construction schedule near sensitive receptors like schools and hospitals shall be informed to the concerned authorities well in advance. All works near sensitive receptors shall be adequately well planned and works shall be completed in shortest possible time, with minimal inconvenience to users of sensitive receptors locations. If warranted, steel barricades shall be used to minimize the inconvenience to the road users as well as occupants of the sensitive receptors.

- Environmental measures such as construction of noise barriers etc shall be constructed for the identified sensitive receptors, well in advance of commencement.
- Along the settlement areas, the use of all rollers shall be regulated through slow pace of operations, use of non – vibratory and small rollers to minimize or avoid cracks or damages to the kutcha or old structures.

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

| S.No | Description | Mitigation Measures | Dimensions |
|---|---|---|---|
| 1 | Govt primary school at Gahar (Km 1+130) | Noise Barrier cum boundary wall | 60m long X 5m height X 300 mm thick masonary wall with suitable foundation |
| 2 | School near Ladhyani (Km 4+520) | Noise Barrier cum boundary wall | 40m long X 3m height X 300 mm thick masonary wall with suitable foundation |
| 3 | School at Bharari (Km 6+470) on RHS | Noise Barrier cum boundary wall | 50m long X 5m height X 300 mm thick masonary wall with suitable foundation |
| 4 | School at Bharari (Km 6+470) on LHS | Re-constrcution of Retaining wall along with reconstruction of all affected strcutures at new locations | Retaining wall (450m long X 10m height) and recontruction of all affected strcutures at new locations |
| 5 | Hospital (Km 6+640) at Bharari | Noise Barrier cum boundary wall | 40m long X 5m height X 300 mm thick masonary wall with suitable foundation |

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

### 6.4.1 Occupational Health and Safety

**Transport and accessibility**

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

215. The 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.

216. **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.

217. 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**

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

219. 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

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

221. **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 |

| S.No | Type of Material | Recommended Slope cuts |
|---|---|---|
| 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 are considered, though potential location being identified, to mitigate the impacts of erosion and slope stability along the project road.
- The landslide impact can be further minimized / mitigated through provision of engineering and non-engineering interventions. Some of engineering measures considered for the project road are breast walls along hill side and retaining walls along valley side. Apart from the engineering measures, 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 | Item | Unit | Quantity |
|---|---|---|---|
| 1.1 | Construction of hedge brushlayer | RM | 1,500.00 |
| 1.2 | Construction of brushlayer | RM | 900.00 |
| 2 | Construction of live palisade | RM | 900.00 |
| 3 | Construction of live Fascine | RM | 900.00 |
| 4.1 | Grass slip plantation on slope <45° @ 100 drills/sqm | sqm | 3000 |
| 4.2 | Grass slip plantation on slope 45°-60° @ 100 drills/sqm | sqm | 600.00 |
| 4.3 | Grass slip plantation on >60° slope @ 100 drills/sqm | sqm | 600.00 |
| 4.4 | Plantation of large sized stature grass slips at slope of <45° @ 20 slips/sqm | sqm | 600.00 |
| 5 | Bamboo crib wall | cum | 1,200.00 |
| 6 | Tree plantation in plains with tree guard | nos | 1,000.00 |
| 7.1 | Shrub Plantation in plains with tree guard | nos | 2,500.00 |
| 7.2 | Agave plantation in slopes | nos | 1,500.00 |
| 8.1 | Group plantation of shrubs | sqm | 1,200.00 |
| 8.2 | Hedge Plantation (2 plants/RM) | RM | 900.00 |
| 8.3 | Hedge Plantation (4 plants/RM) | RM | 900.00 |
| 9 | Bamboo plantation with Bamboo tree guard | nos | 600.00 |
| 10 | Construction of Gabion | cum | Under Civil Works |
| 11 | Construction of barb wire | RM | Under Civil Works |
| 12.1 | Grass seed sowing<40° | sqm | 6000 |
| 12.2 | Grass seed sowing<40° with mulch | sqm | 5000 |

| S.No | Item | Unit | Quantity |
|---|---|---|---|
| 12.3 | Grass seed sowing on slope 40-45$^0$ with mulch and jute netting | sqm | 3500 |
| 13 | Hydroseeding | sqm | 5000 |

**Hazardous and non-hazardous wastes**

222. 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.

223. During the complete construction phase, an estimated 104 used batteries are likely to be discarded, which are to be disposed of in accordance with the battery management rule. The estimated generation of hazardous waste during the construction waste is given table 6-13.

**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 | 3 | 15 | 4 | 180 | 18 | 4.8 |
| Vibratory Roller ( 2 Tandem + 1 Vibro) - Minimum 8-10T static Weight | 2 | 12 | 4 | 96 | 9.6 | 3.2 |
| Pneumatic Road Roller - 200-300KN Cap. | 1 | 10 | 4 | 40 | 4 | 1.6 |
| Smooth Wheeled Roller - 8-10T Cap. | 2 | 15 | 4 | 120 | 12 | 3.2 |
| Tipper - 5.5 Cum Cap. | 15 | 15 | 4 | 900 | 90 | 24 |
| Water Tanker - 6 KL Cap. | 3 | 15 | 4 | 180 | 18 | 4.8 |
| Tractor-Trolley - 50HP Cap. | 3 | 10 | 4 | 120 | 12 | 4.8 |

| 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) |
|---|---|---|---|---|---|---|
| Rock Excavator/Ripper - 60 Cum/hr Cap. | 1 | 12 | 4 | 48 | 4.8 | 1.6 |
| Hot Mix Plant (Batch Type) with electronic controls and vibratory screens - Minimum 60 to 90 TPH | 1 | 15 | 4 | 60 | 6 | 1.6 |
| WMM Mixing Plant - Minimum 60 TPH | 1 | 15 | 4 | 60 | 6 | 1.6 |
| Stone Crushing Plant - 175-200 TPH Cap. | 1 | 15 | 4 | 60 | 6 | 1.6 |
| Paver Finisher Hydrostatic with sensor control - 100 TPH Cap. | 1 | 15 | 4 | 60 | 6 | 1.6 |
| Paver Finisher Mechanical for WMM Work - 100 TPH Cap. | 1 | 15 | 4 | 60 | 6 | 1.6 |
| Bitumen Pressure Distributor - 1750 Sqm/Hr Cap. | 1 | 10 | 4 | 40 | 4 | 1.6 |
| Power Broom - 1250 Sqm/hr Cap. | 1 | 15 | 4 | 60 | 6 | 1.6 |
| Loader - 1 Cum Bucket | 2 | 15 | 4 | 120 | 12 | 3.2 |
| Concrete batching and mixing plant - 15 to 20 cum/hr. Cap. | 1 | 15 | 4 | 60 | 6 | 1.6 |
| Mini smooth wheeled roller - 3-5T Cap. | 2 | 12 | 4 | 96 | 9.6 | 3.2 |
| Air Compressor - 170-250 cfm Cap. | 3 | 10 | 4 | 120 | 12 | 4.8 |
| Plate Compactor | 2 | 15 | 4 | 120 | 12 | 3.2 |
| Transit Mixer - 3-4.5 cum per hr Cap. | 5 | 15 | 4 | 300 | 30 | 8 |
| Cranes 60-80 T – capacities, with telescopic arm of Min 25 m length | 1 | 15 | 4 | 60 | 6 | 1.6 |
| | 57 | | | 3200 | 320 | 91 |

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

**Table 6-14: 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 | 155 | 0.25 | 38 | 38 | 19 | 7 |
| **Total Muncipal Solid Waste in Kg during Constrcuton phase** | | | **50** | **50** | **25** | **9** |

| Category | Nos | Kg per day | Quantity Kg | Solid Waste (Peak) | Average | Lean |
|---|---|---|---|---|---|---|
| Organic Waste (40%) | | | 20 | | | |
| In organic Waste (60%) | | | 30 | | | |

**Mitigation Measures:**

225. 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.

226. The camp site shall have compost pits for treating organic waste and separate bins for collecting the inorganic waste, which shall be disposed at nearest municipal disposal sites. The nearest such sites are available at Mandi and Ghumarwin.

227. Waste management and the minimization of potential impacts during construction will depend on the implementation of appropriate procedures, protocols and monitoring of materials being delivered, handled and stored prior to disposal. The CEMP will include a Waste Management Plan prepared in accordance with requirements stipulated in (a) The Batteries (Management & Handling ) Rules, 2001 (b) Municipal Solid Wastes (Management and Handling) Rules, 2000, (c) Hazardous Waste (Management, Handling & Transboundary Movement) Rules, 2016 and (d) Construction and Demolition Waste Management Rules, 2016.

**Hazard and Vulnerability**

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

229. **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)**

230. The project design has considered the following mitigation hierarchy to avoid the impacts.
- Restricting the widening of the project road to the already available Right of Way and avoid diversion of any fresh land for road construction

- Selection of Government owned waste/barren land for establishing construction camps, material stack yards and/or work force camps, hot mix plants, concrete batch plants, construction vehicle parking areas
- Avoidance of agricultural land or grazing land /community lands for any borrowing of good earth requirements of road construction work.
- Identify low lying areas within the right of way for disposal of muck and construction debris and developing such reclaimed areas as green patches through the intervention of bio-engineering measures.
- Identify vacant areas within the right of way for developing them as green patches through the intervention of avenue plantation and/or bio-engineering measures

231. Since the project road widening is limited to the existing right of way with no new land diversion for road construction, there will not be any change in land use. 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 Dadhol to Ladrour road, the categories of impact has been finalised through the collection of likely impact data. The categories includes:

1) Structure (Private, Encroachments) - Residential, commercial and Squatters (residential, commercial and Residential –cum- commercial); and
2) Common Property resources (School, College, religious [Temple, Mosque, Churches etc.], bus shelter/bus stand, and Hand pump.

232. As per the available right of way information provided by PWD units and revenue officials there is no additional land that needs to be acquired from private sources. The total numbers of families affected are 136– all of which are non-titleholder encroachers. These structures of these affected families are mainly residential, commercial and mix of residential and commercial, besides others such as cattle sheds, etc. In addition, there are 4 CPRs that comprise Schools (1), Religious structures (1),) and Hand Pump (2). These also comprise 6 vulnerable households comprising 1 from ST, 5 from SC categories.

**Table 6-15 : Likely Impact of the project on structures, CPRs within RoW**

| **Impact Category** | **Likely Impact** |
|---|---|
| Titleholder Residential | Nil |
| Non-Titleholder – Encroachments | |
| - Residential | 102 |
| - Commercial | 15 |
| - Residential + Commercial | 16 |
| - Others (Cattle Sheds, Sheds) | 3 |
| - Squatters | Nil |
| - Kiosks | Nil |
| **Sub-Total** | **136** |
| Title holders – Land losers | Nil |
| **Common Property Resources** | |
| School | 1 |
| Religious | 1 |
| Bus Stand/Rain Shelter | NIL |
| Government Buildings | NIL |

| Table 6-15 : Likely Impact of the project on structures, CPRs within RoW | |
|---|---|
| **Impact Category** | **Likely Impact** |
| Hand Pump | 2 |
| **Total** | **4** |
| **Estimated Land Acquisition (Dadhol- Ladraur)** | Nil |
| **Vulnerability/Vulnerable Household** | **6** |
| Schedule Caste | 5 |
| Schedule Tribe | 1 |
| Women headed Household | 0 |
| Below Poverty Line | 0 |
| Orphan | 0 |
| Destitute | 0 |
| Transgender | 0 |

233. During construction stage, the temporary requirements of land either from government sources or from private parties through lease hold basis to tune of 1.1 Ha is anticipated to establish construction camps, material stack yards, hot mix plants & machinery. 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.

234. 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.

235. **Mitigation Measures**:

236. Impacts on land and assets arising pre-construction stage activities will require be addressing and mitigating through a mix of measures of compensation, assistance and relocation arrangements. For this purpose, a Resettlement Action Plan will be developed that will contain details of such mitigation provisions. The mitigation provisions includes:1) Fixation of compensation at replacement cost will be paid as per the provisions mentioned in RFCTLARR Act 2013 or through negotiated settlement;2) Structure replacement cost will be calculated as per the Basic Schedule of Rate and with depcriciation;3) Each affected family shall be given a one-time "Resettlement Allowance";4) one time rehabilitation grant for reconstruction of affected assets;5) One time subsistence assistance in cash for displaced families;6) one time transportation allowance for shifting the assets for displaced families;7) Training for skill development. This assistance includes cost of training and financial assistance for travel/conveyance and food.;8) one time cash grant as vulnerability allowance; and 9) Reconstruction of community structure and common property resources, will be done in consultation with community;10) compensation for temporary impact. It will also be prepared keeping in view actions proposed under the Stakeholder Engagement Plan. In addition, in cases of impacts on livelihood, rehabilitation through appropriate skill training/financial counselling would be required as well.

237. 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)

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

**Impact on Flora**

238. The site clearance activities for road construction will involve removal of road side vegetation and felling of trees. The biodiversity studies have 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.

239. A total of 3614 has been enumerated existing within existing right of way, of which only 75 trees (2%) needs to be cut for road improvement. As per the current procedure of department of forests, GoHP, tree enumeration has to be conducted jointly with the department of forests after the marking of the center line of the proposed road improvement plan. Thus, the number of trees which will be required to be felled for road construction is not confirmed at this stage. While according the permissions for tree felling, the forest department will stipulate planting of three saplings for every tree cut and maintenance of the same for five years with 70% survival rate.

240. 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.

- 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**

241. 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 the presence of any scheduled faunal species, except for monkey. Local consultations along the project corridor indicate that they frequently face attacks from monkeys near Ladhyani village. Thus, the project road construction is not likely to cause any impacts on the fauna.

242. Mitigation Measures would include the following:

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

243. The corridor does not have any schedule V areas. Though it has 3[6] tribal households might be impacted across the 13.5 km corridor these households are well mainstreamed into the general population and society and do not meet the characteristics outlined in ESS 7[7].

244. 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)

245. 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.

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

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

246. Further, 4 religious structures/shrines, which are along the project corridor are not impacted by the proposed road improvement activities. These structures are not protected under Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010.

247. During excavation works, in an unforeseen and unlikely scenario of sighting of remnants or chance find, the matter is to be immediately brought to the attention of the State/Central Department of Archaeology. All further work at the specific location shall be carried out only after the site is cleared by the competent authority of archaeological Department.
248. Extent of impact of chance finds 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. It is a project-specific procedure which will be followed if previously unknown cultural heritage is encountered during project activities. It will be included in all contracts relating to construction of the project, including excavations, demolition, movement of earth, flooding or other changes in the physical environment.
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

249. 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.

250. The right of way of the project road has 8 sensitive receptors like schools, hospitals, religious structures (temples/shrines), etc.

251. As a part of design, adequate consideration was given to minimize the impacts on most of the sensitive receptors. However, in unavoidable circumstances, noise barriers has been considered as a mitigation measure at two schools to attenuate the noise levels due to anticipated increase in the traffic after the upgradation of project road.

252. 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.

## 6.9 ESMP and Budgetary Provisions

253. An ESMP for the project is prepared along with the budgetary provision in a separate volume, abstract of the ESMP budget is given below.

**Table 6-16 – ESMP Budget**

| S.No | Description | Amount in Lakhs |
|---|---|---|
| 1 | Management of Excess Debris (56251 cum) Disposal on site. | 11.28 |
| 2 | Provision of Noise Barriers and other enhancement measures at Sensitive receptors (at km 1+130, 4+520, 6+470, 6+640) | 14.49 |
| 3 | Provisions of enhancement measures for Community property (Crematorium) at Km 12+500 including 25 precast cement concrete benches and 6000 litres water tank | 10.86 |
| 4 | Provision of Toilets at specified location (13+100 Km) | 9 |
| 5 | Bio Engineering Interventions at selected locations along the project road as pr EMP | 77 |
| 6 | Clearance/Removal of Invasive Species like Lantana and Sea Ruthenium etc. form the road corridor and Plantation of Indigenous local vegetation and Maintenance and upkeep for 70% survival rate for 6 months (16 km both sides up to width of 1.5 m) | 48.6 |
| 7 | Provision of plantation and maintenance ( tree guard) of 1500 Avenue trees along roadside and in RoW | 27 |
| 8 | Monitoring Cost as per CPCB Standard Procedures | 12.96 |
| 9 | Provision for Compensatory Afforestation in lieu of Tree felling for road construction | Cost shall be paid by HPRIDC to forest Department of GoHP |
| 10 | Provisions of Environmental specialist (full time), EHS Officer (fulltime), Bio-Engineering Specialist (intermittent input), Horticultural specialist (intermittent input) and Training sessions for implementation of EMP | To be included by PMC |
| 11 | Land acquisition and Resettlement & Rehabilitation Cost | Covered in RAP Budget |
| 12 | Relocation and construction of hand pumps, water storage tanks, OHTs, open wells & water taps as per directions of the Engineer. | Covered in Utility Shifting Budget |
| 13 | Cost for institutional strengthening, capacity building and training by HPRIDC | To be provided by HPRIDC |
| 14 | Resettlement Action Plan as per Entitlements including implementation, monitoirng and stakeholder engagement plan | 158 |
| 15 | Contingencies 10% | 37 |
| | **Grand Total For ESMP Implementation** | **407** |

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

254. 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 relating to provisions for non-titleholders and cut-off date.

vii. Institutional arrangement to address E&S aspects are currently relatively weak and need significant strengthening

viii. Though GRM is decentralized but it presently is not tuned to receiving to respond to grievances of PAPs and requires systematic recording of grievances and redressal

255. 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. more consultations need to be carried out to inform communities/affected persons of the mitigation measures and entitlements once firmed to compensate them for their losses. Besides other road safety and bio-engineering measures need to be informed;

v. develop mechanisms to foster greater participation of more passive members of the community, including disadvantaged persons, women and vulnerable groups;

vi. 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.

vii. 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.

viii. The road design to explore mitigation options for environmental concerns highlight by communities and its integration in EMP.

ix. 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.

256. 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, 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 7.1 – Plan documents to meet relevant ESS requirements**

| | | |
|---|---|---|
| ESS 1 | EMP and ESMP | By January 2020 |
| ESS 2 | Labor Management Procedure for HPRIDC[8] | 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) | 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 |

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

## LIST OF APPENDICES

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

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