ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT

Improvement & Up-gradation of:

1. Bijbehara-Waghama Road via Kitriteng in District Anantnag
2. Sangam-Khudwani Road in District Anantnag

Matricaria chamomilla: Naturally Grown Common Roadside Herb in Kashmir Roads

Jhelum Tawi Flood Recovery Project- The World Bank Financed Project

Environmental Impact Assessment Report

November 2019

Jhelum Tawi Flood Recovery- World Bank Financed Project

Improvement & Up-gradation of;

1. Bijbehara-Waghama Road via Kitriteng in District Anantnag (8.396 Km)
2. Sangam-Khudwani Road in District Anantnag (4.793 Km)

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Acronyms & Abbreviations

AAQ	:	Ambient Air Quality
ASI	:	Archaeological Survey of India
BIS	:	Bureau of Indian Standards
CPCB	:	Central Pollution Control Board
CPR	:	Common Property Resources
DPR	:	Detailed Project Report
DO	:	Dissolved Oxygen
EA	:	Environmental Assessment
EIA	:	Environmental impact Assessment
EMP	:	Environmental Management Plan
ERA	:	Economic Reconstruction Agency
GC	:	General Conditions
GoI	:	Government of India
ILO	:	International Labour Organization
IS	:	Indian Standards
J&K	:	Jammu and Kashmir
JTFRP	:	Jhelum Tawi Flood Recovery Project
MoEF&CC	:	Ministry of Environment, Forest and Climate Change
NAAQS	:	National Ambient Air Quality Standards
NOC	:	No Objection Certificate
OP	:	Operational Policy
PAP	:	Project Affected Persons
PIU	:	Project Implementation unit
PIA	:	Project Influence Area
PMU	:	Project Management Unit
PPE	:	Personal Protective Equipment
PUC	:	Pollution Under Control
PWD	:	Public Works Department
RoW	:	Right of Way
SPCB	:	State Pollution Control Board
TAQAC	:	Technical Assistance and Quality Audit Consultants
WB	:	The World Bank

EXECUTIVE SUMMARY

Catastrophic deluge of September 2014 shows negative impact on economic aspects of the State and massive infrastructure damages in which capital city Srinagar was most affected and a trail of siltation in most of the water bodies as environmental degradation which is always synonymous with major floods. In connection to catastrophic flood, a mission of the
World Bank visited the State during February 1-6, 2015 on request of Government of India to review and assess the damages in order to produce a rapid multi-sectoral assessment report of the damages and needs. The Rapid Damage and Needs Analysis (RDNA) estimates the total damages and loss caused by floods at about INR 211,975 million (US$ 3,550.45), most of it to housing, livelihoods, and roads and bridges, which combined represented more than 70% of the damages in terms of value. Public service infrastructure and equipment of hospitals and education centres were also severely damaged and are still not fully operational. Based on the RDNA results, restoration works underway, and discussions with the GoJ&K, "Jhelum and Tawi Flood Disaster Recovery Project (JTFRP)" will focus on restoring critical infrastructure using international best practice on resilient infrastructure.

The objective of this component is to restore and improve the connectivity disrupted due to the disaster through the reconstruction of damaged roads and bridges. The infrastructure will be designed to withstand earthquake and flood forces as per the latest official design guidelines. The affected areas will benefit from the restored access to the markets thereby increasing the economic growth in these areas and timely access to health and education services. Restoration of roads will also serve as supply/rescue lines in the event of disaster.

The environmental assessment scope includes screening and scoping, environmental assessment and environmental management plans for the individual road subprojects under Jhelum Tawi Flood Recovery Project. The objective of Environment and social screening is to identify the potentially significant environmental/ social issues of the sub-projects at an early stage for Environmental and Social Assessment.

Under Road Package-4, two road subprojects have been identified and DPR has been prepared namely (1) Bijbehara-Waghama Road via Kitriteng (8.396 Km), and (2) Sangam – Khudwani Road (4.793 Km) in District Anantnag

As per the EIA notification 2006 and subsequent amendment, environmental clearance for the widening/ strengthening/ up-gradation and improvement works on existing road is not required. The subproject shall require to obtain Consent to Establish and Consent to Operate under Water (Prevention and Control of Pollution) Act, 1974, Air (Prevention and Control of Pollution) Act, 1981 and authorization under Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016 from J&KSPCB for establishing and operation of Crusher Plant, Hot Mix Plant, and WMM Plant for the subprojects.

The World Bank safeguard policies are designed to prevent and mitigate undue harm to people and their environment in the development process. The layout requirements that must be complied with for all Bank-funded projects (refer to World Bank's Website on

Safeguard Policies). Environmental and Social Policies – OP/BP 4.01 Environmental Assessment and OP/BP 4.11 Physical Cultural Resources are triggered in the project.

Project Location

The project road is located in Anantnag District in Kashmir region, having geo-coordinates of 33°73'08.34"N (Latitudes) and 75°15'02.08"E (Longitudes). The proposed subproject "Improvement & Up-gradation of roads under Package-4" is rural road passing on mostly Plain & Rolling terrain.

Screening and Environmental Assessment (EA)

Sub-projects under "Jhelum and Tawi Flood Recovery Project" commonly known as JTFRP have a prior requirement of screening which is based on three categories; viz., nature of the project, size of the project and location of the project that is sensitive area criteria. The objective of the Environment screening is to identify the potentially significant environmental issues of the sub-project at an early stage for detailed Environmental impacts. The EA for selected subproject includes establishing environmental baseline in the study area, identify the range of environmental impacts, specify the measures to avoid, minimize, and mitigate negative impacts and maximize positive impacts and integrate possible environmental enhancement measures. The proposed measures will be formulated in the form of an environmental management plan with necessary budget and institutional roles for effective implementation. The EMP developed shall form the part of construction contract document.

Policy and Legal Regulatory Instruments

National and State Laws

- EIA Notification, 14th Sept 2006 and Subsequent amendments
- Jammu and Kashmir Forest (Conservation) Act, 1997
- Jammu and Kashmir Wildlife (Protection) Act, 1978
- Air (Prevention and Control of Pollution) Act,1981
- Water Prevention and Control of Pollution) Act,1974
- Noise Pollution (Regulation and Control Act),2000
- Construction & Demolition Waste Management Rules, 2016
- e-waste (Management) Rules, 2015
- Public Liability and Insurance Act 1991
- Central Motor Vehicle Act 1988 and Central Motor Vehicle Rules 2019
- Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996/ Jammu and Kashmir Building and Other Construction Workers (Regulation of Employment and Condition of Services) Rules, 2006
- Jammu and Kashmir Electricity Act, 2010 and amendments thereof and BIS 1255;1983 and amendments thereof
- Hazardous Waste (Management, Handling and Trans-boundary Movement) Rules,2008 and amendments thereof
- Solid Waste Management Rules, 2016
- The Jammu and Kashmir Preservation of Specified Trees Act, 1969

World Bank Operational Policies

- OP/BP 4.01 Environmental Assessment
- OP/BP 4.36 Forests
- OP/BP 4.11 Physical Cultural Resources
- OP/BP 4.12 Involuntary Resettlement

Project Description

The proposed improvement and up-gradation of the roads under Package-4 in Anantnag District will involve construction of 2 roads by way of improving & up-gradation of roads, drains, protective works, road profile and enhancement measures etc as per the best engineering practices, in compliance to the World Bank policies and in synchronization with project environmental management strategies.

Scope of the Work

The scope of works for the proposed project will include but not limited to

The component will finance the reconstruction of damaged roads, bridges and associated drainage and slope stabilization works, retaining walls, breast walls and other structures to increase resilience.

Public Consultation

One of the important components of this study is dissemination of project information by way of “Consultation with stakeholders and general public”, which was conducted success fully with local residents/ stakeholders in project area of Anantnag, Sangam, Hassain Pora, Arwani, Wanpoh, Qaimoh, Bijbehara, Kitriteng, Hayar, Waghama, etc. Public consultation was conducted at the project location and reconnaissance survey of the project as part of study. During consultation process of the proposed sub-project, people have expressed keen interest about the proposed sub-project and were aware about the upcoming project. People in general were very enthusiastic about the benefits of the subproject.

And some of the positive response with suggestions received from the local residents and stakeholders during consultation is abridged as, i) roads to be designed and executed with better riding surface, higher life period, drainage provision etc. Further the locals ensured full cooperation and support for the successful execution of the project; ii) local residents who are related to the construction industry may be engaged with the proposed road works; iii) along the river banks/ other surface bodies, protective measures should be implemented in the form of engineering embankment protective measures, beautification process/ programme by way of Pine plantation along the bund roads/ green turfing, introduction of ornamental plants in open space and to make roads better), iv) built-up shall be provided with drainage system

Assessment of Impacts

The environmental assessment study carried out for the road projects under Package-4 namely; Bijbehara-Waghama Road via Kitriteng and Sangam- Khudwani Road in district Anantnag in terms of the potential environmental impacts that may occur as a result of

the implementation of project. The anticipated environment impacts identified during construction phase which comprise of transitory/ insignificant increase in air and noise pollution, soil erosion, slight change in water quality near the construction area and these impacts are temporary and site and time specific in nature . The major impacts of the project are expected to be during the construction phase leading to air and noise quality deterioration, occupational, health and safety impacts to the works and local communities, utility shifting, generation of construction debris and disposal of waste material respectively. The proposed road projects will have significant positive impacts and to address the problem of bad road condition through improved design and environmental enhancement measures.

The project mitigation measures has been developed for evading, reducing and regulating the adverse impacts on the environment impacts induced by the project proposed. The policy, legal and institutional framework under the ambit of which the EIA was undertaken, is also detailed out in environmental assessment report. The Environmental Management Plan (EMP) for the improvement and up-gradation of roads under Package-4 has been developed, which elaborates on the mitigation measures, means of implementation for the proposed measures, monitoring strategy and the budgets pertaining to implementation of the proposed mitigation measures.

1. INTRODUCTION

1.1. Project Background

In September 2014, Jammu & Kashmir experienced torrential monsoon rains in the region causing major flooding and landslides. The continuous spell of rains from September 2 to 6, 2014, caused Jhelum and Chenab Rivers as well as many other streams/tributaries to flow above the danger mark. The Jhelum River also breached its banks flooding many low-lying areas in Kashmir, including the capital. In many districts, the rainfall exceeded the normal by over 600%. The Indian Meteorological Department (IMD) records precipitation above 244.4 mm as extremely heavy rainfall, and J&K received 558mm of rain in the June- September period, as against the normal 477.4 mm. The district of Qazigund recorded over 550 mm of rainfall in 6 days as against a historic normal of 6.2 mm over the same period.

Due to the unprecedented heavy rainfall, the catchment areas particularly the low lying areas were flooded for more than two weeks and south Kashmir was badly affected by 2014 floods. Some areas stayed flooded for more than 1 month. Water levels were as high as 27 feet in many areas. The areas from the main tributaries of river Jhelum vis-à-vis Brengi nallah, Vishav nallah, Lider nallah and Sandran nallah started overflowing due to the heavy rainfall causing water levels in Jhelum river to rise.

Based on the **Rapid Damage Needs Assessment (RDNA)** results, restoration works underway, and discussions with the GoJ&K, the project will focus on restoring critical infrastructure using international best practices on resilient infrastructure. Given the state's vulnerability to both floods and earthquakes, the infrastructure will be designed with upgraded resilient features and will include contingency planning for future disaster events. Therefore, the project aims at both restoring essential services disrupted by the floods and improving the design standard and practices in the state to increase resilience.

The Project Development Objective (PDO) is to support the recovery and increase disaster resilience in targeted areas of the State and increase the capacity of the State entities to respond promptly and effectively to an eligible crisis or emergency.

The project comprises of the following seven components:

1. Reconstruction and strengthening of critical infrastructure (US$60 million)
2. **Reconstruction of roads and bridges (US$80 million)**
3. *Restoration of urban flood management infrastructure (US$50 million)*
4. Strengthening and restoration of livelihoods (US$15 million)
5. Strengthening disaster risk management capacity (US$25 million)
6. Contingent Emergency Response (US$0 million)
7. Implementation Support (US$20 million

Under Jhelum Tawi Flood Recovery Project (JTFRP), component-2 aims at Improvement, up-gradation of more than 300 km of roads in J&K that would be developed under different packages covering a total of 19 roads. These roads were badly damaged during 2014 floods and are mostly in poor condition with respect to riding quality, geometry, pavement strength,

absence of longitudinal drainage, and road safety standards.The sub projects were selected based on flood damages incurred during September 2014 and findings of environment and social screening exercise. The improvement and up-gradation of the proposed package roads will improve the efficiency and safety of transport on these roads. List of the roads to be taken under Componenet-2 is provided in Table 1.1 below;

Table 1.1: List of the Road Projects (Package Wise) under Component-2 of JTFRP in Jammu & Kashmir.

S. No.	Package Name	Subprojects	Length of the Road (in Km)	District
Kashmir Region				
Improvement & Upgradation of:				
1.	Package-1	Pampore-Pulwama Road	30.256	Pulwama
2.		Rambagh-Lasjan-Kadalbal Road	12.978	Srinagar
3.	Package-2	Hajin-Ajas Road Via Saidnara Road	7.186	Bandipora
4.		Hamray-Sultanpora-Nowgam Road to Sumbal Bridge.	12.688	Baramulla/ Bandipora
5.		Shadipora-Khanpeth-Sumbal Road	6.0	Bandipora
6.	Package-3	Rigid Pavement of IG Road from Rambagh to Civil Secretariat	1.907	Srinagar
7.		Rigid Pavement of IG Road from Peerbagh to Humhama Chowk	1.491	Srinagar
8.		Rigid Pavement of Eastern Foreshore Road (Brari Nambal)	3.600	Srinagar
9.		Parimpora-Soibugh Road	7.927	Srinagar/Budgam
10.	Package-4	Sangam Khudwani Road	4.793	Anantnag
11.		Bijbehara-Waghama Road via Kitriteng Road	8.396	Anantnag
12.	Package-5	Kawhar Bala Payeen Road (On Hold)	5.240	Baramulla
Jammu Region				
13.	Package-1	Sidra-Surinser Road	18.290	Jammu
14.		Tutain Di Khui to Khadamadana Road	11.0	Jammu
15.	Package-2	Anji-Panasa Road	4.256	Reasi
16.		Devi Mai to Ohli Mandir Road	4.999	Reasi
17.	Package-3	Chiralla Link Road	10.139	Doda
18.		Malaini to Chakrabatti Road	10.059	Doda
19.	Package-4	Gulhati to Shahdra Sharief Via Ghambir Gali	27.280	Rajouri

This report pertains to environmental assessment and environmental management plan for roads under Package 4 covering improvement & up gradation of (1) Bijbehara-Waghama Road via Katriteng (8.396 km), (2) Sangam- Khudwani Road (4.793 km) in District Anantnag (J&K)

1.2. Description of the Project

The Package-4 roads are located in Anantnag District. The project road traverses through the settlement areas of Bijbehara, Kitriteng, Hayar, Waghama, Hassain Pora, Tavela, Sangam, Arwani, Wanpoh, Qaimoh etc.

The Bijbehara-Waghama Road via Katriteng is proposed to be improved and up-graded with a design length of 8.396 km. The existing road is 2.50m-3.00m single lane and is proposed to be upgraded as 3.75m. The terrain features are characteristic plain and rolling with mixed land use with sections of built-up, agricultural land and mainly horticultural fields of Apple Orchards. The existing surface of carriageway is flexible pavement which is in poor condition through the entire road length. The existing formation width varies between 3m to 4m. The proposed new flexible pavement thickness is OGPC-25mm, BM-50mm, WBM-225mm, GSB-200mm. 8 minor junctions exists in proposed road and cross drainage structures include proposed 5 pipe culverts and a box culvert and development of side drains in built-up sections and open drain through orchard field.

The existing length of the Sangam-Khudwani Road is 4.793 km. The proposed road is passing through plain terrain features with land use pattern of open area, agricultural fields and built-up areas. The existing surface of carriageway is flexible pavement BT surface which is poor in condition. The existing formation width is 4.5-4.8m. The proposed new flexible pavement thickness is OGPC-25mm, BM- 50mm, WBM-225mm & GSB- 200mm. One (1) minor junction exists in Sangam-Khudwani Road. 12 existing cross drainage structures include 9 hume pipe culverts and 2 slab culverts and the proposed 9 hume pipe culverts (reconstruction).

1.3. Scope of Environmental Assessment

Environmental assessment study of the project roads, comprise of identification and evaluation of impacts on environment due to the various stages of the project implementation and provide inputs to project road design team to incorporate necessary measures in design to minimise such impacts through suitable engineering interventions. The combined length of 2 roads is 13.189 Km of selected sub-projects under road Package-4 for its restoration of damage occurred during floods. Hence, an Environmental Management Framework has been designed for baseline environmental study, identifying impacts, mitigation measures to avoid, minimize and mitigate anticipated negative impacts within the project impact zone and project influence area. Accordingly, to minimize negative impacts during the entire project cycle environmental management plan has been developed with roles and responsibility for sound construction management during the project implementation. Furthermore, the report covers major finding of existing environmental, legal and administrative framework, monitoring programme, cost for environmental management and evaluation of potential environmental impacts due to the proposed road sub-projects under Package-4 in Kashmir region of J&K.

In general, the broad scope of the Environmental Assessment study includes following but not limited to:

- collect additional data relevant to the study area;
- undertake environmental monitoring so as to establish the baseline environmental status of the study area;
- assess the impacts on environmental attributes due to the construction and operation on of the proposed improvement work;
- prepare an Environmental Management Plan (EMP) outlining the measures for improving the environmental quality and budgetary cost estimation for implementation;
- identify critical environmental attributes required to be monitored subsequent to the implementation of the proposed subproject

1.4. Need and Benefits of The Project Road

The prerequisite objective of this component is to restore and improve the connectivity disrupted due to the disaster through the reconstruction of damaged roads. The infrastructure will be designed to withstand earthquake and flood forces as per the latest official design guidelines. The affected areas will benefit by the restored access to markets thereby increasing the economic growth in these areas and timely access to health and education services. Restoration of roads will also serve as supply/rescue lines in the event of a disaster. The component will finance the reconstruction of damaged roads, bridges and associated drainage and slope stabilization works, retaining walls, breast walls and other structures to increase resilience.

By improving and upgrading the existing roads which is in highly dilapidated condition will facilitate better riding surface and the access to the education/ religious places, markets, connecting villages and by inter district connectivity which is the perceivable benefits.

1.5. Need of Environmental Assessment (EA)

The environmental impact assessment for the road Package-4 includes establishing the environmental baseline conditions in the study area, identify the range of anticipated environmental impacts during design, pre-construction, operation and maintenance phases of the project, specifying the measures to avoid, minimize, and mitigate negative impacts and maximize positive impacts and integrate possible mitigation measures, environmental management plan and environmental enhancement measures.

The proposed mitigation measures will be formulated in the form of an environmental management plan with necessary budget and institutional roles for effective implementation of EMP for the “Improvement and Up-gradation of Road Package-4 (Kashmir Region) under Jhelum and Tawi Flood Recovery Project (JTFRP) and integration of the same in to project implementation agreements, including construction contract documents.

1.6. Environmental Screening and Scoping

Environmental screening exercise of the proposed subproject projects was undertaken to facilitate inputs on environmental, social and economic considerations for current and future prospects. Further, this report also provides scoping inputs in determining the major

environmental issues and defines the scope of work for conducting environmental assessment. As per the findings and recommendations of the Environmental Screening report, Environmental Assessment has been carried out for the subproject. The scoping exercise defines geographical boundaries for the subproject for impact assessment as well as defining the project influence area to assess the impacts due to project activities.

1.7. Environmental Assessment (EA)

The EA for selected subproject includes establishing environmental baseline in the study area, identify the anticipated environmental impacts, specify the measures to avoid, minimize, and mitigate negative impacts and maximize positive impacts and integrate necessary mitigation measures, environmental management plan and environmental enhancement measures as required. The proposed measures will be formulated in the form of an environmental management plan with necessary budget provisions and institutional roles for effective implementation during various stages of the project. The EMP developed shall form the part of the construction contract document.

1.8. Environmental Management Plan

An Environmental Management Plan designed for the implementation of the subproject shall consists of overall framework which will be a guidance document providing environmental planning and design criteria for the current subprojects, generic environmental management measures, institutional mechanism for implementation, capacity building and training process, and resource materials to function adequately to mainstream the environmental management and implementation of environmental management and monitoring plan.

1.9. Study Approach

In order to accomplish the above objectives, studies were organised in line with the guidelines stipulated by the World Bank and ESMF of JTFRP for environmental assessment.

a) Field Reconnaissance Survey

The approach to the entire study was formulated based on a detailed field reconnaissance survey and a thorough understanding of the proposed project. The reconnaissance survey was carried out for the project road to understand the salient environmental features of the project area, sensitive areas with regards to the proposed project activities, and general understanding of the proposed subproject.

Based on the above an environmental profile of the project area, primary and secondary data requirements for carrying out further activities of the study, environmental surveys necessary for assessing the project impacts, and the project influence area were identified.

b) Review and Assessment of Applicable Environmental Regulations

Discussions with different stakeholders and review of the various regulations and guidelines for EA were conducted to assess the sampling and analysis requirements for the project and the procedural requirements for conducting an Environment

Assessment. This primarily comprised of reviewing all relevant documents available for the project area.

c) Delineation of Study Area for Assessment

The above tasks identified the survey and analysis requirements for baseline data collection required for assessing the anticipated impacts of the proposed subproject activities. Based on which, the study area that is critical for assessing the project impacts was identified and delineated. The project influence area also considered those areas that are directly or indirectly influenced by the project activities during pre-construction, construction or operation of the proposed road improvement works.

d) Base Line Environmental Conditions

This activity comprised of field surveys for assessing the baseline environmental conditions and collecting primary and secondary information regarding physical, biological and socio-economic conditions of the study area. In addition, existing environmental quality of the study area was assessed based on the field of environmental monitoring. For monitoring the air, noise, and water quality, monitoring was carried and samples were collected and analyzed for relevant parameters.

e) Prediction/Assessment of Potential Impacts

The activity identified the likely impacts through changes in the physical, biological or socio-economic environment based on the analysis of the baseline environmental data collected. The assessment considered both positive and negative impacts due to the subproject activities and also due to the construction, and operation of the project corridor.

f) Environment Management Plan

The major components of the environment management plan comprised preparation of mitigation plan for all the negative impacts identified during study and to avoid, minimize or compensate the impacts, and the post-project monitoring plan for the measures suggested in the management plan to ensure that the impacts of the project are within the regulatory standards.

1.10. Structure of Environmental Assessment Report

The structure of the EA report has been categorized in the following Chapters:

Executive Summary

1. Introduction
2. Approach & Methodology
3. Project Description
4. Policy, Legal and Administrative Framework
5. Baseline Environmental Conditions
6. Potential Environmental Impacts
7. Analysis of Alternatives
8. Consultation with Key Stakeholders
9. Environmental Management Plan

Annexures

2. APPROACH & METHODOLOGY

2.1. Reconnaissance Survey

The reconnaissance survey was conducted in June-July 2019 in the project domain area of Bijbehara-Waghama Road via Kitriteng and Sangam-Khudwani Road before the inception of the screening exercise and environmental assessment study. The site visit and the initial assessment have become the key elements of the schedule of preparation as a part of the screening report. In addition to field investigations and observations, consultations/ field visits were held jointly with the stakeholders and project proponents and available environmental documentation was assembled for review.

2.2. Project Impact and Project Influence Area

In perspective of the environmental assessment study of above roads under Package-4 it is important to define the area for environmental impacts are being considered. The project will support infrastructure and the proposed improvement and up-gradation of roads under Package-4 which are confined within the existing roads of the area. The roads are free from any land acquisitions as no widening is involved.

The project impact area has been considered Right of Way (RoW) of the project corridor and project influence area has been considered as 500 meter from the centre line of the road surface on both sides (LHS/RHS).

2.3. Screening Methodology

The screening exercise was done through reconnaissance survey. Public consultation meetings were arranged with the local community and conducted in Bijbehara and Sangam Khudwani area. Field survey and data collection were carried out as per the screening checklist provided in Environmental & Social Management Framework (ESMF-2015) of the project. The information has been collected through primary as well as secondary sources, with the support of PMU/PIU team members. The objective behind the environmental screening was to delineate affected environmental features and issue like water logging/ submergence, scheduled trees protection, sensitive receptors-schools/ religious places and residential area, human settlements, water, natural resources etc. in the project area, in order to define impacts and to minimize the adverse environmental impacts by suggesting best engineering solutions/options at optimal costs.

The positive actions not only to avoid adverse impacts, but to capitalize on opportunities to correct environmental degradation or improve environmental conditions were determined.

2.4. Detailed Baseline Environmental Surveys

A comprehensive survey was conducted for the purpose of environmental impact and screening studies. For this purpose, a data-sheet was devised to collect quantitative and qualitative social and environmental data together with local subproject specific consultations. This will be the basis for further investigations for future studies. Information

collection, literature survey and analysis of data published and other recorded data *e.g.* on wildlife, forest flora, climate, pollution along with socio-economic, demographic, land-use pattern, land ownership details etc. pertaining to the subproject were also studied and reviewed. National and state environmental guidelines were also reviewed prior to carry out baseline studies. Detailed survey has been carried out by the environmental and social experts who are responsible for the documentation of the environmental and social investigations and issues, to evaluate the existing environmental and social setting and conditions of the proposed project area. Potential significant impacts were identified on the basis of analytical review of project activities, baseline data, land use, environmental factors, socio-economic conditions and review of assessment of potential impacts identified in previous similar kind of projects. A participatory process was adopted while performing social screening of the sub-project. The information has been gathered through primary as well as secondary sources of information, with the support of PMU and PIU team members.

2.5. Collection of Data

Keeping in line with the proposed improvement and up-gradation of existing roads various activities like specific literature reviews and surveys were carried out referring publication & using internet and useful information about the project impact and influence area was collected. This includes both published and unpublished environmental data. Literature searches were undertaken and relevant agencies were contacted and apprised of the proposed subproject. The following data were collected for the road projects during environmental screening/ assessment study: `

- Geo reference maps.
- Socio-economic data from the Planning Department and Census records.
- Geological data from the Geological Survey of India.
- Meteorological data from India Meteorology Department, Govt. of India.
- District Profile from District Statistics Department.
- Forestry and Wildlife Data from the Forest Department.
- Flora and fauna from various sources, including the State Forests Department and Wildlife Department.

Readily available data were reviewed with the initial reconnaissance investigations, and the need for primary data collection in some instances was determined.

2.6. Environmental Monitoring Data

Environmental monitoring of roads under Package-4 will be carried during pre-construction stage in order to generate the latest baseline data so that it can be correlated for the comparative analysis with the monitoring during the construction/ operation stages of the project

2.7. Assessment of Alternatives

Analysis of alternatives is an analytical comparison of the operational effectiveness, costs and environmental and social risks of proposed development options. This helps to

analyze the options critically in relation to its impacts on all physical, social and biological environments. The 'no action option' is to be considered among various options available. The process will ultimately help to determine which option is comparatively better than the other various options. For this project, alternative analysis has been made for three considerations, *i.e.* strategic, planning and technology consideration. Since the project is improvement and up-gradation of the existing roads under Package-4 which was affected during the catastrophic floods of September 2014. Based on this assessment the present option of improvement and up-gradation is the best applicable solution and socio-economically viable option since does not involve any land acquisition/ displacement/ rehabilitation.

2.8. Stakeholder consultation and participation

Stakeholder's view and perception were assessed through informal and formal public consultation meetings. The different stakeholder's *viz.* government officials, local people (both male & female) were contacted and consulted during the course of the study. Stakeholders were informed about the subproject components and likely environmental impacts before seeking their views. In each consultation, all efforts were made to have adequate participation from women as well. Consultations have been carried out for the project in two stages. First stage consultation was undertaken during the impact assessment process to identify the concerns of people, which were duly addressed through appropriate mitigation measures. Second stage consultation was undertaken as part of the preparation of the EIA report to assess the adequacy and acceptability of the proposed mitigation measures and management plan. Public consultations ensured the involvement of the public, experts in the project's pre-planning stage itself and redressal of their concerns and expectations from the subproject. The community members, government officials members opined that the proposed subproject would contribute to social and economic development of the area. The proposed project would contribute to increased employment opportunities for the local people during and after subproject implementation. The communities welcomed the subproject and all were in favour of the project. Issues raised by stakeholders were analysed for practical and scientific basis, and for developing an appropriate mitigation, management and monitoring plan, depending on its importance and practicality.

Environmental Assessment report for Improvement and up-gradation of Road Package-4 (Bijbehara-Waghama Road via Kitriteng and Sangam-Khudwani Road in District Anantnag) and its executive summary shall be disclosed at JTFRP/PMU website as per provisions of World Bank disclosure policies.

3. PROJECT DESCRIPTION

3.1. Project Area

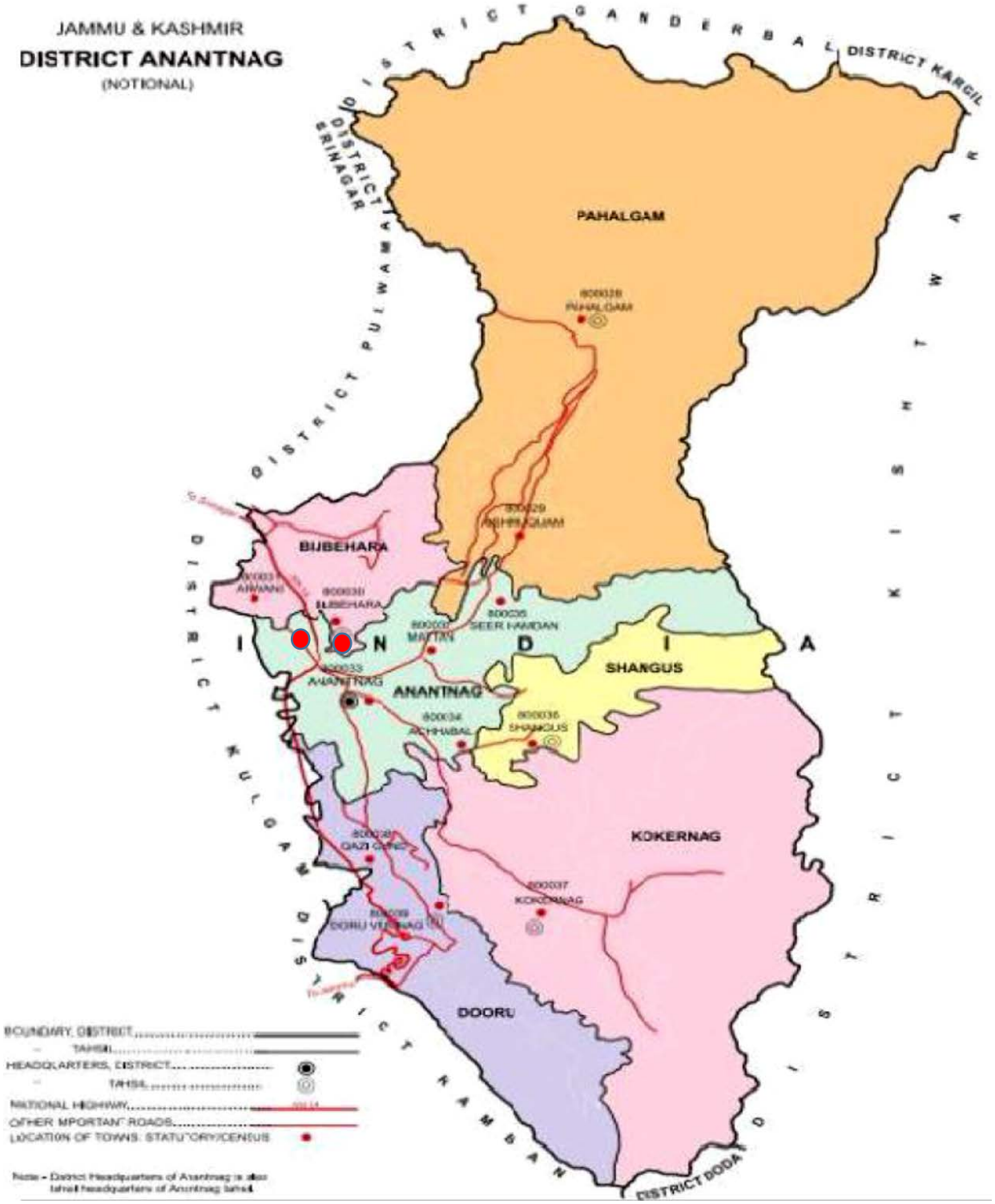


Fig: Showing Anantnag district map (Red dots showing indicative location of the roads)

The Package-4 roads are located in District Anantnag and having a geo-coordinates of 33°48'52.41"N Latitude and 75°04'51.44"E Longitude.

3.2. Project Location and Outline

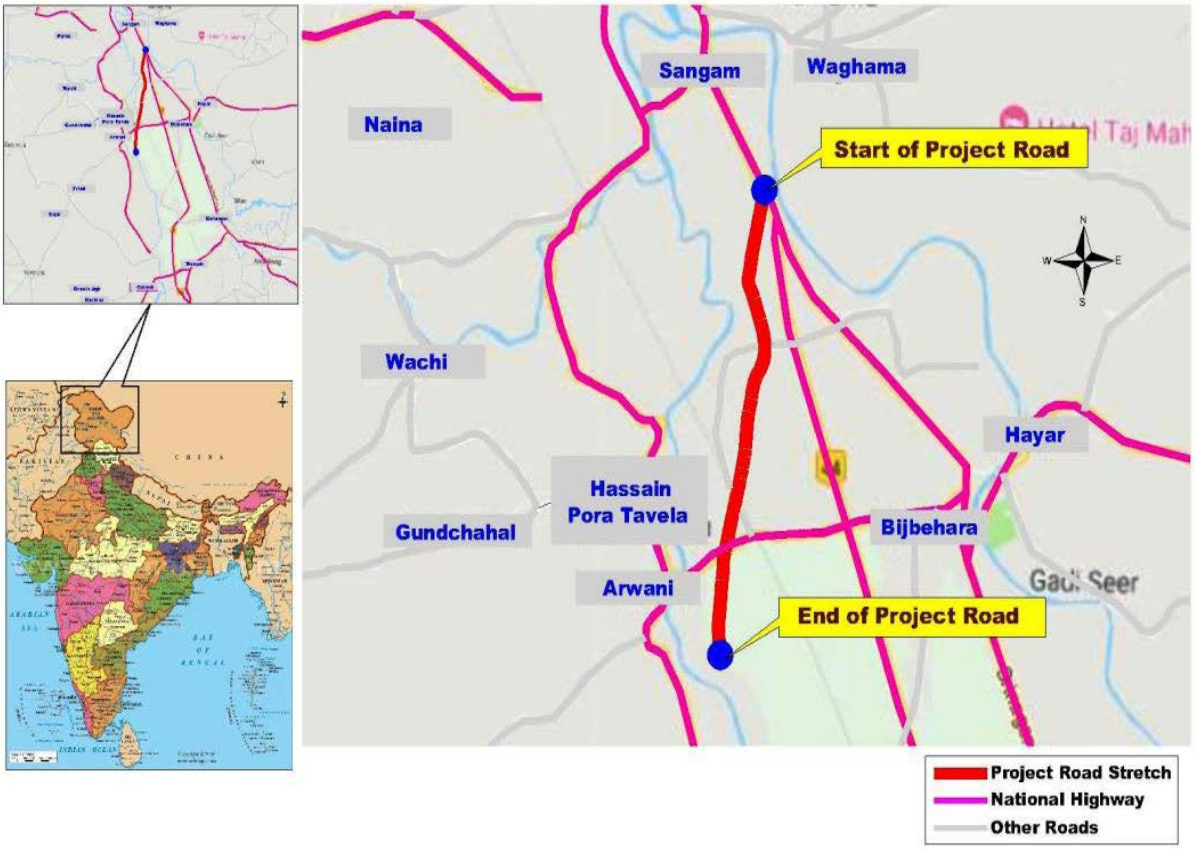
The Bijbehara-Waghama Road starts from old National Highway (Bijbehara) and ends at Waghama village. It is a Single lane rural road passing on mostly Plain & Rolling terrain, having moderate intensity of commercial vehicles. After 3+600 km the road is passing through rolling terrain. From 4+000 Km, project road follows earthen foot track. Apart from that, there is small link road having length 1.053 Km, taking off from 1.510 Km of Main Road, moving towards south direction and connects to Bijbehara. The Subproject toad also connects villages namely Kitriteng, Hayar, Waghama, Hussain Pora Tavela etc. Average existing carriageway width is 2.5 m which is lesser than a Single lane road (3 m). In that case widening is required and due to constraint of ROW, the concentric widening is proposed. Based on the traffic study during preparation of DPR lane configuration has been finalized. Embankment height of the road is zero as most of the stretches are passing through built up zones. The road has no history about regular flooding. Existing BT surface is mostly dilapidated in condition and moreover from pavement composition study it has been observed that the thicknesses of Base & Sub-base are less than the design thickness. As a result, new construction will be done for the entire stretch. RCC drain will be required at built up locations. A small open concrete irrigation drain of approximately 2 feet in width is running along the edge of the road (mainly on RHS) from 3+600 to 4+900 and is passing through Orchard fields. This channel is in dilapidated condition and needs to be constructed.

The Sangam to Khudwani road is a single lane VR falling under plain terrain, having low intensity of commercial vehicles. Project road starts from NH-44 and ends on Shopian-Wanpoh- Anantnag MDR. Overall length of the existing road is 11.481 Km, but the project road stretch is restricted up to Km 4.750 (near crossing of Irrigation Canal) as rest of the stretch i.e from Km 4.750 to Km 11.481 to be develop under PMGSY Scheme. From Km 0.000 to Km 4.750, sub project road is passing through open area. An Irrigation canal goes parallel on LHS of the road from Km 2.030 to Km.3.000. Existing pavement consists of GSB & WBM. Premix Carpet has been used as BT Surface and where overlay executed from time to time. Embankment height of the road is negligible. Average existing carriageway width is 2.70 m which is lesser than a single lane road configuration. In that case widening is required however due to constraint of RoW, carriage way is proposed as 3.75 m only with Granular Hard Shoulder on either side of the project road. There is no subsequent history found about regular flooding as Anantnag district is located on upstream side of River Jhelum. For the improvement, embankment height required to be raised upto 1.5 m from OGL. However, embankment may rise up to 600 mm at different stretches. Road is passing along the Nallah Vishnaw at different stretches and necessary protection work is required at those locations. Existing BT surface is fully dilapidated, Reconstruction of road proposed in addition with provision of replacement of poor pipe culverts.

Figure 3.1: Index Map of the subproject Roads under Package-4 (Component A & B)

Component A: Bijbehara-Waghama Road Via Kitriteng Road (8.396 Km) in District Anantnag

Component B: Sangam-Khudwani Road (4.793 Km) in District Anantnag



3.3. Technical description of the Package-4 (Component A & B)

Table 3.1: Component A (Improvement & Up-gradation of Bijbehara-Waghama Road via Kitriteng)

S.No	Description of Item	Details	
1	Road length	Existing Main Road – 7+340 Km Link Road – 1.050 Km	Design Main Road – 7+343 Km Link Road – 1+053 Km
2	Road Configuration	Existing:- 2.50 m to 3.0 m wide carriageway (Both)	Propose:- 3.75 m wide carriageway (Both)
3	Terrain	Plain & Rolling	
4	Land use pattern	Open, Agricultural & Residential	
5	Existing Surface of carriageway	Flexible Broken BT surface exists for a net length of 3.6 Km (Km 0.000 to Km 3.600) and rest stretches are either Gravel or Earthen	
6	Existing Formation Width	3.50 m to 4.00 m	
7	Right of Way (ROW)	6.55 m	
8	Pavement Condition	Poor	
9	New Flexible Pavement thickness	OGPC-25 mm; BM -50 mm, WBM - 225 mm; GSB-200 mm	
10	Design CBR	6.05 % (Av CBR)	
11	Junctions	Minor - 8	
12	Traffic	T9 (15 ESAL to 20 EASL) – IRC SP 72 -2015	
13	Cross drainage structures	Existing CD Structure - 6 Slab Culvert – 4 No Bridge - 2 No	Proposed Culvert- 1 (Reconstruction) Box Culvert – 1 No
14	Settlement	Bijbehara, Kitriteng, Hayar, Waghama, Hussainpora Tavela	

Table 3.2: Component B (Improvement & Up-gradation of Sangam - Khudwani Road)

S.No	Description of Item	Details	
1	Road length	Existing – 4.750 km.	Design – 4.793 km
2	Road Configuration	Existing:- 2.70 m to 3.0 m wide carriageway	Propose:- 5.5 m wide Carriageway
3	Terrain	Plain	
4	Land use pattern	Open & Agricultural	
5	Existing Surface of carriageway	Flexible pavement BT surface	
6	Existing Formation Width	4.50 m – 4.80 m	
7	Right of Way (ROW)	6.7m	
8	Pavement Condition	Poor	
9	New Flexible Pavement thickness	OGPC-25 mm; BM -50 mm, WBM - 225 mm; GSB-200 mm	
10	Design CBR	5.79 % (Av CBR)	
11	Junctions	Minor - 1	
12	Traffic	T9 (15 ESAL to 20 EASL) – IRC SP 72 -2015	
13	Cross drainage structures	Existing CD Structure- 12 HP Culvert - 9 Nos. Slab Culvert - 2 Nos Bridge - 1	Proposed Culvert- 9 HP Culvert - 9 Nos (Reconstruction)
14	Settlement	Sangam, Hassain Pora Tavela, Arwani, Wanpoh, Qaimoh	

3.4. Project Features & Design Aspects of Package 4 Roads

3.4.1. Cross Drainage Structures

There are 18 nos. of cross drainage structures existing in the project roads. 4 slab culverts and 2 bridges exist in Bijbehara-Waghama road of which only one slab culvert need to be reconstructed as per DPR as box culvert of suitable size. Whereas, 8 hume pipe (HP) culverts, 2 slab culverts and a bridge exsit in the Sangam Khudwani Road. These existing HP culverts are proposed to be replaced with the 1200mm dia hume pipe culverts as such the existing such culverts are choked due to the siltation process and are in poor condition. The details are given in the **Table 3.3.**

Table 3.3: List of Existing Cross Drainage Structures

Sl No.	Existing Structures					
	Chainage	Types	Dia/Span(m)	Width	Width of Head/Parapet Wall (m)	Condition
A	**Bijbehara-Waghama Road via Kitriteng**					
1	1+210	Bridge				U/C
2	2+370	Bridge	20.000	4.50	22.20	Good
3	2+940	Culvert	4.600	5.50	5.10	Good
4	3+930	Culvert	7.000	4.50	7.40	Poor
5	5+270	Culvert	3.500	7.50	3.90	Good
6	6+050	Culvert	3.000	5.00	3.40	Good
B	**Sangam Khudwani Road**					
1	0+525	SC	4.6	5.750	5	Good
2	1+620	Bridge	18.0	11.240	18.4	Good
3	2+192	HPC	-	5.000	-	Poor
4	2+225	HPC	-	5.100	-	Poor
5	2+262	HPC	-	6.100	-	Poor
6	2+290	HPC	-	6.200	-	Poor
7	2+315	HPC	-	6.000	-	Poor
8	2+425	HPC	-	5.000	-	Poor
9	2+862	HPC	-	6.300	-	Poor
10	3+788	HPC	-	7.120	-	Good
11	4+490	HPC	-	5.180	-	Poor
12	4+762	SC	10.0	7.000	10.4	Poor

HPC: Hume Pipe Culvert

Table 3.4: Details of Proposed Cross Drainage Structures

S. No.	Structures					Proposed Structure		
	Chainage	Types	Dia/Span (m)	Width	Chainage	Types	Dia/Span (m)	Remarks
A	Bijbehara-Waghama Road via Kitriteng							
1	-	-	-	-	0+140	HP	1x1.2	NC
2	-	-	-	-	0+800	HP	1x1.2	NC
3	1+210	Bridge	U/C		1+210	-	-	UC
4	2+350	Bridge	20.0	4.5	2+355	-	-	Retained
5	2+940	Culvert	4.6	5.5	2+930	-	-	Retained
6	-	-	-	-	3+540	HP	1x1.2	NC
7	3+930	Culvert	7.0	4.5	3+918	Box Culvert	1x6.0x4.0	R&NC

S. No.	Structures					Proposed Structure		
	Chainage	Types	Dia/Span (m)	Width	Chainage	Types	Dia/Span (m)	Remarks
8	5+270	Culvert	3.5	7.5	5+268	-	-	Retained
9	6+050	Culvert	3.0	5.0	6+045	-	-	Retained
10	-	-	-	-	7+020	HP	1x1.2	NC
B	Sangam-Khudwani Road							
1	-	-	-	-	0+140	HPC	1 x 1.2	NC
2	0+525	Slab Culvert	4.6	5.804	0+530	-	-	Retained
3	-	-	-	-	1+040	HPC	1 x 1.2	NC
4	1+620	Bridge	18.0	11.39	1+615	-	-	Retained
5	2+192	Pipe Culvert	-	4.937	2+190	HPC	1 x 1.2	R&NC
6	2+225	Pipe Culvert	-	5.15	2+225	HPC	1 x 1.2	R&NC
7	2+262	Pipe Culvert	-	6.155	2+265	HPC	1 x 1.2	R&NC
8	2+290	Pipe Culvert	-	6.217	2+292	HPC	1 x 1.2	R&NC
9	2+315	Pipe Culvert	-	6.044	2+315	HPC	1 x 1.2	R&NC
10	2+425	Pipe Culvert	-	5.077	2+420	HPC	1 x 1.2	R&NC
11	2+862	Pipe Culvert	-	6.323	2+860	HPC	1 x 1.2	R&NC
12	3+050	Rail Crossing	-	5.53	3+050	-	-	-
13	3+788	Culvert	-	7.14	3+790	HPC	1 x 1.2	R&NC
14	4+490	Pipe Culvert	-	5.18	4+490	HPC	1 x 1.2	R&NC
15	4+762	Culvert	10.0	6.723	4+760	-	-	Retained

U/C – Under Construction, SC – Slab Culvert, BC – Box Culvert, R&NC – Replaced and New Construction
HPC- Hume Pipe Culvert, R&NC – Replaced and New Construction & NC – New Construction

3.4.2. Improvement of Existing Drains

In this project road, there are only 526.201 m earthen (unlined) drain exists at different stretches. Details are shown in **Table 3.5**

Table 3.5: List of Existing Drain

S. No	Chainage		Left	Right	Type of Drain
	From	To	Length (m)		
A. Bijbehara Waghama Road via Kitriteng					
From Km 0.000 to Km 7.343 (Main Road)					
1	0+180	0+346	165.914	-	PCC
2	0+620	0+746	126.250	-	PCC
3	1+700	1+879		178.767	PCC
4	2+892	2+911		19.270	PCC
		Length	**292.164**	**198.037**	
From Km 0.000 to Km 1.053 (Link Road)					
6	0+966	1+002	36.000		PCC
		Length	**36.000**		
		Total Length	**526.201**		
B. Sangam Khudwani Road					

S. No	Chainage		Left	Right	Type of Drain
	From	To	Length (m)		
1	0+484	0+518	34.064	-	
2	0+850	0+971	-	121.22	
3	1+060	1+388	-	328.45	
4	3+400	3+715	-	315.096	
5	3+780	4+500	689.522	-	
6	4+490	4+505	-	14.55	
Total Length			**689.52**	**779.32**	

In this project road PCC Drain require at those stretches where stretches are under Rolling Terrain having a total length 1400 m. The chainage wise details given in **Table 3.6** below;

Table 3.6: Details of Proposed Drain

Sl No.	Drain			
	Chainage		Left	Right
	From	To	Length (m)	
A.	Bijbehara-Waghama Road via Kitriteng			
1	4+300	5+000	700.00	700.00
B.	Sangam Khudwani Road			
1	0+484	0+518	34.064	-
2	0+850	0+971	-	121.22
3	1+060	1+388	-	328.45
4	3+400	3+715	-	315.096
5	3+780	4+500	689.522	-
6	4+490	4+505	-	14.55
Total Length			**689.52**	**779.32**

3.4.3. Protection Walls (Breast Wall and Retaining Wall)

In this project road, there are only 121.20 m Stone Wall and 116.651 m Retaining Wall exists in the form of stone masonry at different stretches. Details are shown in **Table 3**.7**.**

Table 3.7: List of Existing Protection Walls

A. **Bijbehara Waghama Road via Kitriteng**

S. No.	Chainage		Stone Wall		Chainage		Retaining Wall	
			Left	Right			Left	Right
	From	To	Length (m)		From	To	Length (m)	
From Km 0.000 to Km 7.343								
1	0+522	0+624	102.21	-	2+320	2+347	26.721	21.370
-	-	-	-	-	2+370	2+406	32.020	36.540
		Length	**102.21**			**Length**	**58.741**	**57.910**
		Total Length	**102.21**			**Total Length**	**116.651**	

B. Sangam Khudwani road

S. No.	Chainage		Left	Right
	From	To	Length (m)	
1	0+940	1+014	-	74.170
2	1+100	1+219	-	119.00

3	1+316	1+442	-	125.60
4	1+575	1+594	-	19.430
5	1+600	1+608	8.025	-
6	1+625	1+637	-	11.731
7	2+975	3+000	-	24.880
Total Length			8.025	374.82

Breast wall has been considered about 1400m length.

3.5. Traffic Safety and Other Appurtenances

Following road furniture and miscellaneous items have been designed keeping safety aspect in mind.

Road Markings

Road Markings on the carriageway and on the objects within and adjacent to the roadway are used as a means of guiding. They promote road safety and ensure smooth flow of traffic in the required paths of travel.

The location and type of marking lines, material and colour is followed using IRC: 35-2015 – "Code of Practice for Road Markings". The road markings were carefully planned on carriageways, intersections and bridge locations.

Road Signs

Road signs were planned to supply information, to regulate traffic by imparting messages to the drivers. The type, locations, sizes were planned using IRC: 67-2012 "Code of Practice for Road Sign". A detail of "Road Signage" is given in **Table 3.8**.

Table 3.8: Details of Road Signage

S. No	Sign		Size	Nos
	Fig No	Description		
1	14.02	Give Way	900 Equilateral	8
2	14.23	Overtaking Prohibited	600 Equilateral	0
3	15.01	Left Hand Curve	600 Equilateral	5
4	15.02	Right Hand Curve	600 Equilateral	5
5	15.03	Right Hairpin Curve	600 Equilateral	0
6	15.04	Left Hairpin Curve	600 Equilateral	0
7	15.05	Right Reverse Bend	600 Equilateral	6
8	15.06	Left Reverse Bend	600 Equilateral	6
9	15.07	Series of Bends	600 Equilateral	6
10	15.09	Side Road Right	600 Equilateral	3
11	15.10	Side Road Left	600 Equilateral	3
12	15.18,15.19, 15.20, 15.21	Intersection	600 Equilateral	8
13	15.23	Narrow Road Ahead	600 Equilateral	0
14	15.24	Road Widens	600 Equilateral	0
15	15.34	School Ahead	600 Equilateral	0
16	15.35	Build Up Area	600 Equilateral	8
17	15.72	Chevron(Normal)		0

18	15.76	Object Hazard(Left)	90 cm x 30 cm rectangular	20
19	15.77	Object Hazard(right)	90 cm x 30 cm rectangular	20
20	16.02	Directional Sign		5
21	16.04	Directional Sign	60 cm x 90 cm rectangular	1
22	16.06	Place Identification Sign	60 cm x 45 cm rectangular	8
23	14.37	Maximum Speed Limit	600 mm dia	24
24	15.30,15.31	Start & End of Dual Carriageway	600 Equilateral	0
25	17.07	Hospital Ahead	600 Equilateral	0
Total				**136**

Delineators

The role of delineators is to provide visual assistance to driver about alignment of the road ahead, especially at night. Reflectors are used on the delineators for better night visibility. IRC: 79-1981 “Recommended Practice for Road Delineators” was followed to plan locations details. Two types of road delineators were planned i.e. hazard markers and object markers. Hazard markers are to define obstructions like guardrails, and abutments adjacent to the carriageway, for instance at culverts and bridges. Object markers are used to indicate hazards and obstructions within the vehicle flow path, at channeling islands close to intersections.

Crash Barrier

W Type Metal crash barriers are proposed/ provided for safety of the traffic on the stretches on approaches of bridges. It is also proposed on the curves for safety of traffic irrespective of embankment height as per NHAI Circular (NHAI/PH-II/NHDP/ADB/GM (NS)-I dated May 19, 2004).

Parapet Wall

Parapet walls are provided along the edge of the shoulders at the valley side throughout the project stretch excluding the settlement areas. These are provided to prevent the vehicles from toppling over.

4. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

This chapter presents the national and state-level environmental legislations and regulations; and World Bank Policies relevant to the "Improvement and Up-Gradation of roads under Package-4 namely; Bijbehara-Karihama Road via Katriteng and Sangam - Khudwani Road in District Anantnag, Kashmir J&K. The various regulation applicable and regulatory clearances required for the road improvement and up-gradation are also been incorporated in this section.

4.1. Legal Framework

The Government of India has laid out various policy guidelines, acts and regulations pertaining to the environment. The Environment (Protection) Act, 1986 provides umbrella legislation for the protection of the environment. As per this Act, the responsibility to administer, the legislation has been jointly entrusted to the Ministry of Environment, Forests and Climate Change (MoEF & CC) at National level, whereas Jammu & Kashmir Pollution Control Board (J&KPCB) at State level in the present context to "Improvement and Up-gradation of Existing Roads under Package-4.

4.2. Applicable National and State Regulations

The key environmental and other regulations relevant to up-gradation of subproject roads under Package-4 in Kashmir is presented in Table 4.1

Table 4.1: Environmental Regulations Relevant to Up-gradation of subproject roads under

S. No.	Environmental and Other Regulations	Relevance to Improvement & Up-gradation of Subproject Roads (Package-4), Kashmir	Regulatory Clearances Required, if any	Authority
1.	EIA Notification, 14th Sept 2006 and subsequent amendments	The subproject is not covered in the ambit of the EIA Notification 2006 as this is not covered under Category of the notification. As a result, the categorization, and the subsequent environmental assessment and clearance requirements, either from the state or the Government is not triggered.	The project road is not covered under the preview of EIA Notification 2006 and subsequent amendments. However, for opening of new borrow areas and stone quarry, prior environmental clearance will be required from SEIAA/DEIAA, which is to be obtained by the contractor.	MoEF & CC, GoI and SEIAA/DEIAA, GoJ&K

2.	Jammu and Kashmir Forest (Conservation) Act, 1997	This Act is NOT applicable as the proposed road Package-4 does not require diversion of forest land.	NONE	Principal Chief Conservator of Forests, J&K Forest Department, Government of J&K
3.	Jammu and Kashmir Wildlife (Protection) Act, 1978 as amended, J&K Wildlife (Protection) Act 1978, as amended provide for protection & management of Protected Areas	This act is NOT applicable as the proposed road Package-4 is not passing through any National Parks, and Wild Sanctuary.	NONE	Chief Wildlife Warden, Government of J&K
4.	Air (Prevention and Control of Pollution) Act, 1981	This act is applicable for construction phase to manage ambient air quality at the project site and ancillary sites like camp, crusher plant, hot mix plant, concrete batch mix plant, DG Set etc, for the road Package-4 The NAAQ standards (CPCB) for Ambient Air Quality have been promulgated by the MoEF&CC for various land uses.	YES Consent to Establish (CTE) and Consent to Operation (CTO) from the JKSPCB for setting up of hot mix plant, wet mix plant, stone crusher and diesel generators. To be obtained by the Contractor, prior to construction works.	J&KSPCB, Government of J&K
5.	Water Prevention and Control of Pollution) Act,1974	This act is applicable for the construction phase of the road Package-4 to manage liquid waste discharges from a work camp, concrete batch mix plant, etc. This act will be applicable for control of water pollution from project activity. during the construction phase	YES Consent to Establish (CTE) and Consent to Operation (CTO) from the JKSPCB for setting up of hot mix plant, wet mix plant and stone crusher. To be obtained by the Contractor, prior to construction works.	J&KSPCB, Government of J&K
6.	Noise Pollution (Regulation and Control Act),2000	This act will be applicable for all construction equipment/ plant and machinery including vehicles deployed for implementation of the proposed road Package-4 to regulate ambient noise levels The standards for noise for day & night have been promulgated by the	Noise levels are to be controlled during construction works for the proposed road Package-4 in conformity with permissible standards	J&KSPCB, Government of J&K

		MoEF&CC for various land uses. This act will be applicable to regulate noise nuisance during the construction phase		
7.	Construction & Demolition Waste Management Rules, 2016	This rule shall be applicable to the generation of wastes resulting from the demolition of bridge and culvert structures and scarifying of the surface of the existing road and from road construction activities. This will be mitigated within the ambit of this rule.	Construction and Demolition Waste Management Plan shall be prepared and implemented by the contractor, prior to commencement of works	Municipal Corporation
8	Wetland (Conservation and Management) Rules, 2017	This rule prohibits range of activities in wet lands like settling up and expansion of industries, waste dumping, effluent discharge.	There is no wetland in the project road.	State Wetland Authority
9.	Public Liability and Insurance Act of 1991	To protect damage to the public life and/or property as a result of negligence/accidents during the construction of proposed road Package-4.	Project operations are to be insured by the contractor to cover damage to the public life and/or property due to accidents/ negligence during construction of the proposed road.	State Labour Department
10.	Central Motor Vehicle Act 1988 and Central Motor Vehicle Rules 2019	This act will be applicable for all construction equipment/plant and machinery including vehicles deployed during construction of road Package-4.	Vehicular emissions are to be regulated by project proponent in conformity with permissible levels/ emissions PUC to be obtained by the contractor.	J&K Motor Vehicles Department
11.	Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996/ Jammu and Kashmir Building and Other Construction Workers (Regulation of Employment and Condition of Services) Rules, 2006	To ensure safety and welfare measures for workers employed at construction sites. Compliance to provisions of health and safety measures for the construction workers in conformity with BOCW rule concerning safety and health in construction. These regulations to be complied with during the construction of proposed road works.	Safety and welfare measures for workforce employed at construction sites are to be regulated by the contractor in conformity with the Jammu and Kashmir Building and Other Construction Workers (Regulation of Employment and Condition of Services) Rules, 2006	Labour and Employment Department, Govt. of J&K

12.	Hazardous and Other Waste (Management, and Transboundary Movement) Rules,2016	The rules will be applicable to used oil generated from construction equipment/ machinery during construction works. The rule includes storage, handling, transportation procedures and requirements for safe disposal of hazardous wastes.	Hazardous Waste Authorisation with CTE and CTO by the contractor.	J&KSPCB
13.	Solid Waste Management Rules, 2016	This rule is applicable to all forms/types of solid waste generated at construction activities, campsite, plant sites, etc..	Solid Waste Management Plan shall be prepared and implemented by the contractor, prior to commencement of works	Municipal Corporation
14	The Jammu and Kashmir Preservation of Specified Trees Act, 1969	The act preserves specified trees and for cutting of such trees, permission will be required from Forest Department.	For cutting of any specified trees permission will be obtained from Forest Department.	J&K Forest Department
15	The Ancient Monuments and Archaeological Sites and Remains Act, 1958, and the rules, 1959 provide guidance for carrying out activities, including conservation, construction and reuse in and around the protected monuments.		No ASI site located within the project influence area. .	ASI Archaeological Survey of India

4.3. World Bank Safeguard Policies

World Bank safeguard policies are designed to prevent and mitigate undue harm to people and their environment in the development process. They layout requirements that must be complied with for all Bank-funded projects (refer to World Bank's Website on Safeguard Policies). The safeguard policies of the World Bank relevant to the Construction of Storm Water Drainage are given in **Table 4.2**.

Table 4.2: Relevant and Applicability of WB Safeguard Policies for Up-gradation of existing Road Package-4 in District Anantnag, Kashmir

S. No.	World Bank Safeguard Policy	Key Features	Policy Applicability to Sub Project	Policy Triggered Or Not
1.	OP/BP 4.01	Overall governing policy	All potential impacts due to the	Triggered

	Environmental Assessment	intended to ensure Bank-financed projects are environmentally sound and sustainable	construction of roads under Package-4 by way of improvement and up-gradation of the existing roads are to be assessed and necessary mitigation measures are to be incorporated accordingly.	
2.	OP/BP 4.04 Natural Habitats	Policy is intended to prohibit Bank financing of projects that degrade or convert critical habitats and supports projects that affect non-critical habitats only if no alternatives are available and if acceptable mitigation measures are in place.	The construction of roads under Package-4 by way of improvement and up-gradation of the existing roads and the project sites are not located in any forest area/ national park or wild sanctuary.	Not Triggered
3.	OP/BP 4.36 Forests	Policy is intended to support sustainable and conservation-oriented forest management, harness potential of forests to reduce poverty in a sustainable manner, integrate forests into sustainable economic development and protect vital local and global environmental services and values of forests.	The improvement & up-gradation of roads under Package-4 are existing roads and are not located in any forest area.	Not Triggered
5.	OP/BP 4.11 Physical Cultural Resources	Policy is intended to ensure that projects identify and inventory cultural resources that are potentially affected by the project. Projects should include mitigation measures, when there are adverse impacts on physical cultural resources.	Construction of road will be on existing road corridor and will avoid cultural property resources (CPR) and therefore does NOT warrant shifting or affect CPRs. However, there may be direct or indirect impact on nearby cultural properties along the road.	Triggered

4.4. MoRTH & IRC Specifications

Section 111	Precautions for safeguarding the environment
Clause 201.2	Preservation of Property/Amenities during clearing and grubbing
Clause 202	Dismantling of Culverts
Clause 301.3.2	Stripping and storing of topsoil for reuse during excavation for roadway and drains
Clause 302.4	Restriction on timings for blasting operations
Clause 304.3.6	Public safety near towns/villages where excavation is carried out
Clause 305.2.2.2	Locations of borrowing and relevant regulations
Clause 305.3.3	Stripping and storing of topsoil at borrow locations
Section 306	Soil erosion and sedimentation control
Clause 407.4.2	Provisions for turfing on median and islands

Clause 701.2.1	Use of geo-textiles (Jute or Coir) for control of soil erosion
Section 810	Use of Metal beam crash barriers for safety, relevant regulations and specifications

Indian Road Congress (IRC) Code of Practices applicable for the Project Road

Key Indian Road Congress (IRC) Code of Practices applicable for the project road with respect to environment are given below:

Table 3.3: Indian Road Congress Code of Practices for Project Road

S. No.	IRC Code Theme	Year	Purpose	Applicability
1.	Recommendations for Road Construction in Areas Affected by Water Logging, Flooding and/or Salts Infestation	IRC:34-2011	Construction in water logged areas	Yes
2.	Recommended Practice for Construction of Earth Embankments and Sub-Grade for Road Works	IRC:36-2010	Issues relating to Borrow pits	Yes
3.	Guidelines for Pedestrian Facilities	IRC: 103 - 1988	Safety of pedestrians	Yes
4.	Guidelines for Use of Construction and Demolition Waste in Road Sector	IRC:121-2017	Use of Construction and Demolition Waste in Road Sector	Yes
5.	Guidelines on Landscaping and Tree Plantation	IRC:SP:21-2009	Landscaping and Tree Plantation along of the road	Yes
6.	Guidelines on Road Drainage	IRC: SP: 42-1994	Drainage	Yes
7.	Highway Safety Code	IRC: SP: 44-1994	Highways safety	Yes
8.	Guidelines for Use of Geotextiles in Road Pavements and Associated Works	IRC:SP:59-2002	Use of Geotextiles in Road Pavements and Associated Works	Yes
9.	Guidelines for Soil and Granular Material Stabilization Using Cement Lime and Fly Ash	IRC:SP-89-2010	Soil and Granular Material Stabilization Using Cement Lime and Fly Ash	Yes
10.	Guidelines on Requirements for Environmental Clearance for Road Projects	IRC:SP-93-2017	Requirements for Environmental Clearance for Road Projects	Yes
11.	Use of Cold Mix Technology in Construction and Maintenance of Roads Using Bitumen Emulsion	IRC:SP-100-2014	Use of Cold Mix Technology in Construction and Maintenance of Roads Using Bitumen Emulsion	To be considered
12.	Guidelines on Preparation and Implementation of Environment Management Plan	IRC:SP-108-2015	Preparation and Implementation of Environment	Yes

S. No.	IRC Code Theme	Year	Purpose	Applicability
			Management Plan	

4.5. Applicability of International Conventions

Ramsar Convention on Wetlands of International Importance, 1971 – not Applicable

The Ramsar Convention is an international treaty for the conservation and sustainable utilization of wetlands i.e. to stem the progressive encroachment on and loss of wetlands now and in the future, recognizing the fundamental ecological functions of wetlands and their economic, cultural, scientific and recreational value.

According to the Ramsar list of Wetlands of International Importance, there are 25 designated wetlands in the country which are required to be protected. Activities undertaken in the proximity of these wetlands should follow the guidelines of the convention.

International Union for Conservation of Nature (IUCN) - not Applicable

The International Union for Conservation of Nature (IUCN) is a membership Union uniquely composed of both government and civil society organizations. IUCN has evolved into the world's largest and most diverse environmental network. IUCN is the global authority on the status of the natural world and the measures needed to safeguard it.

IUCN produces the IUCN Red List of Threatened Species and the IUCN Red List of Ecosystems. The IUCN Red List of Ecosystems is applicable at local, national, regional and global levels. IUCN' stated goal is to expand the global network of national parks and other protected areas and promote good management of such areas. In particular, it focuses on greater protection of the oceans and marine habitats.

4.6. Environmental Standards

Various environmental standards like National Ambient Air Quality Standards, Ambient Noise Standards and Drinking Water Standards applicable to the proposed "Construction of Roads under Package-4 by way of Improvement and Up-gradation of existing roads of Bijbehara-Waghama Road via Katriteng and Sangam-Khudwani Road are reflected in Environmental Monitoring section of this report.

[*]Environmental standards applicable to this subproject are given below:

- National Ambient Air Quality Standards, 2009
- Ambient Noise Standards
- Drinking Water Quality Standards-IS:10500:2012
- CPCB Standards for Surface Water Use
- Stack Gas Discharge Standards for Hot Mix Plant

[*] Refer Annexure XVIII for the detailed description of environmental standards

5. BASELINE ENVIRONMENTAL CONDITION

5.1. General

Anantnag is one of the six district of Kashmir valley situated in its south and south-western direction. The district lies geographically between 33°-30° to 34°-15° North latitude and 74°-30° to 75°-35° East Longitude. It is bounded by two districts of Kashmir division, one district of Leh (Ladakh Division) and three districts of Jammu division. The district Srinagar is in the North, district Pulwama in the Northwest, and district Kargil in the Northeast. Three districts of Jammu division are Doda in the East, Udhampur in the Southeast, Ramban and Kulgam in the Southwest respectively. Its entire southern sector and major parts of the eastern region is strewn with thick forests and mountains. The height of these mountains in the East, South and West of the district ranges between 2438 meters to 3048 meters and in some cases the peaks soar even to a height of 4267-4572 meters. On the west the district is bounded by mighty Pir Panchal Range mountains, through which passes worlds famous Jawahar Tunnel. The District Anantnag is situated at a distance of 55kms of the south-east of Srinagar.The average elevation between 1594-[†]3048m asl The total population of the District Anantnag is 10,78,692 as per census 2011. The geographical area of the District is 2917 sq. Kms and the administrative centre of the District is situated at Anantnag, which is 50 Km from Srinagar. 73.77 % of the population lives in rural areas and 26.23 % in urban areas. As per Census 2011, the literacy rate of the District is 62.69 % with male and female literacy rate of 72.66 % and 52.19 % respectively.

5.2. Study Area

The Bijbehara-Waghama via Kitriteng Road starts from old National Highway (Bijbehara) and ends at Waghama village. It is a Single lane rural road passing on mostly Plain & Rolling terrain, having moderate intensity of commercial vehicles. After 3+600 km the road is passing through rolling terrain. From 4+000 Km, project road follows earthen foot track. Apart from that, there is small link road having length 1.053 Km, taking off from 1.510 Km of Main Road, moving towards south direction and connects to Bijbehara. Subproject Road also connects villages namely Kirihama, Kitriteng Hayar, Waghama, Hassain Pora Tavela, having population of more than 1000. Average existing carriageway width is 2.5 m which is lesser than a Single lane road (3 m). In that case widening is required and due to constraint of ROW, the concentric widening is proposed. Based on the traffic study during preparation of DPR lane configuration has been finalized. Embankment Height of the road is zero as most of the stretches are passing through built up zones. The road has no history about regular flooding. Existing BT surface is mostly dilapidated; moreover from pavement composition study it has been found that thicknesses of Base & Sub-base are less than the design thickness. As a result, new construction will be done for the entire stretch. RCC drain will be required at built up locations and also from 8.2 km to 10 km where road is passing through Orchard Garden.

The Sangam-Khudwani road is a single lane VR falling under plain terrain, having low intensity

[†] Which include Elevation of highest mountain peaks

of commercial vehicles. Project road starts from NH-44 and ends on Shopian-Wanpoh-Anantnag MDR. Length of the Road is 11.481 Km, but project stretch is restricted up to Km 4.750 (near crossing of Irrigation Canal) as rest of the stretch i.e from Km 4.750 to Km 11.481 to be develop under PMGSY Scheme. From Km 0.000 to Km 4.750, sub project Road passing through open area. An Irrigation canal goes parallel on LHS of the road from Km 2.030 to Km.3.000. Existing pavement consists of GSB, WBM. Premix Carpet has been used as BT Surface in existing road. Embankment Height of the road is negligible. Average existing carriageway width is 2.70 m which is lesser than a Single lane road (3 m). In that case widening is required and due to constraint of RoW, carriage way is proposes as 3.75 m only with Granular Hard Shoulder on either side of the project road. There is no subsequent history found about regular flooding as Anantnag district is located on upstream side of River Jhelum. For the betterment, embankment height required to rise up to 1.5 m from OGL. However, embankment may rise up to 600 mm at different stretches. Road is passing along the Nallah Vishnaw at different stretches and necessary protection work is required at those locations. Existing BT surface is fully dilapidated, Reconstruction of road proposed in addition with provision of replacement of poor pipe culverts.

5.3. Topography and Physiography

Bijbehara-Waghama road and Sangam Khudwani road lies in the District Anantnag of Kashmir region. The starting section of Bijbehara road falls in a characteristic plain terrain topography and has a progressive rolling terrain features onwards, whereas the Sangam Khudwani road is a low lying area with distinctive plain terrain type. The project influence area on both sides of the Bijbehara road section is built-up areas and rest of the section have open and orchard land-use pattern. River Jhelum traverses at Ch 1+200 in Bijbehara at Gadhanji road. Sangam Khudwani lies in flood plain area of River Jhelum which was affted with the 2014 floods.The Anantnag district, more or less enjoys similar climate as other districts in the valley except that the areas situated at higher altitudes are cooler in summer and inaccessible in winter due to heavy snowfall.

Farming in Anantnag is the main occupation as maximum working population is engaged with it, thus has made district as one of the important district of Jammu and Kashmir. Anantnag District is located in the valley of Kashmir. The economy of the district mainly depends on the Agriculture Sector. The District is famous for Paddy and Maize production.

The Anantnag District as per census 2011 consists of 387 villages. The villages have been grouped into 12 Tehsils. District Headquarters of Anantnag is well connected by road.

Table: Settlement and Landuse Pattern along the Project Road

Sl. No.	Existing Chainage		Name of Village/Town	Terrain (Plain/ Rolling/ Hilly)	Land Use	
	From km	To km			Left	Right
A	Bijbehara-Waghama Road via Kitriteng in District Anantnag					
1	0+000	0+100	Bijbehara	Plain	Plantation/R/C	R/C/Plantation
2	0+100	0+200	Bijbehara	Plain	Plantation/R/C	R/C/Plantation
3	0+200	0+300	Bijbehara	Plain	BW/Builtup	Builtup

Sl. No.	Existing Chainage		Name of Village/Town	Terrain (Plain/ Rolling/ Hilly)	Land Use	
	From km	To km			Left	Right
4	0+300	0+400	Bijbehara	Plain	Builtup/Mosque	Builtup
5	0+400	0+500	Bijbehara	Plain	Builtup	Builtup
6	0+500	0+600	Bijbehara	Plain	Builtup	Builtup
7	0+600	0+700	Bijbehara	Plain	Builtup	Builtup
8	0+700	0+800	Bijbehara	Plain	Builtup	Builtup
9	0+800	0+900	Bijbehara	Plain	Builtup	Builtup
10	0+900	1+000	Bijbehara	Plain	Builtup	Builtup/ School
11	1+000	1+100	Bijbehara	Plain	Builtup	Builtup
12	1+100	1+200	Bijbehara	Plain	Builtup/Open	Builtup/Open
13	1+200	1+300	Kitriteng	Plain	Open/Plantation/R	Open/R/C
14	1+300	1+400	Kitriteng	Plain	Open/Plantation/R	Open/Plantation/R
15	1+400	1+500	Kitriteng	Plain	Open/Plantation	Open/Plantation
16	1+500	1+600	Kitriteng	Plain	Open/Plantation/R	Open
17	1+600	1+700	Kitriteng	Plain	Open/Plantation	Open/Plantation
18	1+700	1+800	Kitriteng	Plain	Builtup	Builtup
19	1+800	1+900	Kitriteng	Plain	Builtup/Plantation	Builtup/Plantation
20	1+900	2+000	Kitriteng	Plain	Builtup/Plantation	Builtup/Plantation
21	2+000	2+100	Kitriteng	Plain	Builtup	Builtup
22	2+100	2+200	Kitriteng	Plain	Builtup/School	Builtup
23	2+200	2+300	Kitriteng	Plain	Builtup	Builtup
24	2+300	2+400	Kitriteng	Plain	Builtup	Builtup
25	2+400	2+500	Kitriteng	Plain	Builtup	Builtup
26	2+500	2+600	Kitriteng	Plain	Cultivated Land	Cultivated Land
27	2+600	2+700	Kitriteng	Plain	Cultivated Land	Cultivated Land
28	2+700	2+800	Kitriteng	Plain	Cultivated Land	Cultivated Land
29	2+800	2+900	Kitriteng	Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
30	2+900	3+000	Kitriteng	Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
31	3+000	3+100	Kitriteng	Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
32	3+100	3+200	Kitriteng	Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
33	3+200	3+300	Kitriteng	Plain	Builtup/Cultivated Land/Plantation	Builtup/Cultivated Land/Plantation
34	3+300	3+400	Kitriteng	Plain	Builtup/Cultivated Land/Plantation	Builtup/Cultivated Land/Plantation
35	3+400	3+500	Kitriteng	Plain	Builtup/Cultivated Land/Plantation	Builtup/Cultivated Land/Plantation
36	3+500	3+600	Kitriteng	Plain	Builtup/Cultivated Land/Plantation	Builtup/Cultivated Land/Plantation
37	3+600	3+700	Kitriteng	Plain	Builtup/Cultivated Land/Plantation	Builtup/Cultivated Land/Plantation
38	3+700	3+800	Kitriteng	Plain	Builtup/Canal	Builtup/Cultivated Land/Plantation
39	3+800	3+900	Kitriteng	Plain	Builtup/Cultivated Land/Plantation	Builtup/Cultivated Land/Plantation
40	3+900	4+000	Kitriteng	Plain	Builtup/Cultivated Land/Plantation	Builtup/Cultivated Land/Plantation
41	4+000	4+100	Kitriteng	Plain	Builtup/Plantation	Builtup/Plantation
42	4+100	4+200		Plain	Builtup/Plantation	Builtup/Plantation
43	4+200	4+300		Plain	Builtup/Plantation	Builtup/Plantation
44	4+300	4+400		Plain	Builtup/Plantation	Builtup/Plantation
45	4+400	4+500		Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
46	4+500	4+600		Plain	Cultivated	Cultivated

Sl. No.	Existing Chainage		Name of Village/Town	Terrain (Plain/ Rolling/ Hilly)	Land Use	
	From km	To km			Left	Right
					Land/Plantation	Land/Plantation
47	4+600	4+700		Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
48	4+700	4+800		Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
49	4+800	4+900		Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
50	4+900	5+000		Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
51	5+000	5+100	Wengan	Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
52	5+100	5+200	Wengan	Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
53	5+200	5+300	Wengan	Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
54	5+300	5+400	Wengan	Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
55	5+400	5+500	Wengan	Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
56	5+500	5+600	Wengan	Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
57	5+600	5+700	Wengan	Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
58	5+700	5+800	Wengan	Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
59	5+800	5+900	Wengan	Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
60	5+900	6+000	Waghama	Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
61	6+000	6+500	Waghama	Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
62	6+000	6+100	Waghama	Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
63	6+100	6+200	Waghama	Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
64	6+200	6+300	Waghama	Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
65	6+300	6+400	Waghama	Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
66	6+400	6+500	Waghama	Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
67	6+500	6+600	Waghama	Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
68	6+600	6+700	Waghama	Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
69	6+700	6+800	Waghama	Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
70	6+800	6+900	Waghama	Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
71	6+900	7+000	Waghama	Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
72	7+000	7+100	Waghama	Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
73	7+100	7+200	Waghama	Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
74	7+200	7+300	Waghama	Plain	Cultivated Land/Plantation	Cultivated Land/Plantation

Sl. No.	Existing Chainage		Name of Village/Town	Terrain (Plain/ Rolling/ Hilly)	Land Use	
	From km	To km			Left	Right
75	7+300	7+400	Waghama	Plain	Cultivated Land/Plantation	Cultivated Land/Plantation
Link Roads						
76	0+000	0+100	Bijbehara	Plain	Open	Open/R/C
77	0+100	0+200	Bijbehara	Plain	Open//Plantation	Open/R/C
78	0+200	0+300	Bijbehara	Plain	Open/Builtup	Buildup/Open
79	0+300	0+400	Bijbehara	Plain	Open	Open/Nala
80	0+400	0+500	Bijbehara	Plain	Open	Open
81	0+500	0+600	Bijbehara	Plain	Open	Open
82	0+600	0+700	Bijbehara	Plain	Open/Builtup	Open
83	0+700	0+800	Bijbehara	Plain	Builtup	Open
84	0+800	0+900	Kitriteng	Plain	Builtup	Open
85	0+900	1+000	Kitriteng	Plain	Builtup	Open
86	1+000	1+100	Kitriteng	Plain	Builtup	Builtup

Sl. No.	Existing Chainage		Name of Village/Town	Terrain (Plain/ Rolling/ Hilly)	Land Use	
	From km	To km			Left	Right
B	**Sangam-Khudwani Road in District Anantnag**					
1	0+000	0+100	Sangam	Plain	Cultivated Land/Plantation	Cultivated Land
	0+100	0+200	Sangam	Plain	R/Cultivated Land/Plantation	Cultivated Land
2	0+200	0+300	Sangam	Plain	Cultivated Land	Cultivated Land
3	0+300	0+400	Sangam	Plain	Cultivated Land/BW	Cultivated Land/BW
4	0+400	0+500	Sangam	Plain	Cultivated Land	Plantation
5	0+500	0+600	Sangam	Plain	Cultivated Land/Plantation	Plantation
6	0+600	0+700	Sangam	Plain	Plantation	Plantation
7	0+700	0+800	Hassanpora	Plain	Cultivated Land/Plantation	Plantation/Cultivated Land
8	0+800	0+900	Hassanpora	Plain	Cultivated Land/Plantation	Plantation/Cultivated Land
9	0+900	1+000	Hassanpora	Plain	Cultivated Land/Plantation/BW	Plantation/Cultivated Land
10	1+000	1+100	Hassanpora	Plain	Cultivated Land/Plantation/BW	Plantation
11	1+100	1+200	Hassanpora	Plain	Plantation	Plantation
12	1+200	1+300	Hassanpora	Plain	Plantation	Plantation
13	1+300	1+400	Hassanpora	Plain	Cultivated Land/Plantation/BW	Plantation
14	1+400	1+500	Hassanpora	Plain	Cultivated Land/Plantation/BW	Plantation
15	1+500	1+600	Hassanpora	Plain	Plantation	Plantation
16	1+600	1+700	Hassanpora	Plain	Water Pipe/R/Mosque	R/C/Passenger Shelter/Plantation
17	1+700	1+800	Hassanpora	Plain	R/C/Plantation	R/C/Plantation
18	1+800	1+900	Hassanpora	Plain	R/C/Plantation	R/C/Cultivated Land
19	1+900	2+000	Jablipora	Plain	Cultivated Land	Cultivated Land
20	2+000	2+100	Jablipora	Plain	Cultivated Land	Cultivated Land
21	2+100	2+200	Jablipora	Plain	Cultivated Land	Cultivated Land
22	2+200	2+300	Jablipora	Plain	Cultivated Land	Cultivated Land
23	2+300	2+400	Jablipora	Plain	Cultivated Land	Cultivated Land
24	2+400	2+500	Jablipora	Plain	Cultivated Land	Cultivated Land
25	2+500	2+600	Jablipora	Plain	Cultivated Land	Cultivated Land
26	2+600	2+700	Jablipora	Plain	Cultivated Land	Cultivated Land
27	2+700	2+800	Jablipora	Plain	Cultivated Land	Cultivated Land
28	2+800	2+900	Jablipora	Plain	Cultivated Land	Cultivated Land

Sl. No.	Existing Chainage		Name of Village/Town	Terrain (Plain/ Rolling/ Hilly)	Land Use	
	From km	To km			Left	Right
29	2+900	3+000	Jablipora	Plain	Cultivated Land	Cultivated Land
30	3+000	3+100	Jablipora	Plain	Cultivated Land	Cultivated Land
31	3+100	3+200	Jablipora	Plain	Plantation	Plantation
32	3+200	3+300	Jablipora	Plain	Cultivated Land/Plantation	Plantation
33	3+300	3+400	Jablipora	Plain	Cultivated Land/Plantation	Plantation
34	3+400	3+500	Jablipora	Plain	Cultivated Land/Plantation	R/Plantation
35	3+500	3+600	Jablipora	Plain	Cultivated Land/Plantation/R	Plantation/R
36	3+600	3+700	Jablipora	Plain	Cultivated Land/Plantation	Plantation
37	3+700	3+800	Jablipora	Plain	R/C/Cultivated Land/Plantation	R/C/Cultivated Land/Plantation
38	3+800	3+900	Jablipora	Plain	R/C/Cultivated Land/Plantation	R/C/Cultivated Land/Plantation
39	3+900	4+000	Jablipora	Plain	R/Cultivated Land/Plantation	R/Cultivated Land/Plantation
40	4+000	4+100	Jablipora	Plain	Cultivated Land	Cultivated Land
41	4+100	4+200	Jablipora	Plain	R/Cultivated Land	Cultivated Land
42	4+200	4+300	Jablipora	Plain	R/Cultivated Land	R/Cultivated Land
43	4+300	4+400	Jablipora	Plain	R/Cultivated Land	R/Cultivated Land
44	4+400	4+500	Jablipora	Plain	R/Cultivated Land	R/Cultivated Land
45	4+500	4+600	Jablipora	Plain	R/Cultivated Land	Cultivated Land
46	4+600	4+700	Jablipora	Plain	Cultivated Land	Cultivated Land
47	4+700	4+800	Jablipora	Plain	Cultivated Land	Cultivated Land/BW/Mosque
48	4+800	4+900	Jablipora	Plain	Cultivated Land	Cultivated Land
49	4+900	5+000	Jablipora	Plain	R/C	R/C

5.4 . Geology and Soil of the Area

The main geological formations in the district are Karewas and Paleozoic Sedimentaries and Volcanics. These formations are overlain by a thin mantle of recent alluvium. The Karewas are overlying the folded Zeewan formation and Panjal volcanic. In the northern extremity of the valley portion, Karewa formations rests over the Cambrio-Silurians. The general geological successions of the area are shown in Table 5.1.

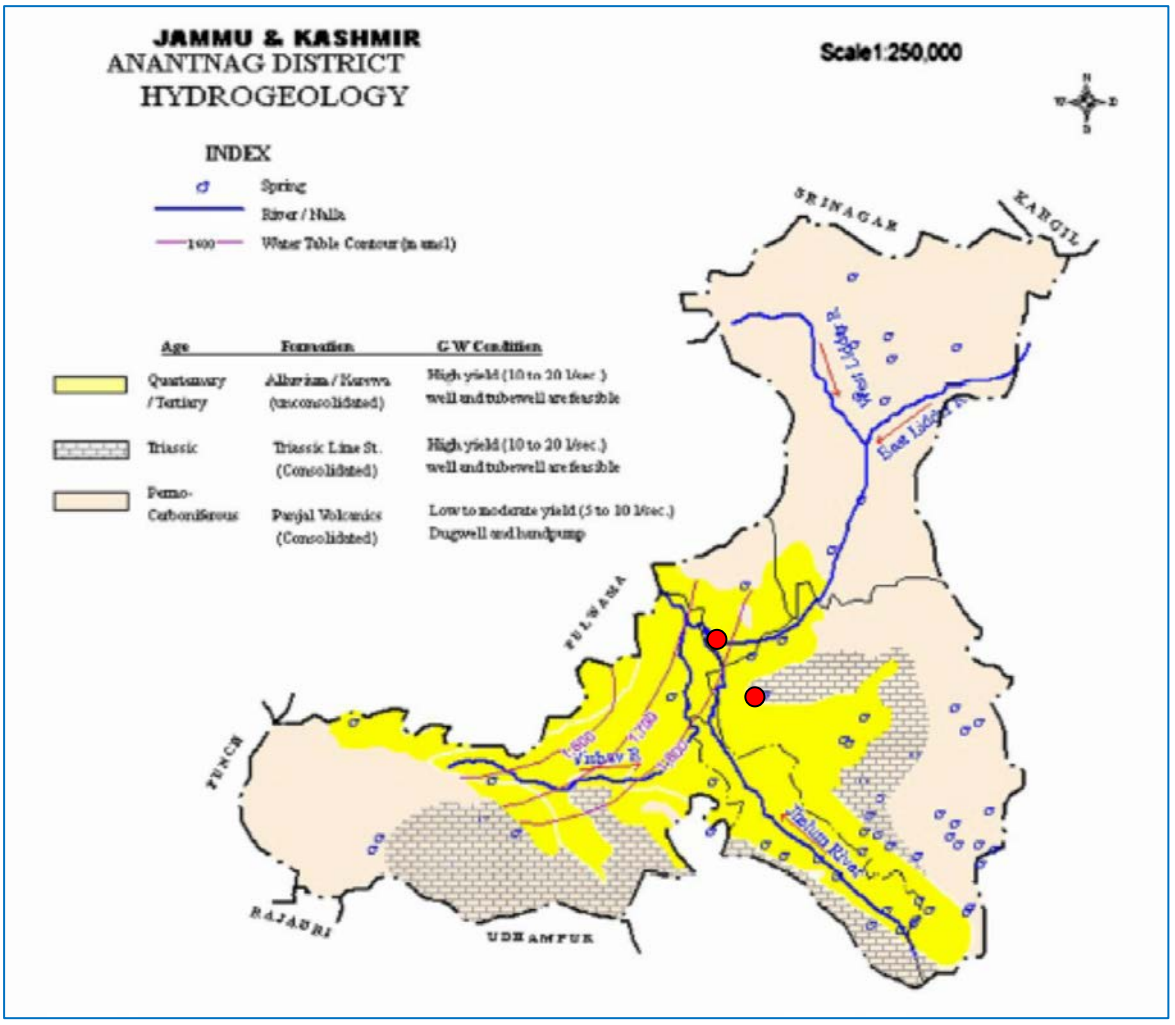
Table 5.2: Geology and Soil of the Area

Group /Formation	Lithology	Age
Scree material & Alluvium	Heterogeneous Clastic sediments comprising of Sand, Silt, Clay	Sub-Recent to Recent
Upper Karewas Naugam Formation	Loams, Silts & Silty brown-grey Clays unstratified, laminated to marls, sands, silts, and plastic clays. Glacier boulder bed II, glacial stage	Lower to middle Pleistocene to Lower Pliocene
Lower Karewas Hirpur Formation	Plastic bluish grey clays, sandy clays and sand with lignite at places Glacier boulder bed I, glacial stage	
Zeewan beds	Limestone & Shale	Middle to late Permian

The soils in J&K are loamy and there is little clay content in them. Poor in lime but with a high content of Magnesia, the soil is treated with chemical fertilizers and enriched with green manure and legume before cultivation. There is sufficient organic matter and

nitrogen content in the alluvium of the Kashmir valley as a result of plant residue, crops stubble, natural vegetation and animal excretion. The valley of Kashmir has many types of soils like: Gurti (clay), Bahil (Loam), Sekil (Sandy), Nambaal (Peats), Surzamin, Lemb, Floating garden soils and Karewa soils. No wonder, in Kashmir, soil is virtually worshipped as a miracle of divinity as it is a source of wealth of the land.

The soils of the Kashmir Valley are broadly divided into two types *viz,* Hapludalfs and Ochraqualfs.



Source: Ground Water Information Booklet, District Anantnag, March 2013

Fig 5.1: Map showing Hydro-geology of the District Anantnag (Red & Blue dots are project location- for illustration purpose only)

The Sangam Khudwani subproject falls under Alluvium formation which is characteristic to floodplain. The Alluvium, in the low-lying areas/ floodplain areas adjoining the Jhelum river and its tributaries consist of finely compacted detrital sediments such as loam, clay, silt and sand with occasional gravel. The Bijbehara to Waghama area mainly have a high yield-consolidated and Panjal Volcanics formation with lithology of Andesitic to Basaltic flows. The sediments are of heterogeneous nature ranging from boulder, cobbles, pebbles, gravels before merging into valley fill of fine-grained sediments.

5.5. Natural Hazards

The state is a multi-hazard prone region with natural disasters like earthquakes, floods, landslides, avalanches, high velocity winds, snow storms, cloud bursts, besides manmade disasters including road accidents and fires etc. occurring in various parts of the state. The subproject roads/ project influence comes under flood hazard, heavy snowfall, earthquakes (under Zone-V classification), and ma- made disasters including road accidents and fires which is synonymous with valley roads.

5.5.1. Floods

Although flooding is a major hazard to lives and infrastructure the world over, but mechanism and trends in flood hazards are poorly understood. Normally, the pro- longed and high intensity rainfall is the trigger for floods, however, the geomorphic setup and nature of the socio-economic development in the river basin would either ameliorate or exacerbate the flooding under various scenarios. Recently, the frequency of extreme rainfall events and floods has increased worldwide including the NW Himalayas. The extreme rainfall event, as evident from the 7-day antecedent rainfall data observed in the Jhelum basin, turned into one of the worst disasters in the flood history of the Jhelum compounded by the existence of the injudicious socioeconomic structures and massive land system changes in the floodplains that interfered with the hydraulic and hydrological processes during the flooding The scenario was further worsened due to the dilapidated flood control structures and the institutional failure on managing the enormity of the extreme flooding.

The 2014 flood was very devastating killing more than 100 people and causing colossal loss to the infrastructure to the tune of INR 1 Trillion (World Bank 2015). The Jhelum waters, that used to be the provider of life and sustenance, suddenly became a monstrously destructive force against the human life and the infrastructure that cohabit its backyards since millennia. The high discharge levels of the Jhelum persisted for more than a week, flooding the vast low lying areas of the valley. The scene was frightening making the people fear for a high human loss and total destruction of the capital city, Srinagar. Even though there is tremendous advancement in the flood hazard prediction globally during the last few decades, but there is insignificant progress in translating the benefits of the scientific advancements for the flood risk reduction of the society as was evident from the high loss of life and property during the 2014 Kashmir flooding. Dilapidated flood control infrastructure, shrinking of the wetlands, deforestation, high rate of the urbanization of Jhelum floodplains and siltation of the watercourses witnessed in the Kashmir valley during the last few decades has degraded the ability of the environment to absorb the excess rainwater in Jhelum basin and thus, increased the vulnerability of the basin to flooding which is manifest in the frequent flash floods and recurrent water logging observed in the floodplains of Jhelum

The roads under Package 4 were affected during floods of 2014, low lying areas/village were inundated with the September 2014 floods and have a history of submergence during floods. The Sangam Khudwani road and Bijbehara section are low lying and flood plain/ detention basin of river Jhelum. These areas are prone to floods.

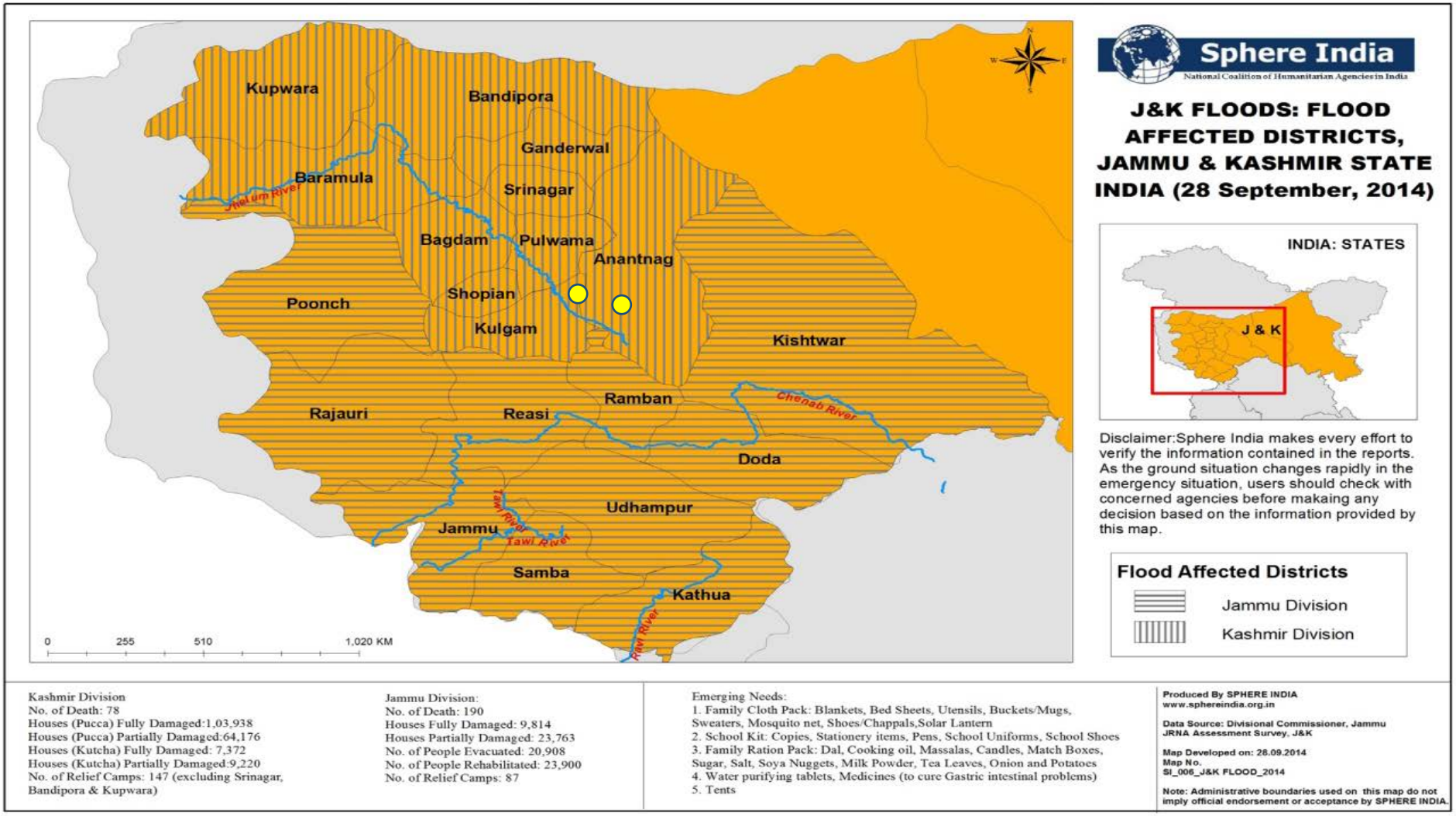


Fig 5.2: Flood Affected District Map (September 2014 Floods in J&K)- Yellow dots showing project roads in Anantnag District

5.5.2. Earthquakes- History and Seismic Zonation

The Indian subcontinent has a history of devastating earthquakes. The major reason for the high frequency and intensity of the earthquakes is that India is driving into Asia at a rate of approximately 47 mm/year. Geographical statistics of India show that almost 54% of the land is vulnerable to earthquakes. The latest version of seismic zoning map of India given in the earthquake resistant design code of India [IS 1893 (Part 1) 2002] assigns four levels of seismicity for India in terms of zone factors. In other words, the earthquake zoning map of India divides India into 4 seismic zones (Zone 2, 3, 4 and 5) unlike its previous version which consisted of five or six zones for the country. According to the present zoning map, Zone 5 expects the highest level of seismicity whereas Zone 2 is associated with the lowest level of seismicity.

The state of Jammu & Kashmir is the western most extension of the Himalayan mountain range in India. Here it comprises of the Pir Panjal, Zanskar, Karakoram and Ladakh ranges. The Main Boundary Thrust (MBT) underlies the Pir Panjal Range and is known as the Panjal Thrust in the region. The Zanskar ranges which are part of the Great Himalayan range are underlain by the Zanskar Thrust. The Kashmir Valley lies between the Pir Panjal and the Zanskar thrusts, making it very vulnerable to earthquakes. Other northern parts of Jammu & Kashmir are heavily faulted. Along the Zanskar and the Ladakh ranges runs a North West (NW) – South East (SE) trending strike-slip fault, the longest in the Jammu & Kashmir area. Apart from the routine small tremors, moderate to large earthquakes have hit nearly all parts of the state. However, it must be stated that proximity to faults does not necessarily translate into a higher hazard as compared to areas located farther away, as damage from earthquakes depends on numerous factors such as subsurface geology as well as adherence to the building codes. There are atleast four regions of the Himalaya where earthquakes of magnitude 8 or above are likely to occur in near future. 2005 earthquake of MW 7.6 has released only 1/10th of the stress generated within the region and remaining has to go in future great earthquakes. The damage occurred in Uri, Kupwara and Baramulla districts in Kashmir province and in the Poonch town and its surrounding areas are along the line of control. This earthquake was the strongest in over 120 years in the area. Efforts at all levels need to be taken to ensure whatever new structures are built are able to withstand future major earthquakes.

The subproject roads under Package-4 are located in District Anantnag which falls in a seismically active part (zone-V) of Kashmir valley. The design parameters for the proposed roads should conform with BIS code of Practice. Keeping in view the maximum credible earthquake magnitudes in the region, the site area is classified in Zone-V as per the Bureau of Indian standards (BIS) code of Practice (IS-1893-2002). These maximum credible earthquake magnitudes represent the largest earthquakes that could occur on the given fault, based on the current understanding of the regional Geo-tectonics. The earthquake zonation map of Jammu and Kashmir is given below:

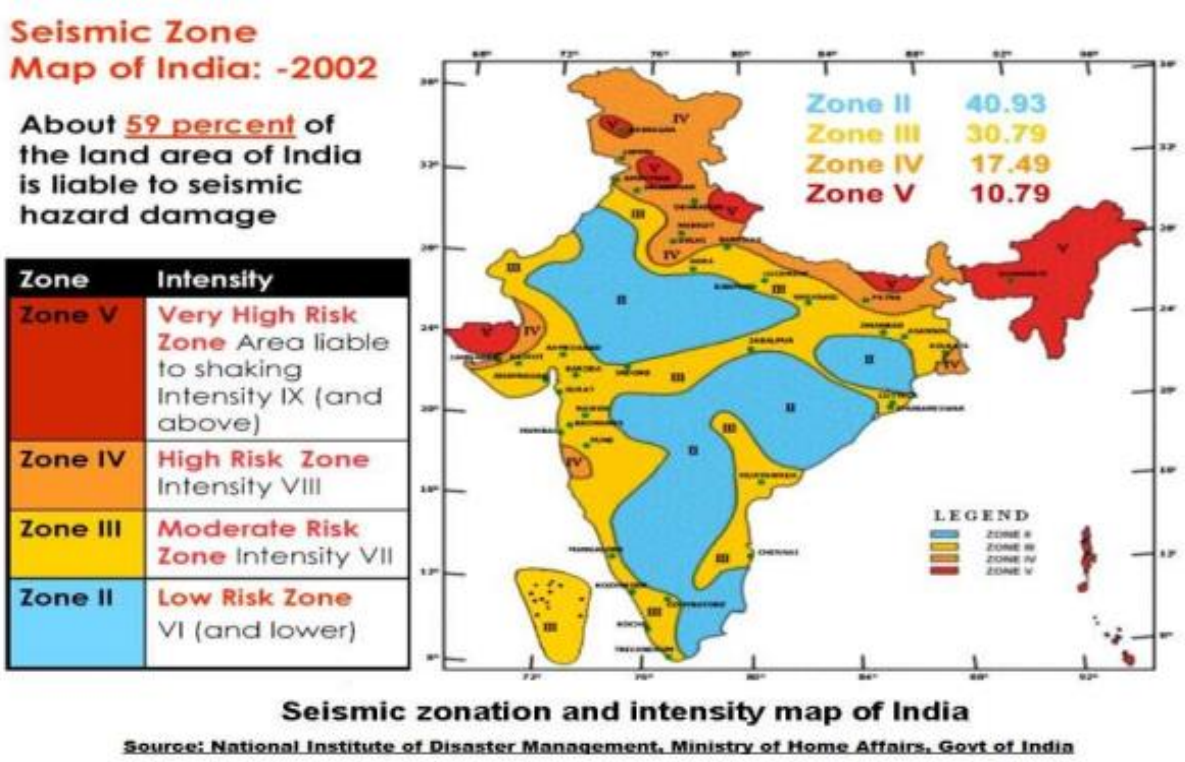


Fig 5.3: seismic Zonation and Intensity Map of India.

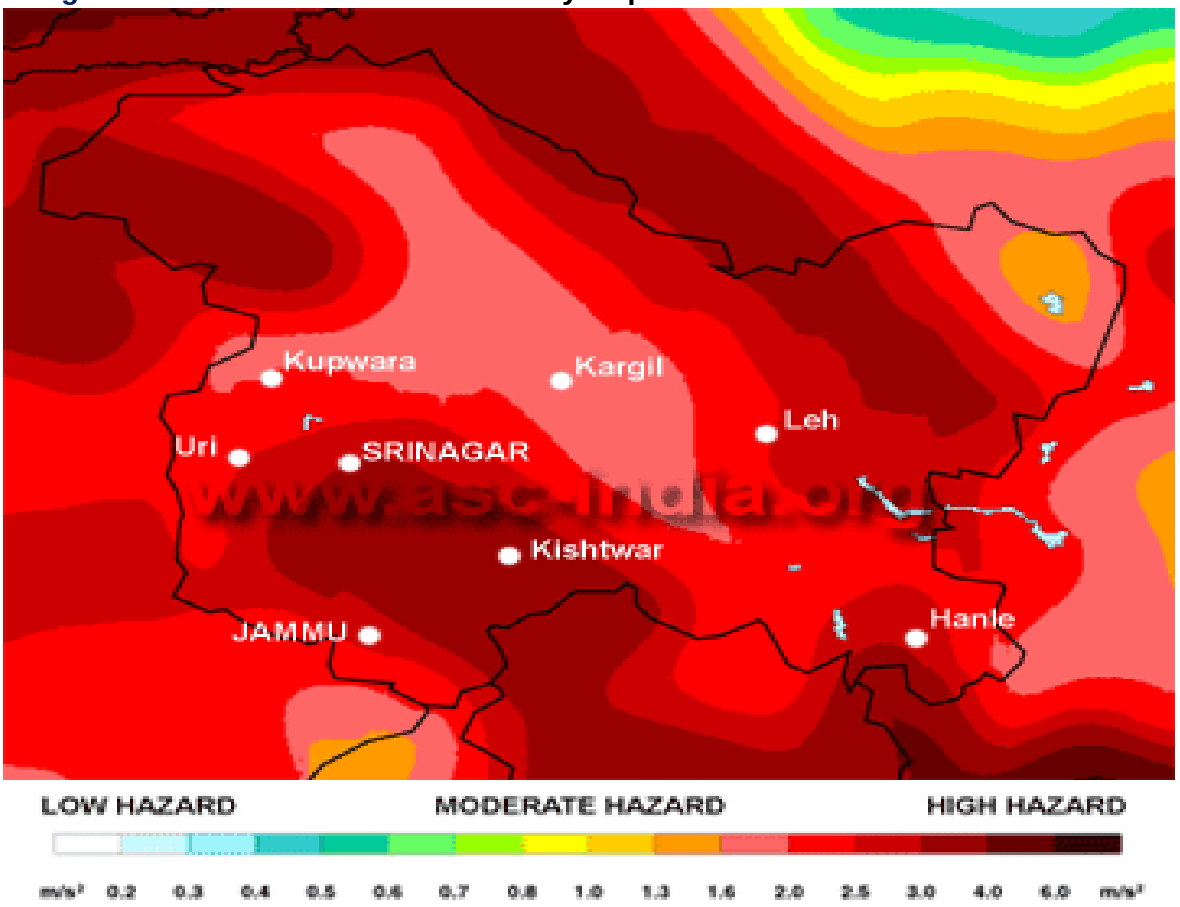
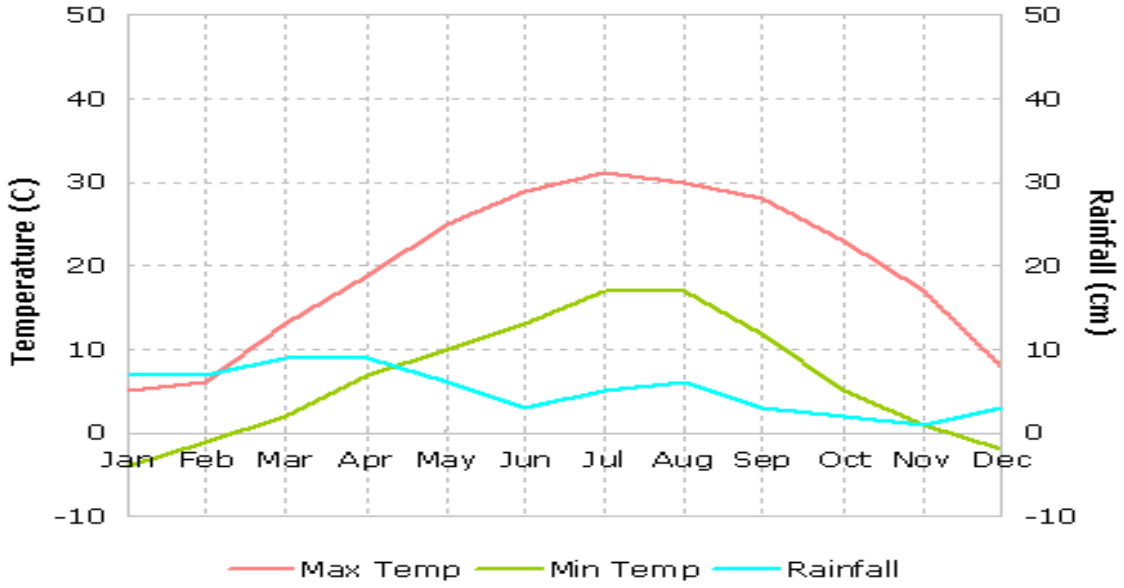


Fig 5.4: Jammu and Kashmir earthquake zones.

5.6. Air Environment

5.6.1. Meteorology and Climatology

The climate, in general, is characterized by temperate summer and cold/mild winters. Annual rainfall in the city is of the order of less than 710 mm– most of it in winter and spring seasons. Weather Graph for Srinagar is shown in **Figure 5.4** below.



Source: Indian Meteorological Department

Fig 5.5: [3]Weather graph of Srinagar

5.6.2. Temperature

June, July and August are the hottest months while December and January are the coldest. The temperature varies from cold in winter with minimum temperature touching even -3.7 °C to mild hot in summers when the temperature shoots up to 30 °C. The mean maximum and minimum temperature (°C) recorded at meteorological observatory (Rambagh, Srinagar) during 2005 - 2014 are summarized in Table 5.2:

[3] These are average maximum and average minimum temperature for Srinagar. The highest temperature in Srinagar for the month is usually higher than the average maximum temperature. Similarly, the lowest temperature in Srinagar for the month is usually lower than the average minimum temperature.

Table 5.3: Mean maximum and minimum temperature of Srinagar city

Year	Temp in (°C) Max/Min	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2005	Max	7.5	6.5	14.7	20.	21.8	29.3	28.9	30.4	29.3	22.7	15.8	9.9
	Min	-0.3	0.7	5.3	7.1	9.9	14.4	18	16.9	13.7	5.8	-0.2	-3.3
2006	Max	4.3	13.4	16	21.	28.2	27.6	30.9	28.7	25.9	22.9	15	8.4
	Min	-1.3	3.3	4.7	7.2	13.3	14.7	19.3	18.3	12.3	8	3.5	0
2007	Max	10	12	14.7	25.	25.5	27.8	29.8	30.1	27.3	24.1	17.1	9.9
	Min	-2.5	2.9	3	8.9	11.9	16	17.8	17.8	13.3	3.9	-1.1	-2
2008	Max	5.5	8.7	20	20.1	25.6	29.6	29.9	29.5	6.5	NA	NA	NA
	Min	-2.5	-1.4	5.3	7.7	11.5	18.3	19.1	17.8	11.3	NA	NA	NA
2010	Max	10.9	9.8	20.	21.3	22.7	25.7	28.9	28.5	26.6	23.8	18.6	11.3
	Min	-1.5	0.4	6.5	9.0	11.1	13.5	17.7	18.8	13.3	7.3	2.2	-3.7
2011	Max	9.5	17.1	18.6	27.7	30.3	29.8	30.1	27.8	22.3	15.7	10.4	7.9
	Min	-2.7	1.5	3.9	7.0	12.6	16.7	18.3	18.1	14.1	6.9	2.8	-1.9
2012	Max	4.8	9.7	16.2	19.9	23.8	27.4	30.9	29.9	26.3	21.2	16.8	9.0
	Min	-3.1	0.2	4.3	8.2	10.1	14.1	18.6	19.1	14.5	5.8	1.6	-0.4
2013	Max	07.8	10.8	18.3	20.0	24.9	29.4	31.1	28.8	27.6	24.4	15.9	10.7
	Min	-02.2	0.9	5.4	8.3	11.4	16.9	19.3	19.1	13.9	9.7	0.6	-1.4
2014	Max	5.5	9.9	12.3	19.0	23.9	29.4	30.4	29.3	24.8	21.8	14.8	10.7
	Min	-1.4	0.5	3.4	07.7	11.3	15.2	19.2	16.9	13.7	8.7	2.0	-2.6

Source: *Indian Meteorological Department, Srinagar*

NA: Not Available

5.6.3. Rainfall

The area experiences rain fall during winter and early summer from western disturbances. The month's total rainfall (MTR in millimeters) recorded at meteorological observatory at Rambagh, Srinagar during 2001 to 2014 is shown in Table 5.3.

Table 5.4: Rainfall data of Srinagar (Month's Total Rainfall in mm)

Months/ Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2001	21.3	46.1	56	57	37	52.8	80.8	67.8	33.5	15.9	36	**8**
2002	35.5	105.8	105.1	77.7	47.3	82.2	16.8	75.3	54.5	8.2	0	**8.9**
2003	28.7	180	173.4	127.6	91.4	20.4	97.9	19.8	62.4	8.7	14.6	**59.4**
2004	79.2	38.1	9.6	145.4	86.6	36.7	58.3	62.3	12	61.3	33.2	**12.5**
2005	86.6	188.5	104.8	48.1	63.6	8.3	115.5	15.6	16.8	18.6	14.4	**0**
2006	134	63.3	48.2	52.7	26.3	33.9	103.3	171.3	93.3	15.3	73.5	**72.2**
2007	8.1	52.6	210.3	1.5	46.2	50.9	54.9	47.4	14	0	0	**15.9**
2008	76.3	105	9.4	81.5	52.3	24.7	33.1	65.3	22.5	-	-	**-**

2010	24.1	88.9	61.0	126.8	186.4	45.3	69.8	132.1	16.9	51.4	2.0	**43.0**
2011	54.2	100.9	100.8	105.8	20.1	27.0	37.1	68.4	46.5	29.1	24.1	**33.1**
2012	60.2	78.7	58.0	82.7	39.8	24.3	12.1	26.6	111.5	10.8	11.7	**27.1**
2013	58.7	111.9	69.4	102.0	51.8	54.1	79.8	88.8	34.2	18.5	04.1	**16.6**
2014	**86.9**	**39.1**	**220.1**	**113.7**	**50.9**	**18.6**	**55.8**	**72.2**	**184.8**	**35.7**	**15.1**	**0.0**

Source*: Indian Meteorological Department, Srinagar*

5.6.4. Humidity

The humidity levels in the area are observed as maximum up to 95% in the months of July and August and minimum humidity levels between 30% – 40% prevail during December and January months. The mean relative humidity (MRH %) recorded at meteorological observatory at Rambagh, Srinagar during 2006 to 2008 at 08:30a.m. and 05:30p.m. Indian Standard Time (I.S.T) are presented in Table 5.4
below.

Table 5.5: Monthly Relative Humidity (%) Data of Srinagar City

Months		Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec
2006	Max	90	87	77	60	71	77	75	77	77	68	81	87
	Min	54	60	52	34	47	50	55	52	52	42	53	65
2007	Max	90	87	77	60	71	77	75	77	77	68	81	87
	Min	54	60	52	34	47	50	55	52	52	42	53	65
2008	Max	89	87	69	73	70	73	75	76	76	NA	NA	NA
	Min	70	63	40	52	53	51	53	51	49	NA	NA	NA
[4]2010	Max	88	87	71	77	78	74	75	85	78	77	85	90
	Min	-	-	-	-	-	-	-	-	-	-	-	-
2011	Max	84	87	75	75	66	65	73	76	77	81	87	88
	Min	60	66	52	58	44	47	51	50	54	57	64	64
2012	Max	88	86	70	73	71	66	70	78	81	81	83	89
	Min	70	61	43	55	49	43	45	56	60	54	56	71
2013	Max	87	88	74	74	69	71	72	80	78	78	82	86
	Min	63	58	43	53	45	46	47	60	51	55	54	65
2014	Max	88	87	84	73	73	63	73	77	86	84	90	90
	Min	69	60	64	53	58	41	52	54	60	60	66	65

Source: Indian Meteorological Department

[4] In 2010, only mean relative humidity data at 08:30 a.m. available

5.6.5. Wind

Wind speed and wind directions have a significant role on dispersion of atmospheric pollutants and therefore, it affects the ambient air quality of the area. Ground level concentrations for the pollutants are inversely proportional to the wind speed in the downwind direction, while in upwind direction no effect is observed and in crosswind directions partial effect due to emission sources is observed. Winds are generally light but do gain some strength during the late summer and early part of the monsoon season. In the southwest monsoon season winds from easterly and south- easterly directions are more common with north-westerly blowing on some days. In the post-monsoon and winter seasons, the predominant wind direction is north- westerly. In the summer, winds are generally from north-westerly direction but on some day they blow from southeast.

March to July are windiest month, whereas the October and November months are the calmest months with low wind speed conditions. Most predominant wind direction is north-west from March to May.

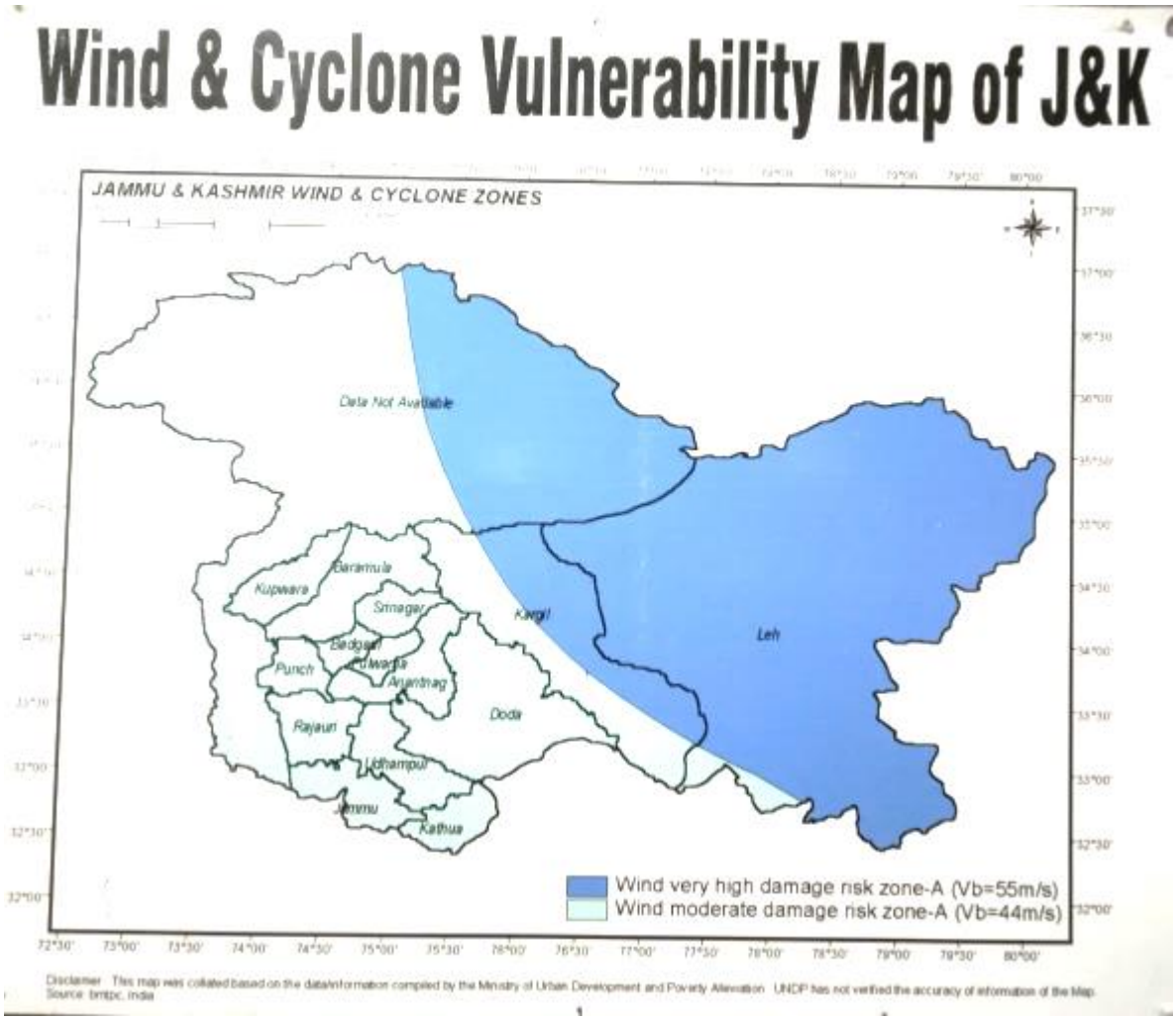


Fig 5.5: Wind & Cyclone Vulnerability Map of J&K (Source: BMTPC)

5.7. Noise Environment

Noise is perceived as one of the most undesirable consequences of road development. Though the level of discomfort caused by noise is subjective, there is a definite increase in discomfort with an increase in noise levels. The most commonly reported impacts of increased noise levels are interference in oral communication and disturbance in sleep. Main source of noise will be from the operation of machinery during the construction stage. The impact on noise quality due to the project will be of significance in both construction as well as operation stages. The noise monitoring data will be generated as baseline data before the construction woks (pre-construction stage) as per environmental monitoring plan.

5.8. Water Environment

5.8.1. Surface Water Body

Box 5.1: River Jhelum and its Flood Spill Channel

Description – Surface Water Body (River Jhelum)
River Jhelum crosses project road of Bijbehara Section at Ch 1+200. At this section the, bridge is under construction by the executing agency of JKPCC. The bridge alongwith the approach road is not part of the project road is under the execution of JKPCC. Small nallah at Kitriteng and minor open irrigation drain (1-2 feets) are also running along road section near Waghama..

River Jhelum originates from Verinag spring in Anantnag of South Kashmir, and enters into Pulwama and after passing through Srinagar it flows into Wular lake and then passing through Baramula and Uri, it enters into Pakistan. The total catchment area up to the outfall channel beyond Uri point is 15,856 km^2. Jhelum basin has a fairly well established drainage system headed by the Jhelum, the main channel of drainage. The Jhelum basin has more than 140 tributaries and some of them drain from the slope of the Pir Panjal range and join the river on the left bank and some others flowing from Himalayan range and join the river on the right bank. River Jhelum basin is home to a number of culturally and geologically important sites which has tremendous scientific and historical importance. In addition, there are several pilgrimage sites including Sufi shrines in the Jhelum basin that are being frequented by the people and tourists throughout the year.

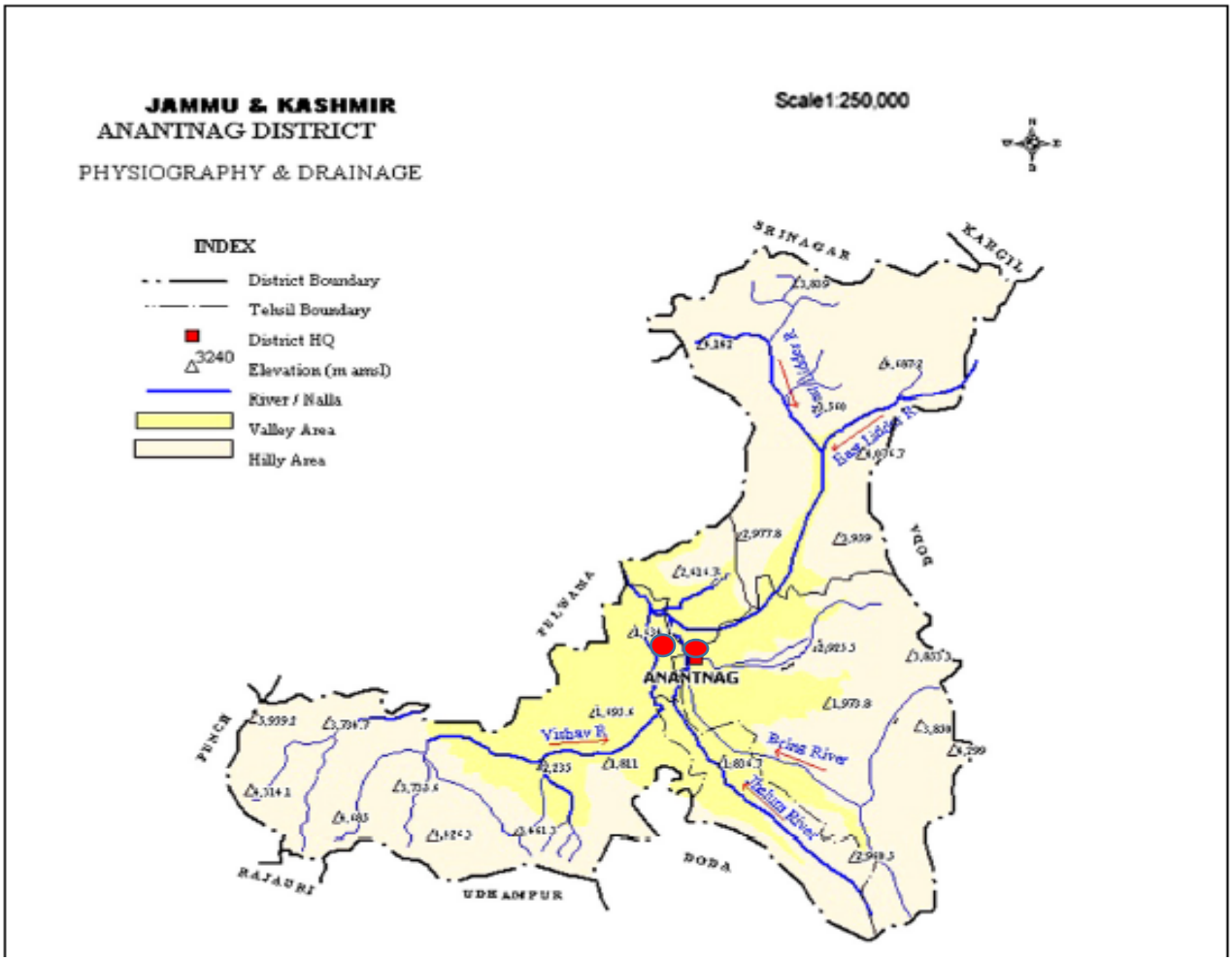


Fig: Drainage Pattern in District Anantnag (Red dots depicts project roads)

The Jhelum River is the only major Himalayan river which flows through the Kashmir valley. The Indus, Tawi, Ravi and Chenab are the other major rivers flowing through the state. There are about 147 glaciers in the Jhelum basin covering an area of about 75 sqkm.

There have been significant changes in the land system particularly built-up in the floodplains of the Jhelum river. The changes in the built up areas within the floodplains of the Jhelum basin that has occured between 1972 and 2013. The large-scale urbanization of the Jhelum floodplains since the last 4-5 decades has adversely affected the hydrological functionality of the floodplains and increased the vulnerability of the people and infrastructure to floods.

5.9. Biological Environment

Plant and animal communities are indicators of the environment. They respond not only to one environmental factor, but also to an interacting group of factors. The plant and animal communities integrates these influences and reacts sensitively to changes in the balance of

environmental stresses. Vegetation is usually the most readily recognized component of ecosystems. Plant communities followed by used often to identify and biological balance through biotic or abiotic pressure or through direct interference by man are readily recognized by changes in the physiognomy, structure and species composition of the flora and fauna. Since the ecological integrity is one of the fundamental factors towards attaining a sustainable ecosystem, following biological status survey study in the study area was undertaken.

5.9.1. Forests

The Package-4 roads are located in district Anantnag of Kashmir region. The Bijbehara-Waghama road falls in plain and rolling terrain and Sangam Khudwani road lies in floodplain area of River Jhelum and having its characteristic features of low lying plain terrain. There is no natural forest like Reserved Forest, Protected Forest or natural heritage sites of national and international importance along the one km radius of project site.

5.9.2. Flora

The prevailing and predominant vegetative species observed in the direct project corridor/ Project Influence Area (PAF) in the study areas of the project area is listed below. The local flora in the study area usually denotes trees along the road, and any other sites of green cover along either side of project road. As per site survey, the common indigenous species are prevalent through the project corridor/ PAF. The common observed trees are mainly Poplar and Willow trees, Ailanthus, Acacia and fruit trees are mainly Apples and Pear trees Orchards from Gund Nowroz to Waghama in Bijbehara-Waghama road and scheduled trees of Chinar, Mulberry and Walnut. No rare or endangered plant species were observed. Some of the trees numbering about 90 Poplar and Willows are required to be cut down (mainly in Sagam-Khudwani Road) and some require pruning in order to facilitate safe road. 3 Chinars (Platnus orientalis) and 4 Walnuts (Juglans regia) are located along the Bijbehara-Waghama Road. 2 small Mulberry Trees (Morus sp.) are located LHS near Nallah bank side at Kitriteng road. These trees are close to the road pavement and most of the trees are protruding towards the road which is causing safety/ visibility hazard

The dominant species observed and documented during the field study is present below;

Table 5.10: List of Flora in the Project Area Corridor (Commonly found)

S.No	Common Name	Scientific Name
A	Scheduled Trees	
1	Chinar	Platanus orientalis
2	Mulberry	Morus alba, Morus nigra
3	Walnut	Juglans regai
B	Indigenous Trees	
4	Willow	Salix alba
5	Poplar	Populus alba, Populus nigra
6	Ailanthus	Ailanthus altissima
7	Acacia (Kikar)	*Robinia pseudo-acacia*
8	Elm (Brenn)	*Ulmus sp.*

9	Eastern Nettle (Bremji)	Celtis tetrandra
10	Apple	*Malus sp.*
11	Pears	*Pyrus sp.*
12	Pomegranate	*Pinica granatum*
13	Indian Fig tree	*Ficus recemosa*
14	Grass (Bermuda Grass, Doob)	*Cynodon dactylon*
15	Grass (Bakung)	*Poa annua*
16	Grass	Stipa sibrica
17	Grass (Bairan Ghaas)	Chrysopogon gryllus
18	Herb/ Shrub (Camomile / Scented Mayweed/ Phake Ghas)	*Matricaria chamomilla*
19	Herb (Batak Nyoor)	*Trifolium repense*
20	Shrub (Goola)	*Plantago lanceolata*

5.9.2.1. Protected (Scheduled) Trees of the J&K State.

As per the Jammu & Kashmir Preservation of Specified Trees Act, 1969, Chinar (Platanus orientalis), Mulberry (Morus sp.) and Walnut (Juglans regia) are scheduled and protected trees.

Table 5.11: List of Protected (Scheduled) Trees located along the Project Corridor

S.No	Name of the Scheduled Tree	Location	Chainage (Ch)	Alignment (LHS/RHS	Distance from the Roads Central Alignment
Bijbehara-Waghama Road via Kitriteng Road					
1	Chinar	Kitriteng (Adjacent to Spring)	2+100	RHS	12
2	Chinar	Kitriteng	2+150	RHS	3.5
3	Chinar	Bijbehara-Kitriteng Link Road	0+300	LHS	3.2
4	Walnut	Bijbehara		RHS	7
5	Walnut	Bijbehara	0+400	RHS	7.2
6	Walnut	Bijbehara	0+410	RHS	4.5
7	Walnut	Kitriteng	2+050	RHS	4.3
8	Mulberry	Bijbehara-Kitriteng link road	0+175	LHS	9-10
9	Mulberry	Bijbehara-Kitriteng link road	0+180	LHS	9-10

5.9.3. Fauna

No forest is present along the subproject or in project influence area; the terrestrial fauna is common domestic animals/ livestock. There are no Schedule-I terrestrial mammals" species observed along the project road.

5.9.4. Wetlands

There is no wetlands site within one km radius of the project roads.

5.9.5. Ecological Sensitive Areas

The project corridors do not pass through any Biosphere Reserve, National Park, wildlife sanctuaries and ecological sensitive areas.

5.10. Socio-Economic Profile

Anantnag is one of the six district of Kashmir valley situated in its south and south-western direction. The district lies geographically between 330-30 to 340-15 North latitude and 74°-30° to 75°-35° East Longitude. It is bounded by two districts of Kashmir division, one district of Leh (Ladakh Division) and three districts of Jammu division. The district Srinagar is in the North, district Pulwama in the Northwest, and district Kargil in the Northeast. Three districts of Jammu division are Doda in the East, Udhampur in the Southeast, Ramban and Kulgam in the Southwest respectively. Its entire southern sector and major parts of the eastern region is strewn with thick forests and mountains. The height of these mountains in the East, South and West of the district ranges between 2438 meters to 3048 meters and in some cases the peaks soar even to a height of 4267-4572 meters. On the west the district is bounded by mighty Pir Panchal Range mountains, through which passes worlds famous Jawahar Tunnel. The District Anantnag is situated at a distance of 55kms of the south-east of Srinagar

Bijbehara is a Municipal Committee city in district of Anantnag, Jammu and Kashmir. The Bijbehara city is divided into 13 wards for which elections are held every 5 years. The Bijbehara Municipal Committee has population of 22,789 of which 12,057 are males while 10,732 are females as per report released by Census India 2011. Population of Children with age of 0-6 is 3411 which is 14.97 % of total population of Bijbehara (MC). In Bijbehara Municipal Committee, Female Sex Ratio is of 890 against state average of 889. Moreover Child Sex Ratio in Bijbehara is around 790 compared to Jammu and Kashmir state average of 862. Literacy rate of Bijbehara city is 75.12 % higher than state average of 67.16 %. In Bijbehara, Male literacy is around 83.44 % while female literacy rate is 65.96 %. Bijbehara Municipal Committee has total administration over 3,098 houses to which it supplies basic amenities like water and sewerage. It is also authorize to build roads within Municipal Committee limits and impose taxes on properties coming under its jurisdiction.

The Primary Census Abstract which is important publication of 2011 Census gives basic information on Area, Total Number of Households, Total Population, Scheduled Castes, Scheduled Tribes Population, Population in the age group 0-6, Literates, Main Workers and Marginal Workers classified by the four broad industrial categories, namely, (i) Cultivators, (ii) Agricultural Labourers, (iii) Household Industry Workers, and (iv) Other Workers and also Non-Workers. The characteristics of the Total Population include Scheduled Castes, Scheduled Tribes, Institutional and Houseless Population and are presented by sex and rural-urban residence.

Table 5.12: Primary Census Abstract (Census 2011) of Villages in project area

District/ CD Town Block/ Town	Particulars	Total	Male	Female
Bijbehara	Total No. of Houses	3098	-	-
	Population	22,789	12,057	10,732
	Child (0-6)	3411		
	Schedule Caste	0	0	0
	Schedule Tribe	440	226	214
	Literacy	75.12 %	67.16 %	83.44 %
	Total Workers	542	270	272
	Main Worker	204	-	-
	Marginal Worker	338	75	263
Kitriteng	Total No. of Houses	195	-	-
	Population	1,346	676	670
	Child (0-6)	262	157	105
	Schedule Caste	0	0	0
	Schedule Tribe	0	0	0
	Literacy	59.41 %	74.95 %	45.13 %
	Total Workers	575	301	274
	Main Worker	223	-	-
	Marginal Worker	352	93	259
Waghama	Total No. of Houses	726	-	-
	Population	5,429	2,696	2,733
	Child (0-6)	929	525	404
	Schedule Caste	0	0	0
	Schedule Tribe	0	0	0
	Literacy	60.44 %	71.58 %	50.06 %
	Total Workers	1,826	1,199	627
	Main Worker	868	-	-
	Marginal Worker	958	387	571
Hussain Pora	Total No. of Houses	354	-	-
	Population	2,967	1,439	1,528
	Child (0-6)	521	252	269
	Schedule Caste	0	0	0
	Schedule Tribe	0	0	0
	Literacy	66.19 %	75.74 %	57.19 %
	Total Workers	1,220	650	570
	Main Worker	236	-	-
	Marginal Worker	984	450	534
Sangam	Total No. of Houses	145	-	-
	Population	974	451	523
	Child (0-6)	168	90	78
	Schedule Caste	0	0	0

District/ CD Town Block/ Town	Particulars	Total	Male	Female
	Schedule Tribe	6	3	3
	Literacy	50.92 %	52.42 %	48.58 %
	Total Workers	417	218	199
	Main Worker	184	176	8
	Marginal Worker	233	42	191
Qoimoh	Total No. of Houses	5929	-	-
	Population	44029	22160	21869
	Child (0-6)	7947	4326	3621
	Schedule Caste	0	0	0
	Schedule Tribe	23	14	9
	Literacy	50.95 %	58.69 %	41.31%
	Total Workers	16864	9500	7364
	Main Worker	6039	5452	587
	Marginal Worker	9665	2967	6698
Hassain Pora	Total No. of Houses	33	-	-
	Population	244	136	108
	Child (0-6)	37	23	14
	Schedule Caste	0	0	0
	Schedule Tribe	0	0	0
	Literacy	45.49 %	66.67%	33.33%
	Total Workers	115	61	54
	Main Worker	46	45	1
	Marginal Worker	69	16	53
Arwani	Total No. of Houses	1582	-	-
	Population	11815	5959	5856
	Child (0-6)	2569	1345	1224
	Schedule Caste	0	0	0
	Schedule Tribe	0	0	0
	Literacy	47.60 %	59.25 %	40.75%
	Total Workers	3063	2238	825
	Main Worker	1584	1471	113
	Marginal Worker	1479	767	712

5.11. Recreation Resources

The recreational sites include Amusement Park, centre for musical & cultural activities. There is none of any recreational sites in close proximity of proposed sub-project.

5.12. Archaeological, Historical, Heritage Sites and Religious/ Cultural Sites

No ASI listed or such sites observed along the project corridor or in the project influence area.

Religious/ Cultural sites are located along project corridor/ project influence area details are provided in 5.13 section.

5.13. Sensitive Environmental Receptors

The sensitive environmental receptors existing along the alignment of proposed up-gradation of existing road subprojects include cultural/ religious places, educational institutions and community property resources. The details of the existing sensitive environmental receptors are given in Table 5.13.

Table 5.13: Sensitive Environmental Receptors in Subproject Corridor

S. No	Sensitive Feature	Location	Chainage	Alignment (RHS/LHS)[5]	Distance in meters (m) from the alignment (edge of the road)
Component A: Bijbehara-Waghama via Kitriteng Road					
1	Zaiba Aapa (Institute of Inclusive Education for Persons with Disabilities in J&K) Childline Anantnag-1098	Bijbehara	0+200	RHS	15
2	Mosque	Bijbehera	0+320	LHS	3
3	Govt. Middle School (School code: 01060505101)	Gadhanjipora, Bijbehara	0+900	RHS	12
4	Mosque	New Housing Colony, Gadhanjipora	1+100	LHS	120
5	School	Kitriteng	2+200	LHS	10-15
6	Mosque	Kitriteng	2+250	RHS	10
7	Mosque	Karihama	2+850	RHS	-
8	[6]Spring (Kitriteng)	Kitriteng	2+150	RHS	9-11
9	Hand pump	Bijbehara	0+200	LHS	3
10	Hand pump	-	3+000	RHS	5
	Bijbehara-Kitriteng Link Road				
11	Mosque	Kitriteng	0+180	RHS	3.5
12	Graveyard	Kitriteng	0+450	RHS	8
Component B Sangam-Khudwani Road					
13	Mosque	Hassanpora	1+700	LHS	8
14	Mosque	Jablipora	4+100	LHS	130
15	Iqra Public School	Jablipora	4+450	RHS	10

[5] LHS-Left Hand Side RHS-Right Hand Side

[6] Water Spring which is located in Kitriteng Village at an approximate distance of 10 m from the central alignment of the road at Ch 2+150. The existing spring is in bad condition with algal infestation. The spring will be included in the environmental enhancement measures for the rejuvenation of the spring. Necessary instruction and permission will be obtained from the concerned department/ agency.

6. POTENTIAL ENVIRONMENTAL IMPACTS

6.1. Project Impacts & Issues

This chapter presents identification and evaluation of anticipated environmental impacts during pre-construction, construction and operation phases of the Package-4 subproject roads namely, Bijbehara-Waghama via Kitriteng Road and Sangam-Khudwani Road. The planning of the proposed project intervention points towards the impacts in the pre-construction, construction stages and operation stages. The subsequent sections deal with the prediction of impacts due to the project on the physical, biological environment and social & cultural environment. Tables 6.2 & 6.3 below presents the potential environmental impacts expected due to the proposed improvement and up-gradation of the project road. Potential environmental impacts have been assessed and evaluated based on the information collected from the project activities as per DPR, screening & scoping of environmental attributes and baseline data collected during the EIA study.

The impact matrix for the project road is given Table 6.1 below;

Table 6.1: Impact Matrix for Project Road

S.No.	Parameters	Bijbehara-Waghama Road via Kitriteng	Sangam-Khudwani Road
A.	**Negative Impacts**		
1.	Handpumps	1	Nil
2.	Pond Area	Nil	Nil
3.	Relocation Religious Properties	Nil	Nil
4.	Transfer of Agriculture Land (ha)	Nil	Nil
5.	Nos of trees to be felled	<35	<55
B.	**Positive Impact**		
1.	Enhancement Sites (Nos.)	2	
2.	Cultural/Religious Properties (Nos.)	5	3
3.	Surface Water Body (Nos.)	[7]5	1
4.	Educational Institute (Nos.)	3	2
5.	Safe Access to Educational Institute (Nos.)	3	1
6.	Bus Bays (Nos.)	Nil	1
7.	Village Gates (Nos.)	Nil	Nil
8.	Sitting Arrangement (Nos.)	Nil	Nil
9.	Trees Saving (Nos)	Most of the trees within ROW have been saved.	Most of the trees within ROW have been saved.
10.	Wastes Reuse		

[7] Water bodies include River Jhelum, Kitriteng nallah, Irrigation Channel, Water Spring (Kitriteng), and a small irrigation drain in Waghama.

11.	Proposed Plantation	Near River Embankment/ Open areas/ Schools	Open areas/ Schools
12.	Proposed Compensatory Plantation (if tree cutting requirement arises)	About 105 (1:3)	About 165 (1:3)

C.	**Road Safety Measures**		
1.	Major Junction Improvement (Nos)	1	1
2.	Proposal for Rotary Junctions	Nil	Nil
3.	Intersection/Access Improvement	8 (Minor Junctions)	1 (Minor Junctions)
4.	Bus Bays	Nil	1 No.
5.	Pedestrian Crossing	As per IRC Guidelines	As per IRC Guidelines
6.	Signage Boards (Nos.)	As per IRC Guidelines	As per IRC Guidelines
7.	Sidewalk	Nil	Nil
8.	Traffic Calming Measures Locations	3	2
9.	Lined Drains (Length in Km)	1.4	1.47
10.	Crash Barriers/Guard Rails (Lengths)		

Anticipated environmental impacts on physical, biological and socio-economic environment have been discussed in details in subsequent paragraphs.

Table 6.2 : Anticipated Impacts on Physical & Biological Environment

Project Activity	Planning and Design Phase	Pre-construction Phase		Construction Phase					Road Operation
Environmental component Affected		Removal of Old Structures	Removal of trees and vegetation	Earth works including and borrow area	Laying of pavement	Vehicle & Machine operation & maintenance	Asphalt & crusher plants	Sanitation & Waste (labour campus)	Vehicle operation
Air		Dust generation during dismantling	Reduced buffering of air pollution, Hotter, drier microclimate along the road	Dust generation	Asphalt odour and emissions	Dust, Pollution	Soot, Odour, Gaseous Dust, Pollution	Odour / Smoke from Cooking of food	dust, vehicular emissions
Land	Impact on productive land if land acquisition required	Generation of debris	Erosion and loss of top soil	Erosion and loss of top soil	Land contamination due to improper disposal of bitumen waste/ solid wastes	Contamination by fuel and lubricants and compaction	Contamination and compaction of soil at camp& Plants	Contamination from Wastes and sewage	--
Water	Impact on Water Sources	Siltation due to loose earth	Siltation due to loose earth	Alteration of drainage, Break in continuity of ditches Siltation, Stagnant water pools in quarries and borrow area.	Reduction of ground water recharge area	Contamination by fuel and lubricants	Contamination by asphalt leakage or fuel	Contamination from wastes and untreated sewage disposal	Spill Contamination by fuel, lubricants and washing of vehicles
Noise		Noise Pollution	High Noise due to machinery	Noise Pollution	Noise pollution	Noise pollution	Noise Pollution	--	Noise from traffic movement
Flora	Tree cutting		Loss of Biomass and vegetation cover due to Removal of vegetation	Lowered productivity loss of ground for vegetation	--		Lower productivity Use as fuel wood	Felling trees for fuel	Compensatory plantation and road side plantation

Table 6.3: Anticipated Impact on Social and Cultural Environment

Project Activity	Planning and Design Phase	Pre Construction Phase			Construction Phase					Operation	
										Direct	Indirect Induced development
Env. Component Affected	**Design decisions & Implementation policies**	**Land acquisition**	**Removal of Structures**	**Removal of trees & vegetation**	**Earth works including quarrying**	**Laying of Pavement**	**Vehicle & machine operation & maintenance**	**Asphalt and crusher plants**	**Labour Camps**	**Vehicle operation**	**-**
Agricultural land	-	Change in land prices	Change in land economic value	Loss of standing crops	Loss of productive land	-	-	Dust on agricultural land reduce n productivity	-	-	Conversion of Agricultural Land
Buildings and built structures in ROW	-	-	Loss of structures, Debris generation, Noise and Air pollution	-	Dust Deposition on structures	-	Noise, vibration may cause damage to structures near to road	Dust accumulation on building and structure	-	Vibration and noise	Change in building use and characteristics
People and Community	Impact on nearby community structure,	-	Impact on people and loss of livelihood	Loss of shade & community tree.	Health hazard to people	Odour and dust	Noise and Air pollution and discomfort	Air and noise pollution and discomfort	Community clashes with migrant labour	Risk of accident due to increase in speed on smooth carriageway	Induced pollution and increase in accident rate
Cultural Assets	-	Impact on access to cultural structure	Displacement loss of structure from RoW	--.	--	-	--	Dust accumulation	-	Damage from vibration & air pollution	-
Utilities and Amenities	-	-	Interruption in supply	-	-	-	Damage to utility and amenities	Dust accumulation on water bodies	Pressure on existing amenities		-
Labour's Health & Safety	-	-	-	-	Stagnation of water and disease	Asphalt odour and dust	Accident and injuries to labour/public	Impact on health due to inhale of dust	Health hazard from raw sewage disposal /wastes	Road safety issues	-

6.2. Impacts on Topography

Construction Phase

Bijbehara road section at Ch 1+050 is crossing river Jhelum, Kitriteng Nallah (small), Irrigation Channel crossing at Kitriteng and a small irrigation drain is also running along the road on RHS from Ch 3+600 to 4+900 in Waghama area. A water spring is located in Kitriteng village at a distance of approximate 10 m from road central alignment. The existing spring is in bad condition and is heavily infested with algae (*Lemna sp.*- duckweed). This road is traversing through the built-up areas and mainly through the Apple Orchards from Ch 3+300 onwards.

The Sangam-Khudwani road lies in low lying areas having mainly paddy fields and open areas. At some locations earth filling will be involved in the project road.

The proposed up-gradation of the project roads will be confined within existing ROW. The design has not suggested any substantial change in the height of the embankments of the road. The overall topography of the area is not going to alter for improvement in road profile.

During construction of the project, the following environmental impacts are anticipated on topography, physiography and geology:

- disfiguration and change are anticipated in existing profile of the land due to borrow pits.
- minor disturbance on geological setting due to stone quarrying.
- digging of borrow pits resulting.
- construction of embankments,
- debris disposal,
- construction of diversions roads for construction of bridges and culverts.

Physiographic impacts could be due to the improvements of the embankments of the project road. The height and width of the embankment will be altered, when the road is widened and rehabilitated as per the new design for the project road.

In most of the stretch along the project road, project will stick to the existing ROW.

Borrow earth will be required in the project road for filling and will be obtained from several borrow areas to be opened or from the existing approved borrowing areas. Except the construction of embankments, there would not be any other impacts to geomorphology of the area during construction stage.

Most of the excavated materials from existing roads derived from the clay/loam formation will be left un-utilised due to poor quality as construction materials. If not careful, contractor may dispose of this in the nearby areas causing untidiness near disposal areas. Therefore, this is seen as a potential impact. It may increase soil erosion and could cause considerable impacts on natural drainage courses, and siltation to runoff during rains.

Likely impact on the geological resources will occur from the extraction of construction

materials like borrow of earth, granular sub-base and aggregates for base courses, culverts bridges.

Operational Phase

Improvement and Up-gradation of the subproject roads will not cause any topographic, physiographic and geological changes during operational stage.

6.3 Impact on Seismological Characteristics

The project road is located in seismic zone V as per BIS classification. All cross-drainage structures on the project roads need to consider the seismic coefficients with regards to the seismic energy propagation along the fragile geological/lithological strata.

The construction and operation phase of the project road are not expected to add the seismicity issues due to the project road.

6.4 Impact on Soil

Construction Phase

Soil Erosion: Erosion of top-soil can be considered a moderate, direct and long-term negative impact resulting from the construction of road. The potential for soil erosion is pervasive during the construction stage. Starting with clearing and grubbing, vegetation will be stripped away, exposing raw soil. Earth works and embankment will also prone to erosion during rains.
Road Slopes and Spoils: Erosion problems may occur on newly constructed slopes and earth fills depending on soil type, angle of slope, height of slope and climatic factors like wind (direction, speed and frequency) and rain (intensity and duration). Soil erosion will add siltation to the runoff during the monsoon season.

Construction of New [8]Bridges (At Bijbehera) and Culverts: A major new bridge is being constructed at Bijbehara at Ch 1+050 by JKPCC. Construction/ reconstruction of culverts is planned in both the subproject roads under package-4. Bridge/ culvert cosntruction involves excavation of water channels bed and banks for the construction of the foundation and piers. If the residual spoil is not properly disposed of, increased sedimentation in downstream of the bridge may take place during the monsoon. Also, the bridge-end fills require armouring to ensure minimum gullying and slumping.

During the construction period, some amount of drainage alteration and downstream erosion/siltation is anticipated. Some of these alterations may be because of construction of temporary traffic detours/diversion. Except for these temporary works, in almost all cases there should be an improvement in the drainage characteristics of the surrounding area due

[8] New bridge including its approaches is being constructed by the executing agency of JKPCC at Bijbehara at Ch 1+050

to improved design and added culvert/ditch capacity. Changes in the drainage pattern due to the raising of the road profile has not been discussed in specific cases, as the likely impact will not adverse and does not warrant mitigation as the road design itself takes care of cross drainage.

Quarries and Borrow Areas: The excavation of quarries and borrow pits used for obtaining aggregate materials and soil for road construction can cause direct, and indirect long-term major adverse impacts on the environment. While loss of productive soil is the most direct negative impact from borrow areas, other significant indirect negative impacts can also occur. Since most of the construction materials would be available from existing quarries nearby, relatively few new borrow areas may be required. One of the long-term residual adverse impacts of borrow pits not reclaimed, is the spread of mosquitos. Mosquitoes breeding and multiplying in stagnant water that collects in these pits can affect human health in villages in close vicinity.

Generation of Debris: The major source of debris generation is dismantling of existing cross drainage structures, scarifying of bitumen from carriageway and removal of existing road for up-gradation.

Contamination of Soil: In this project, contamination of the soil may take place, from the following activities at the construction zones, construction labor camps, construction plant sites and other auxiliary facilities required for the construction. Details of the activities from which the contamination can occur are presented below:

- Scarified bitumen wastes,
- Debris generation due to dismantling of structures,
- Runoff from muck disposal area,
- Maintenance of the machinery and operation of the diesel generator sets on site,
- Oil spill from the operation of the construction machineries, maintenance and diesel storage and diesel generator sets,
- Spillage from Operation of hot mix plant,
- Wastes from the residential facilities for the labour and officers, and
- Storage and stock yards of bitumen

Operation Phase

No significant impact is anticipated on soil along the road during operational phase.

6.5. Water Environment

6.5.1 Water Resource - Impacts

A. Surface Water -Impacts

The project roads are crossing small natural streams. There is no perennial river crossed by the project roads. No potential impact is anticipated on surface water bodies during the pre-construction phase.

Construction Phase

Estimated water requirement will be 20 to 30 kl per day per kilometre. Depending on the source of water there could be minor depletion of water sources due to the construction water requirements.

Operation Phase

During operation phase, impact is anticipated on surface water resources as covered/ line drains storm water will be discharge into outfall channel. Silt traps/ screening will be developed in order to arrest the silt/sediments directly into the water bodies.

B. Ground Water - Impacts

Construction Phase

Along the project road, ground water resources are available and ground water will be exploited through mostly from tube wells, where surface water sources are not available. Therefore, the eventual impact of the proposed improvement of roads will be negated to a considerable extent.

Operation Phase

During the operation phase, ground water resource will not be affected significantly. Therefore, no significant impact is anticipated during operation phase. However, rainwater harvesting will be provided along the project road in unpopulated areas.

6.5.2. Water Resource - Impacts

A. Impact on Surface Water Quality

Degradation of surface water quality due to sediment transport with runoff through erosion of soil and earth may occur from activities like removal of trees, clearing and grubbing, removal of grass cover, excavation, stock piling of materials as part of the pre-construction and construction activities. The soil type present along the project corridor consists of the loam soil, which are prone to erosion. The impacts due to increased sediment laden run-off will make the water more turbid. This is a significant negative impact on the water bodies/flowing streams. Heavier sediment may smother the algae growing in the lower strata and could completely alter the nature of the watercourse. Excessive sediment loads may also mean disruption to areas of fish breeding/aquatic life.

Contamination of Surface Water- The degradation of the surface and to a much less extent

ground water quality can occur from pavement construction works, bridge construction works, construction plants, machinery and accommodations of workers. The sources of water pollution from the construction activities are as follows;

- Water flow from scarified bitumen materials,
- Rain water flow from muck disposal area,
- From the foundation works of the bridges and culverts such as piling and excavation for open/well foundations,
- Oil spills from the maintenance of the machinery and operation of the diesel generator sets on site,
- Oil spill from diesel storage and parking places,
- Operation of the emulsion sprayer and laying of hot mix,
- Discharge of sewage and waste from labour and plants,
- Storage and stock yards of bitumen and emulsion.

Degradation of water quality is also possible due to accidental discharges into water-courses from drainage of workers camps and from spillages from vehicle parking and/or fuel and lubricant storage areas.

Operation Phase

During normal operation phase, no impact is anticipated on the surface water quality.

B. Impact on Groundwater Quality

No impact is anticipated on ground water during pre-construction phase.

Construction Phase

During construction phase, ground water quality can be affected due to following reason:

- Spillage of diesel, lube oil and used oil could lead to ground water pollution in long term and can affect ground water quality.
- Leached water from scarified bituminous waste materials entering into ground.
- Disposal of solid wastes, used POL wastes, oil contained cotton wastes in non-environmentally sound manner and leaching to ground water.

Operational Stage

During the normal operation phase, no impact is anticipated on the ground water quality of the area.

C. Floods Related Impacts

Pre-construction phase impacts

Pre-construction activities such as tree removal and clearing and grubbing will not lead to any flood related impacts.

Construction Phase

During construction phase, the project activities are unlikely to create localized flood related issues. Nevertheless, various construction activities could temporarily worsen the flooding problem due to improper drainage conditions on account of the contractor's poor engineering practices and negligence. If the high intensity rainfall continues for many days a number of sections along the project road could develop flooding situation.

Operation Phase

During operation phase, flood related impacts would not be appeared as culverts and cross drainage structures will be reconstructed, widened or new constructed to maintain proper drainage. Therefore, no flood related impact is anticipated during operation phase.

6.6. Impact on Air Environment

Construction Phase

During construction phase, there will be two main sources of air emissions *i.e.* mobile sources and fixed sources. Mobile sources are mostly vehicles involve in construction activities while emissions from fixed sources include diesel generator set, construction equipment and excavation/grading activities those produce dust and gaseous emissions.

Certain amount of dust and gaseous emissions will be generated during the construction phase from excavation machine and road construction machines. Pollutants of primary concern include Particulate Matter ($PM_{2.5}$) and Particulate Matter (PM_{10}). However, suspended dust particles may be coarse and will be settled within a short distance of construction area. Therefore, impact will be temporary and restricted within the closed vicinity of the construction activities along the project road only.

Considerable amount of emissions of carbon monoxide (CO), unburned hydrocarbon, sulfur di-oxide, particulate matters, nitrogen di-oxides (NO_2), etc, will be generated from the hot mix plant may cause air pollution problem in nearby areas.

Summarily, generation of dust is likely due to:

- Site clearance and use of construction vehicles and machinery, etc.
- Transport of raw materials, borrow and quarry materials to construction sites,
- Earthworks,
- Stone crushing operations at the crushers,
- Handling and storage of aggregates at the asphalt plants,
- Concrete batching plants, and

- Asphalt mixing plants due to mixing of aggregates with bitumen.

Generation of dust is a critical issue and is likely to have adverse impact on health of workers and vegetation in surrounding areas. Generation of exhaust gases is likely due to movement of heavy machinery for clearance of the RoW for construction. High concentration of HC and NO_2 are likely from hot mix plant operations. Toxic gases are released through the heating process during bitumen production. Although the impact will be much localized, it can be dispersed downwind depending on the wind speeds.

Operational Phase

During operational phase, the congestion will be relieved to an optimum level on the project roads. Widening and improvement along the project road could result in improved surface condition and traffic capacity. During the operation phase, vehicular emission will be emitted from vehicular movement on the roads.

6.7. Impact on Noise Environment

Construction Phase

Highway traffic noise, is a complex phenomenon because its intensity and characteristics vary with time depending upon the frequency as well as type of vehicles on the road. The impacts of noise due to the project roads will be of temporary significance locally in the construction phase. The source of noise pollution and the impact categorization is presented in Table 6.3;

Table 6.3: Source of Noise Pollution and the Impact Categorization.

Sn.	Phase	Source of Noise pollution	Impact categorization
1.	Pre-construction	• Man, material & machinery movements • establishment of labour camps, onsite offices, stock yards and construction plants	• all activities will last for a short duration and also shall be localized in nature
2.	Construction Phase	• **Plant Site** - stone crushing, asphalt production plant and batching plants, diesel generators etc • **Work zones** - Community residing near to the work zones	• **Plant Site:** Impact will be significant within 250m. • **Work zones**: Such impacts again will be of temporary nature as the construction site will go on changing with the progress of the works.

Construction - Related Noise

With regards to noise related impacts, construction phase is a difficult stage. During this period noise impacts will be high due to operation of construction machineries and the

conflict with the regular traffic requiring more honking of vehicle horns and more stop and go (acceleration and deceleration process).

All temporary noise related impacts in the immediate vicinity of the project roads will occur during the construction activities. This will be occurred along the construction zones as well as construction camps, hot mix plants, WMM plants, crusher and quarry sites (if required).

Typical noise levels associated with highway construction is given in **Table 6.4** below. The magnitude of impact will depend upon the specific types of equipment to be used, the construction methods employed and the scheduling of the work.

Table 6.4: Typical Noise Levels Associated with Highway Construction

Sn.	Activity Noise Levels	(d(B)A)
1.	Grading & Clearing	84
2.	Excavation	89
3.	Foundations	88
4.	Finishing of Road	84

Operational Noise

During operation phase, noise levels will be reduced due to smooth flow of traffic on reconstructed/upgraded road. However, traffic will be increased on the road in due course of time and subsequently noise levels are expected to increase.

6.8. Impact on Biological Environment

6.8.1. Anticipated Impacts

The proposed up-gradation of the road subprojects doesn't have forest/reserved forest areas in the corridor. Hence anticipating impact on Forest area is not envisaged. Existing road side vegetation is dominated by Poplar, Willows and Apple trees. *Alianthus sp., Elm, Acacia* etc are also located at number of sites. Few schedule trees of *Platanus orientalis, Moris sp.,* and *Juglans regia* were recorded mainly in Bijbehara-Waghama road subproject during the field survey. Paddy fields and Apple orchards were observed on both sides of the project corridor of Package-4 roads. Some of the indigenous trees of Poplar and Willow trees of about 90 nos are likely to be cut down due to the improvement and up-gradation of the existing road.

As per the design criteria of the DPR, minimum tree cutting is envisaged as the road improvement and up-gradation is within the existing RoW, however the resultant pressure on flora and fauna could be the potential impact during preconstruction/construction.

The major impact in this project on flora involves the removal of trees to permit construction and to provide clear zone for safety of the road users. **Table 6.5** below presents the major

adverse impacts on the flora & fauna and the indicators chosen to assess the impacts for this study.

Table 6.5: Impacts Due To Construction and Indicators

Impacts Due To Construction	Indicators
Tree felling	No. of trees to be felled
Vegetation	Area of vegetation loss

Fo*rest Area*

There is no forest along the project road. Therefore, impact related to forest will not be appeared in the project.

Wildlife

There is no wildlife sanctuary, national park or bio reserve along the project roads. Therefore, no impact is anticipated on wildlife due to up-gradation of the project road.

Tree Cutting

Trees growing within the proposed toe line (bottom of formation) will need to be removed for up-gradation of the project road. Roadside trees with strong and rigid stems can pose safety hazards and visibility issues. Some trees obstruct clear sight distances. Others have a propensity to overturn when old and are potential safety hazards depending upon age and decay condition. All such trees that are safety hazards need to be cleared.

There will be a significant, direct impact due to cutting of the roadside trees, it includes:

- The loss of shade.
- Loss of tree products.
- Loss of birds nesting place.
- Removal of roadside trees will also reduce comfort levels for slow moving traffic and pedestrians.
- The removal of trees would lead to erosion and contributes to the loss of the micro-ecosystems developed on the roadside.
- Besides these trees act as noise barrier, dust absorption, pollutant sequester, etc.

Removal of Vegetation

Clearing and grubbing is the foremost requirement to start the construction activities of the project roads. The impact due to removal of vegetation includes:

- Dust generation during windy atmosphere.
- Loss of productive top soil.
- Soil erosion during rainy season, may lead to water contamination.

Measures have been taken in reducing and curtailing the clearing and grubbing of excess land.

6.9. Impact of Dust on the Vegetation Growth

During the construction activities, dust will be emitted and deposited on the leaves of vegetation/crops along the project roads. Dust deposition on the leaves will affect the photosynthesis process and subsequently hamper the growth of the plants.

6.10. Impact on Socio-Economic Environment

Construction and operation phases of the project road will have some beneficial impact on social environment. Some increase in income of local people is expected as some local unskilled, semiskilled and skilled persons will gain direct or indirect employment during construction phase. Since the immigration of work force during construction phase is likely to be very small, the social impacts on literacy, health care, transport facilities and cultural aspect are expected to be insignificant.

The impacts of the construction of the project road on the socio-economic environment are systematically discussed under the following categories:

- Influx of construction workers,
- Economic impacts,
- Relocation of community structures within the proposed ROW.

Influx of Construction Workers

Although the construction contractors are likely to use un-skilled labour drawn from local communities, use of specialized road construction equipment will require trained personnel not likely to be found locally. Sudden and relatively short-lived influxes of construction workers to communities along the project will have the potential to 'skew' certain demographic variables and the traditional social coherence.

It is anticipated that the construction labour inputs for the construction of the project road will be in the order of about 100 to 150 persons per day. However, this number will fluctuate and the number in any particular activities will be lower.

Economic Impacts

The relatively short-lived economic impacts of the construction phase are likely to be experienced in local communities for the duration of construction, as workers will make everyday purchases from local traders. This is likely to give a short-lived stimulus to these traders that will disappear as soon as the construction is complete. Wider, flow-on economic

impacts will be experienced in other sectors of economy as a result of purchase of construction materials and the payment of wages and salaries.

6.11. Impact on Religious Structures and Cultural Properties

Many religious structures are located along the project road. However, no religious structures may be partially or fully affected during up-gradation of the project road. Shifting of religious structures is sensitive issue, therefore, local community and followers of religious structures should be taken in to confident.

Common Property Resources

Along the project road, community structures like mosques, school are located, which are used by local communities. The partial or total impact on these common property resources is anticipated due to up-gradation of the project road. These should be properly relocated and rehabilitee before start the construction or proper access to such common properties should be provided.

Adverse socio-economic impacts include all disruptions on the social and economic interactions of communities due to the road project. This involves effect on both the adjacent communities (mostly direct) as well as the nearby communities (mostly indirect).

6.12. Impacts Relating To Human Health & Safety

Poor sanitation arrangement and improper methods used for collection and disposal of solid wastes and effluent, accommodation without ventilation, unhygienic food, electrical safety, risk from mosquito and reptile etc at the construction workers camp will impact human health and safety.

6.13. Road Safety Aspects

Increase of incidence of accidents is anticipated due to disruptions of traffics movements on the in construction work zones on the project road.

Safety for workers at work site and health problems at Labour camps

- Occupational health and safety risks to workers due to inadequate housekeeping and unsafe work practices at work sites.
- Health problems to workers due to inadequate sanitation and un-healthy environment at labour camps/plant sites.

7. ANALYSIS OF ALTERNATIVES

This chapter presents a comparative analysis of various alternatives considered to avoid or minimize impacts that would be inevitable if technically (based on design speed and geometrics) best-fit alignment is followed. Cross-sections adopted for the improvement and up-gradation component are flexible in design to avoid most of the impacts within RoW. An analysis of various alternatives is attempted to arrive at the technically and environmentally best-fit alternative.

The analysis of alternative is a documented illustration/evidence to show and ensure that final decisions taken are;

- In accordance with the project objectives.
- In compliance with the country laws, policies and legal requirements.
- To confirm that the project is actually needed and not imposed and not to lead any major loss or destruction to natural resources either directly or indirectly.
- To confirm that the implementation of the project will not lead to any major crisis or conflict in the community during implementation.
- To confirm that the Public/Government financial resources are not wasted for wrong projects/infrastructural works without the consideration of views of the stakeholders.
- To confirm that no individual and biased approach (for example implementation of a personal ambition using public money in a secretive manner) from the responsible implementing official/s has taken place.
- In accordance with the actual requirements of the local people.
- In accordance with the World Bank policies and procedures.
- To create climate resilient and flood proof road infrastructure.

These were also integral part of the analysis of alternatives throughout the project preparation. Debris disposal is one of the most important construction stage issues identified in the project.

There are few settlements, as seen in the baseline environmental scenario along the project road, where there is narrow RoW and sometime traffic is leading to congestion as well as various environmental impacts. Several alternatives are analyzed for avoiding localized environmental impacts & arriving at the best-fit alignment.

At places geometry along the project road is poor. Therefore, for up-gradation of the project road, alternative analysis has been carried out for improvement of geometry.

7.1. With or Without Project Scenario

The ‘with’ and ‘without’ project scenarios are analyzed with respect to the development of the state by the back-drop of requirement of reliable quality infrastructure for sustained growth economy and consequent well-being of local people.

Providing better connectivity will ensure that goods and people from areas covered by the road can move in and out of the areas quicker and save time. Increased trade and commerce activity are expected. By reconstruction/up-gradation of the project, climate resilient and flood proof road infrastructure. The project road has been designed to connect the various settlements with better road network.

If the project is not implemented, there is every likelihood that the project road will deteriorate further and impacted by flood. There is every likelihood of deterioration of the existing pavements. In the absence of the project, the J&K Govt may find it difficult to generate resources for such a improvement of the road infrastructure. Increased air pollution, due to slow moving traffic and congestion, will follow. Noise levels will rise due to deterioration of the pavement as well as increased honking.

Therefore, the “with” project scenario, with its minor adverse impacts is more acceptable than the “without” project scenario which would mean an aggravation of the existing problems. Potential benefits of the proposed roads improvements are substantial and far-reaching both in terms of the geographical spread and time. Hence, it is clear that the implementation of the project will have definite advantage to the area in order to create climate resilient and flood proof Road infrastructure.

8. CONSULTATION WITH KEY STAKEHOLDERS

8.1. Introduction

Public consultation was conducted for the proposed road up-gradation of Bijbehara - Karihama Road Via Katriteng, Sangam - Khudwani Road under Package-4 in Kashmir. Consultation has been followed in accordance with the World Bank's ESMF-JTFRP protocol which is the pre-requisite for the environmental screening process and environmental assessment. The purpose and objective of this consultation is the involvement of residents/ stakeholders and to make them cognizant about the proposed road improvement and up-gradation activity of the subproject. In July/ September 2019, the local community of the sub project roads were consulted and participated based on the procedural guidelines of reaching public required for the preliminary baseline characteristics of environmental and social screening. Reconnaissance survey was also conducted in Bijbehara, Kitriteng, Waghama, Sangam, Hassanabad Khudwani, Qaimoh etcalong with the other areas which were required to collect baseline information. Formal and informal consultations were undertaken with the project stakeholders to take the views and propositions about the project activities.

The following section highlights level of consultative procedure adopted at various stages, strategies to participatory and continued consultation and specific inputs from the stakeholder's consultation in project planning.

8.2. Identification of Stakeholders

Consultations were conducted with both primary and secondary stakeholders in the project area. The primary stakeholders consulted are usually (i) Roadside community having their temporary or permanent residences (ii) Road side shop owners/vendors and (iii) Road users (iv) Community Leaders. While the secondary stakeholders are mostly the project officials, Village representatives and social activists

Box 8.1: Identification of Stakeholders

1	Primary Stakeholders (Main stakeholders)	• Potential PAPs, stakeholders and Community leaders
2	Secondary Stakeholders (Other Stakeholders)	• Groups of affected persons; • Village representatives- like Sarpanch and members, PRI's, Village Level health workers, Patwaris • Local voluntary organizations like NGOs etc • Field level Engineers, Asst Engineers, Junior Engineers), PIU/ PWD (R&B, Government of J&K. • Other project stakeholders such as official of line Department

8.3. Consultations with Stakeholders

Consultation with the local communities of each road was carried out with the intention of informing and educating the Project-Affected-People (PAP's) and other stakeholders about the proposed action before the finalization of design so as to include their inputs. Consultation was also carried out to identify the problems associated with the proposed project and the needs and values of the population likely to be impacted by the project. Locations are selected which represent the predominant land uses of the project area and also included all sections of people in the project region -from agricultural labourers to land owners and shop keepers. In each of these consultations, the villagers were briefed about the project (the RoW width, the length of the alignment, the locations where it would be crossing etc) and the potential benefits of the project.

The various forms of public consultations (consultation through adhoc discussions on site-along project corridor) have been used to discuss the sub-project and involve the community in planning the design and mitigation measures.

8.4. Objectives of Consultations

The process of public participation / consultations was taken up as an integral part of the sub-project in accordance with World Bank guidelines and following objectives:

- To educate the general public, specially potentially impacted or benefited communities / individuals and stakeholders about the proposed sub-project activities;
- To familiarize the people with technical and environmental issues of sub -project for better understanding;
- Dissemination of information to local communities through the public consultation by briefing the project including its benefits.
- Informal by group consultations in the sub-project vicinity at field level.
- The environmental concerns and suggestions made by the participants were listed out, discussed and suggestions were accordingly incorporated in the EMP.

8.5. Issues Discussed during Public Consultation

The issues discussed during public consultation for the proposed up-gradation of road projects under Package-4 are given below:

- About proposed sub-project, source of assistance and its implementation/execution etc.
- Information on perceived benefits from the proposed road project including travel time, fuel cost, noise and air pollution.

- Information of the impacts from the proposed road project during construction stage in terms of inconvenience to public, air and noise pollution, etc. Occurrence of disaster like floods and cloud bursting in past.
- Whether construction activities will cause any type of health hazard or not?
- Discussions among public for sharing of information related to the proposed road project, environment policy of World Bank, direct and indirect impacts of improvement/construction work on environment.
- Any loss of land/structure/business or other community property due to proposed road project.
- Presence of any historical or cultural monuments near project area and any impact seen due to the proposed road project?
- Any impact on trees and protective measures to be taken for safeguarding of scheduled trees (Chinar, Mulberry, Walnut) in close vicinity of the proposed site.
- Any possible problems to be faced by the local people in their daily activities due to the proposed road project construction work.

8.6. Outcome and Feedback received from the Public Consultation

In the consultation process about proposed sub-project, local people, students, business, farmers, expressed their keen interest. People in general were very enthusiastic about the benefits of the sub-project. The major problems faced by concerned people are related to road damaged in flood, dilapidated conditions of the road and rough riding surface, lack of efficient longitudinal drainage system etc. People are ready to extend all supports during the execution of the sub-project. The valuable feedback received from the consultation conducted in project influence area with the local residents are summarized below;

- To maintain the good life of the road, longitudinal surface drainage along roads on both sides where the road surface is prone to water logging from the episodes of the rain should be considered.
- Geometric correction/ alignment of road surface should be followed strictly as per design protocol. As it was seen in most the roads here when macadamized tend to retain rain water as smooth depression which leads to the formation of pot holes etc.
- Constructional materials should not be stored to occupy road stretches and should be dump as per daily requirement. It should be managed in such a way that spill over of material or excess leftover fine earth may not occur which leads to fugitive generation while plying of the traffic and by the action of the wind.
- Construction material should be transported during day times only.
- Noise generating activities should be scheduled only during working hours (Day time).
- Proper dust suppression measures by way of sprinkling water must be put in place during construction phase.
- Construction zone must be properly barricaded to avoid interference of project activity with the day normal traffic flow and other business works.

- Proper and timely disposal of construction wastes shall be ensured.
- Local people must be preferred for employment in the project activity.
- PIU shall ensure that the requisite environmental management measures shall be incorporated in EMP and public consultation shall be a regular process during all stages of the sub-project execution to solve any issues arising out of proposed works.

9. ENVIRONMENTAL MANAGEMENT PLAN (EMP)

9.1. Introduction

Environmental Management Plan has been prepared which mainly centered on the understanding of the interactions between the environmental setting and the project activities and the assessment of the likely impacts. Mitigation measures for anticipated environmental impacts have been elaborated as specific actions which would have to be implemented during the project implementation. The EMP would help the contractors/PIU to implement the project in an environmentally sustainable manner and where contractors, understand the potential environmental impacts arising from the project roads and take appropriate actions/ mitigation measures to properly mitigate/manage such environmental impacts. EMP can thus be considered to be an overview document for contractors that will guide environment management of all anticipated impacts in Bijbehara-Waghama Road via Kitriteng Road and Sangam-Khudwani Road in District Anantnag. This EMP may also be considered as flexible and will be further developed by the Contractor in the Contractor's Environment Management Plan.

9.2. Proposed Works of Road Subprojects under Package-4 (Kashmir)

The proposed subproject components of road package 4 (Kashmir) consist of the following strengthening / improvement and up-gradation work:

1. Bijbehara-Waghama Road via Kitriteng in District Anantnag
2. Sangam-Khudwani Road in District Anantnag

9.3. Outline of EMP and its Implementation Strategy

The EMP is a guiding tool which discusses the potential environmental impacts and specific mitigation/management measures for the proposed roads under package- 4 (Kashmir). It refers to the responsibilities ensuring commitment for implementation and means of verifying/ supervision whether the same has been implemented properly. The timing and frequency of monitoring along with the supervision responsibility and reporting requirements are also provided in the Environmental Management Plan. As a part of the EMP, the contractors will commit to the identification of the environmental and, social impacts at the individual sub-project sites. In case of any future changes in the sub-project design, the EMP will need to be updated to reflect the new scope of the activities. Such revisions will be finalized in consultation with the World Bank.

The PIU will be responsible to ensure implementation of EMP for the performance of all by the contractors with the overall accountability resting with the JTFRP-PMU. Whereas, the TAQAC will ensure periodic quality audit/ guidance to the PIU and by imparting regular training, monitoring, and ensuring that all EMP provisions and requirements are translated into contract documents and that these requirements are implemented to their full intent and extent.

The overall responsibility will be of Contractor for effective implementation of EMP and adherence to all the mitigation measures as outlined in this EMP associated with their respective activities. The Contractor will be required to comply with the provisions of the EMP.

9.4. Environmental Management Plan

The Environmental Management Plan (EMP) will guide the environmentally-sound construction of the subprojects roads under Package 4 (Kashmir) namely, "Improvement & Up-gradation of- (i) Bijbehara-Waghama Road via Kitriteng" in District Anantnag and (ii) "Sangam-Khudwani Road" in District Anantnag and ensure efficient lines of communication/ coordination between the PIU, Contractor, PMU and TAQAC. The EMP has been prepared for three stages of road subprojects construction activities as (i) Pre-construction Stage; (ii) Construction Stage; and (iii) Demobilization Stage. EMP for above road subprojects under Package-4 (Kashmir) have been prepared and presented in (Table 1.1). Various guidelines, checklists, strip mapping plans and reporting formats for implementation of EMP will be part of EIA report as Annexures.

The purpose of the EMP is to ensure that the activities are undertaken in a responsible non-detrimental manner with the objectives of: (i) provide a pro-active, feasible and practical working tool to enable the measurement and monitoring of environmental performance on-site; (ii) guide and control the implementation of findings and recommendations of the environmental assessment conducted for the subproject; (iii) detail specific actions deemed necessary to assist in mitigating the environmental impacts of the subprojects; and (iv) ensure that safety recommendations are complied with.

Budgetary provisions for the implementation of EMP shall be integrated with part of the bid/construction contract in the form of technical specifications and environmental performance requirements. The costs to be incurred on implementation of EMP shall be incidental to the civil works and therefore, no separate environment budget/cost will be provided to the contractor for implementation of EMP. The contractor will ensure effective implementation of EMP during pre-construction, construction, and demobilization/ operation stages.

The Contractor is deemed not to have complied with the EMP if; (i) within the boundaries of the project site/ ancillary sites, site extensions and haul/ access roads there is evidence of contravention of clauses and, (ii) if environmental damage ensues due to negligence and, the contractor fails to comply with corrective action measures or other instructions issued by the PIU / JTFRP-PMU within a specified timeframe, (iii) the Contractor fails to respond adequately to complaints from the public

Table 9.1: Environmental Management Plan for Up-gradation of Road Subprojects under Package-4 (Kashmir): (Bijbehara-Waghama Road via Kitriteng and Sangam- Khudwani Road in District Anantnag)

S. No.	Environmental Issues	Environmental Mitigation Measures	Responsibilities	
			Planning and Execution	Supervision/ Monitoring
A.	**Pre-Construction Stage**			
	Pre-construction Activities By the Contractor			
A.1	Appointment and Mobilization of Environment & Safety Officer	• The contractor will appoint 2 (two) qualified and experienced Environment & Safety Officers (ESOs) for [9]each subproject under Package 4 (Kashmir), who will dedicatedly work and ensure implementation of EMP including Occupational, Health and Safety measures. • Separate appointment of qualified Environmental Safeguard Officer and his/her mobilization for each road under Package 4 (Kashmir). • Contractor to inform the PIU for the appointment and mobilization of each Environmental Safeguard Officers (ESOs)	Contractor	PIU TAQAC
A-2	Regulatory Approvals	• Permission from Irrigation & Flood Control Department for any works related to culverts, embankment construction, protective works, etc. along or near water bodies especially • Labour license from the Department of Labour. • Prior permission will be taken from line department offices of Electricity (PDD), Telecommunications (for OFC underground cables, etc), water Pipeline (PHE), etc. Utility shifting required to be undertaken by the contractor in the supervision of PIU. • If contractors open new stone quarry or borrow areas, prior Environmental Clearance will be obtained from SEIAA/DEIAA. • For set–up of Stone Crusher Plant, HMM Plants, Batching Plant, D.G Sets- Consent to Establish and Consent to Operate will be obtained from J&K State Pollution Control Board (J&KSPCB) or if contractor intends to procure construction materials from local authorized third party agencies then contractor will collect and submit necessary clearance/approval from authorized third party agencies.	PIU Contractor	PIU PMU PIU TAQAC
A-3	The orientation of Implementing Agencies	• The PIU shall organize orientation sessions for contractors during all stages of the project. This shall include on-site training (general as well as specific to the context of this subproject) as well. These sessions shall involve concerned PIU, project staff, contractors, consultants, etc.	PIU	PMU, TAQAC

[9] Bijbehara-Waghama Road via Kitriteng & Sangam-khudwanai Road subproject.

A-4	Utility Relocation and Common Property Resources (CPR's)	• All utilities and common property resources, if any shall be relocated and restored before the commencement of the road improvement activities. • Before the commencement of works, a joint field Monitoring will be conducted by the Contractor, TAQAC, PIU to map out the alignments, to check if any utility is being impacted due to construction works. While relocating these utilities and facilities all concerned agencies including PIU shall take necessary precautions and shall provide barricades/delineation of such sites to prevent accidental fall of pedestrian and other road users into pits, drains both during demolition and construction/ relocation of facilities. • Checking for accommodating utilities crossing the drains- rising, lowering or re-location if required.	Contractor	PIU, TAQAC
A.5	Procurement of Machinery, Crushers, Batching Plants, etc	• Specifications of Machinery, crushers, and batching plants shall comply with the requirements of the relevant environmental legislation. Crusher, Batching plants and hot mix plant shall be located 250m away from settlements/ commercial establishments, preferably in the downwind direction. • No plants should be set-up within 250m from the residential/ settlement locations. The Contractor shall submit a detailed layout plan for such sites and seek prior approval of PIU before entering into a formal agreement with a landowner for setting-up such sites. • Actions by PIU/PMU against any non-compliance shall be borne by the Contractor at his own cost. Arrangements to minimize dust pollution through the provision of water spray shall have to be provided at such sites.	Contractor	PIU, TAQAC
A.6	Construction Camp Locations - Selection, Design & Layout	• If the contractor decides to establish labour camp, siting of the camp will be as per the guidelines are given in Annexures- and layout of camp will be approved by PIU). • Labour camp will not be established within 250 m from the nearest settlement to avoid conflicts and stress with the local community.	Contractor	PIU, TAQAC
A.7	Arrangements for Temporary Land for Camp	The Contractor will obtain consent from landowners in writing for temporary use of land for labour camp, etc.	Contractor	PIU, TAQAC

A.8	Tree cutting	• Indigenous trees like Willow and Poplar trees of about 90 no's (mainly in Sangam Khudwani roadand and in Kitriteng/Waghama section) may be required to be cut down/pruned as they come close or may protrude towards road pavement. These may possess the visibility and safety issues for the traffic movement. • Loss of trees will be compensated by a 1:3 ratio (i.e. for loss of 1 tree 3 trees will be planted) or greater and transplantation of the same trees may be envisaged wherever applicable.	PIU/ Line Department and Contractor	PMU TAQAC
A.9	Safeguarding of Trees and Plantation	• The Chinar, Walnut and Mulberry trees will be marked with horizontal reflective strips prior to commencement of works. • These trees in the construction zone will be covered/ wrapped with protective green mesh fiber cloth around base tree trunk area by 6 feet in height. • No stockpiling of any construction will be allowed around or close to Chinar trees. • Any other trees within the area near the construction site will be marked with same horizontal reflective strips and green mesh as per the above measures. • No concreting shall be allowed around the Chinar and Walnut trees or any other scheduled tree and all excavation activities shall be done only in consultation with the Environmental Specialist of PMU.	Contractor	PMU, PIU, TAQAC
A.10	Construction Vehicles, Equipment, and Machinery	• All vehicles and equipment to be procured for the proposed up-gradation works of roads subprojects under Package-4 (Kashmir) will conform to the relevant Bureau of Indian Standard (BIS) norms. The discharge standards promulgated under the Environment Protection Act, 1986 and Motor Vehicles Act, 2019 will be strictly adhered to. • The silent/quiet equipment like DG set as per regulations will be used at the construction site or labour camp. • The contractor will maintain records of Pollution under Control (PUC) certificates for all vehicles used during the contract period, which will be produced to PIU for Monitoring and whenever required.	Contractor	PIU, TAQAC

A.11	Arrangement for Construction Water	• The contractor shall source construction water preferentially from surface water bodies/nearby rivers in the project area. The contractor shall be allowed to pump only from the surface water bodies. Boring of any tube wells shall be prohibited. Necessary permission for use of water will be obtained from the competent authority. • To avoid disruption/disturbance to other water users, the contractor shall extract water from fixed locations. The contractor shall consult the local people before finalization the locations. • The contractor can extract groundwater only in case surface water sources are not available and that too only after proper permission from Central Ground Water Authority.	Contractor	PIU, TAQAC
A.12	Sand (all river beds used directly or indirectly for the project)	If the supplier of sand is another (third) party, the authentic copy of lease agreement that has been executed between the local Tehsildar and the supplier has to be submitted to PIU/PMU of the project, before any procurement is made from such a site. Environmental clearance for stone quarry and borrow area.	Contractor	PIU, PMU
A.13	Labour Requirement	The contractor preferably will use unskilled/semiskilled labour from local areas to give the maximum benefit to the local community to avoid any additional stress on the existing facilities (medical services, power, water supply, etc). At an average >80-150 labours/ day will be required during the construction stage depending upon the extent of construction work.	Contractor	PIU, PMU, TAQAC
A.14	Traffic Management Plan- Planning for Traffic Diversions and Detours	• Detailed traffic control plans shall be prepared by the contractor and the same shall be submitted to the PIU for approval. The traffic control plans shall contain details of temporary diversions, traffic safety arrangements including night time safety measures, details of traffic arrangement after cessation of work each day, safety measures undertaken for the transport of hazardous materials and arrangement of flagmen, etc to regulate traffic congestion. • The contractor shall provide specific measures for the safety of pedestrians and workers as a part of traffic control plans. The contractor shall ensure that the diversion/detour is always maintained in running condition, particularly during the monsoon to avoid disruption to traffic flow. • The Contractor shall also inform the local community about diversion in traffic routes and pedestrian access arrangements with assistance from PIU.	Contractor	PIU, TAQAC

A-15	[10]Stockyard/ Storage of Construction Material and Establishing Equipment Lay-down Area	• Contractor in consultation with PIU shall identify the site for temporary use of land storage of construction materials including pipes etc. These sites shall not cause an inconvenience to the local population/traffic movement. These locations shall be approved by the PIU. • Selection of location for material storage and equipment lay-down areas must take into account prevailing winds, distances to adjacent land uses, general on-site topography and water erosion potential of the soil. Impervious surfaces must be provided wherever necessary. • Protect material stockpiles from storm water (e.g. by excavating a cut-off ditch around stockpiles to keep away storm water). • Enclosed storage for fuel with non- permeable flooring. • Contractor shall cover material stockpiles with a tarpaulin or other materials. • Avoid stockpiling material near water bodies • Proper cover and stacking of loose construction material will be ensured during the construction of outfall structures at construction sites to prevent surface runoff and [11]contamination of receiving water body. • Staff dealing with these materials/substances must be aware of their potential impacts and follow the appropriate safety measures. The contractor must ensure that its staff is made aware of the health risks associated with any hazardous substances like bitumen, diesel, used oil and has been provided with the appropriate protective clothing/equipment in case of spillages or accidents and have received the necessary training. Necessary training and awareness programs shall be carried out to make aware the contractor and its staff aware of the hazardous nature of substances.	Contractor	PIU, TAQAC
A-16	Information Dissemination and Communication Activities	• Prior to construction activity, information dissemination will be undertaken by the contractor at the project site. The wider dissemination of information to the public will be undertaken by PMU through the disclosure of EA / EMP reports on the website of PMU-JTFRP. • Project information Board showing the name of work, project cost, duration, date of commencement, date of completion, executing agency and contact details (including telephone numbers) shall be displayed both sides of the roads. • Information boards will also be set up at the sites of construction camps and labour camps, plants and stockyard site. Details of Nodal officer with telephone numbers will be displayed for registering complaint/grievances by stakeholder/general public	PMU Contractor	PMU, PIU, TAQAC PIU

[10] These storage areas can be hazardous, unsightly and can cause environmental pollution if not designed and managed carefully
[11] The most expected source of watercourse contamination is excavated soil or loose material being washed into water body during construction of drainage works

A-17	Environmental Monitoring-Baseline Data	Ambient air quality, noise levels, and water quality monitoring on a six-monthly basis as per environmental monitoring plan and in accordance with the instruction of Environmental Specialist of PMU.	PIU	PMU, TAQAC
B.	**Construction Stage**			
B.1	**Site Clearance (Clearing and Grubbing)**			
B.1.1	Clearing, grubbing and Levelling	• If required vegetation will be removed from the construction zone before the commencement of construction. • All works will be carried out such that the damage or disruption to flora other than those identified for cutting is minimum. Only ground cover/shrubs that impinge directly on the permanent works or necessary temporary works will be removed with prior approval of PIU. • The Contractor, under any circumstances, will not cut or damage trees. • Trees identified under the project will be cut only after receiving clearance from the Forest Dept (as applicable). Vegetation with a girth size of over 30 cm will be considered as trees and shall be compensated.	Contractor	PIU, TAQAC
B.1.2	Dismantling of Culverts	All necessary measures shall be taken especially while working close to cross drainage channels to prevent earthwork, stonework, materials, and appendage as well as the method of operation from impeding cross-drainage at rivers, streams, water canals, and existing irrigation and drainage systems. Demolition wastes will be collected and disposed of as per the provision of Construction & Demolition Rule 2016.	Contractor	PIU, TAQAC

B.1.3	Generation & disposal of Debris	• Debris generated due to the dismantling of the existing road shall be suitably reused in the proposed construction. • Scarified asphalts and the other construction wastes shall be appropriately re-used in road construction with the permission of PIU. The dismantled road and scarified bitumen waste shall be utilized for the paving of crossroads, access roads and paving works in construction sites and campus, temporary traffic diversions, haulage routes, parking areas along the roads or in any other manner approved by the PIU. • The Contractor will suitably dispose off unutilized debris and waste materials either through filling up of borrows areas located in the wasteland or at pre-designated disposal locations, subject to the approval of the Environmental Expert of PIU. • At locations identified for disposal of residual bituminous wastes, the disposal will be carried out over a 60 mm thick layer of rammed clay so as to eliminate the possibility of leaching of wastes into the groundwater. The Contractor will ensure that the surface area of such disposal pits is covered with a layer of soil. • All arrangements for transportation during construction including provision, maintenance, dismantling and clearing debris, will be considered incidental to the work and will be planned and implemented by the Contractor as approved and directed by the Environmental Expert of PIU. • The pre-designed disposal locations will be a part of the Solid Waste Management Plan to be prepared by the Contractor in consultation and with approval of Environmental Expert of PIU. • Debris generated from pile driving or other construction activities shall be disposed of such that it does not flow into the surface water bodies or form mud puddles in the area.	Contractor	PIU, TAQAC

B.1.4	Stripping, stocking, and preservation of topsoil	The topsoil from areas to be permanently covered will be stripped to a specified depth of 150 mm and stored in stockpiles. A portion of the temporarily acquired area and/or Right of Way will be earmarked for storing topsoil. The locations for stockpiling will be pre-identified in consultation and with approval of Environmental Specialist of PIU. The following precautionary measures will be taken to preserve them till they are used: (a) The stockpile will be designed such that the slope does not exceed 1:2 (vertical to horizontal), and the height of the pile is restricted to 2 m. To retain soil and to allow percolation of water, silt fencing will protect the edges of the pile. (b) Stockpiles will not be surcharged or otherwise loaded and multiple handling will be kept to a minimum to ensure that no compaction will occur. The stockpiles shall be covered with gunny bags or vegetation. (c) It will be ensured by the Contractor that the topsoil will not be unnecessarily trafficked either before stripping or when in stockpiles. Such stockpiled topsoil will be utilized for: • Covering all disturbed areas including borrow areas, only in a case where there are to be rehabilitation • Dressing of slopes of road embankment • Agricultural fields of farmers acquired temporarily land.	Contractor	PIU/ TAQAC
B 1.5	Accessibility	• The Contractor will provide safe and convenient passage for vehicles, pedestrians and livestock to and from roadsides and property accesses connecting the project road, providing temporary connecting road. The Contractor will also ensure that the existing accesses will not be undertaken without providing adequate provisions. The Contractor will take care that the crossroads are constructed in such a sequence that construction work on the adjacent crossroads is taken up one after one so that traffic movement in any given area not get affected much.	Contractor	PIU/ TAQAC

B 1.6	Planning for Traffic Diversions And Detours	• Temporary diversions will be constructed with the approval of the Environmental Specialist of PIU. Detailed Traffic Control Plans will be prepared by the Contractor and approved by Environmental Specialist, seven days prior to commencement of works on any section of road. The traffic control plans shall contain details of temporary diversions, traffic safety arrangements for construction under traffic, details of traffic arrangement after cessation of work each day, safety measures for night time traffic and precaution for transportation of hazardous materials and arrangement of flagmen. • The Contractor will ensure that the diversion/detour is always maintained in running condition, particularly during the monsoon to avoid disruption to traffic flow. • The Contractor will also inform the local community of changes to traffic routes, conditions, and pedestrian access arrangements. The temporary traffic detours will be kept free of dust by a sprinkling of water three times a day and as required under specific conditions (depending on weather conditions, construction in the settlement areas and volume of traffic).	Contractor	PIU/ TAQAC
B.2	**Procurement of Construction Materials**			
B.2.1	Procurement for Aggregate and other construction materials	• No borrow area will be opened without permission of the Environmental Specialist and without obtaining necessary regulatory permission. The location, shape, and size of the designated borrow areas will be as approved by the Environmental Specialist and in accordance to the IRC recommended practice for borrow pits for road embankments (IRC 10: 1961). The borrowing operations will be carried out as specified in the guidelines for siting and operation of borrow areas. • The unpaved surfaces used for the haulage of borrow materials, if passing through the settlement areas or habitations; will be maintained dust-free by the Contractor. A sprinkling of water will be carried out twice a day to control dust along such roads during their period of use. • During dry seasons (autumn and summer) frequency of water sprinkling will be increased in the settlement areas and Environmental Specialist of PIU will decide the sprinkling time depending on the local requirements. The contractor will rehabilitate the borrow areas as soon as borrowing of soil is over from a particular borrow area in accordance with the approved borrow area Redevelopment Plan.	Contractor	PIU, TAQAC

B.2.2	Transporting Construction Materials	• All vehicles delivering fine materials like aggregate, cement, earth, sand, etc, to the site will be covered by Tarpaulin to avoid spillage of materials. • The existing road used by vehicles of the contractor or any of his subcontractors or suppliers of materials will be kept clear of all dust/mud or other extraneous materials dropped by such vehicles. • The contractor will make an effort to transport materials to the site in non- peak hours	Contractor	PIU, TAQAC
B.2.3	Quarry Operations & Crushers	The Contractor shall obtain materials for approved quarries. The crushers will be operated after obtaining consent to establish and consent to operate from J&KSPCB.	Contractor	PIU, TAQAC
B.3	**Construction Work**			
B.3.1	Labour Camp Site	• A project information board will be displayed at the labour campsite. • Electrical cables and wires will be properly arranged with proper electrical safety. Loose electrical connections will not be allowed at the labour camp. • Red danger sign with bone & skull will be displayed as per The Electrical Rules at three-phase motors, electrical panels and electrical machines, DG sets, etc. • Housekeeping at labour camp will be maintained properly. Daily sweeping and cleaning will be done at the labour camp. • HIV Aid awareness posters will be displayed at the campsite. • The solid waste generated at the campsite will be collected in covered waste bins. Then, it will be segregated as biodegradable (food waste, paper, etc) and non-biodegradable (plastic, polyethylene bag, etc) wastes. Polyethylene/plastic wastes will be stored in empty cement bags and to be sent for recycling through scrap dealer. Biodegradable (food waste, paper, etc) solid waste will be disposed of in compost pit. Non-biodegradable inert wastes will be sent to landfill site of Anantnag Municipality. • Proper drinking water, well-ventilated accommodation, sanitation, canteen facilities will be provided to workers at the labour camp. • Suitable signages will be displayed at labour camps.	Contractor	PIU, TAQAC

B.3.2	Drainage and Flood control	The Contractor shall ensure that no construction materials shall block the water flow or create water lodging at the worksite. The Contractor shall take remedies to remove accumulated water (if any) from the construction sites, campsites, storage yard, excavated areas, etc. Construction works should plan well in advance prior to the onset of monsoon to avoid water- pool besides providing temporary cross drainage systems. The contractor shall take all adequate precautions to ensure that construction materials and excavated materials are enclosed in such a manner that erosion or runoff of sediments is controlled. Silt fencing shall be installed prior to the onset of the monsoon at all the required locations, as directed by PIU/PMU. Prior to the monsoon, the contractor shall provide either permanent or temporary drains to prevent water accumulation in surrounding residential, commercial and agricultural areas.	Contractor	PIU, TAQAC
B 3.3	Siltation of Water Bodies and Degradation of Water Quality	• The Contractor will not excavate beds of any stream/canals/ any other water body for borrowing earth for embankment construction. • The contractor will construct silt fencing at the base of the embankment construction for the entire perimeter of any water body (including wells) adjacent to the project road and around the stockpiles at the construction sites including ancillary sites close to water bodies. The fencing will be provided prior to commencement of earthwork and continue till the stabilization of the embankment slopes, on the particular sub-section of the road. • The contractor will ensure that construction materials containing fine particles are stored in an enclosure such that sediment-laden water does not drain into nearby watercourse. • At Kitriteng, Water spring will be safeguarded with the applicable protective measures and barricaded accordingly to avoid any impact. • On completion of the construction of culverts and bridges, drainage channels will be cleared by collecting debris and disposed off suitably. Detours/diversions constructed for construction of culverts and bridges will also be cleared before onset of monsoon.	Contractor	PIU, TAQAC

B 3.4	Slope Protection and Control of Soil Erosion	• The Contractor will construct slope protection works as per design, or as directed by PIU to control soil erosion and sedimentation through use of Breast walls, Retaining Walls, Pilot Bioengineering methods, dykes, sedimentation chambers, basins, fibber mats, mulches, grasses, slope, drains and other devices. • All temporary sedimentation, pollution control works and the maintenance thereof will be deemed as incidental to the earthwork or other items of work and as such no separate payment will be made for them. • The contractor will ensure the following aspects: • After construction of road embankment, the side slopes will be covered with grass and shrubs as per design specifications. • Turfing works will be taken up as soon as possible provided the season is favourable for the establishment of grass sods. Other measures of slope stabilization will include mulching netting and seeding of batters and drain immediately on completion of earthworks. • In borrow pits, the depth shall be so regulated that the sides of the excavation will have a slope not steeper than 1 vertical to 2 horizontal, from the edge of the final section of the bank. • Along sections abutting water bodies, pitching as per design specification will protect slopes.	Contractor	PIU TAQAC
B.3.5	Safeguarding of Trees	• Scheduled trees, if any should be marked (dual horizontal strip- Yellow/ Red colour) with safe reflective strips prior to commencement of works. • Since Chinar tree/Mulberry tree\Walnut tree are sensitive to construction, all such trees in the construction zone will be covered/ wrapped with protective green mesh fiber cloth around base tree trunk area by 6 feet in height. • No stockpiling of any construction will be allowed around or close to Chinar, Walnut or Mulberry trees • Make-shift steel barricading should be provided around each Chinar, Mulberry, and Walnut trees in an active work zone where excavation takes place for the purpose of longitudinal drainage etc.	Contractor	PIU, TAQAC

B.3.6	Pedestrian and Vehicular Traffic Movement Management	• Detailed traffic control plans will be prepared and submitted to the PIU for approval one week prior to commencement of works. • The traffic control plans shall contain details of temporary diversion, details of arrangements for construction (road stretches, timing, and phases). • Provide the construction itinerary in advance so that the road users can use alternative routes • Erect warning and safety signs of ongoing works. • Suitable retro-reflective warning signs should be placed at near construction locations and should be visible at night. • Alternative access ways should be communicated to the community by way of announcement appropriately for the public information. • The contractor shall take all necessary measures for the safety of traffic during construction and shall provide, erect and maintain such barricades, including signs, markings, flagmen as proposed and approved by PIU/PMU. The contractor shall ensure that all signs, barricades, pavement markings are provided as per applicable IRC code and guidelines. • Install signage, barricading, fencing as required and include safety measures for the transport of materials/equipment, which shall be limited to certain times, and arrangements for flagmen at the intersection.	Contractor	PIU, TAQAC

B.3.7	Excavation works for longitudinal drains along the road corridor	• As per DPR, drainage has been proposed for the Package 4 (Kashmir) roads along with built-up areas, market area and beside the project road where ever the drain is necessary. • At the excavation site, warning signboards will be displayed in vernacular language and English. • The entry of general public/unauthorized persons will be restricted. • During excavation for laying of concrete (RCC) cover drains necessary safety measures will be taken by the contractor. • Excavation of 1.5 meters deep or greater requires side protection (Close Timbering and step cutting) unless the excavation is made entirely in stable rock/soil. • Contractor to follow strict protocol during construction/ excavation for longitudinal drainage especially along with sensitive receptors like schools, mosque, community centres, religious places, shrines, graveyard, etc. • Excavated earth will be collected and disposed of in pre-identified site with the approval of PIU. Excavated earth shall not be dump on the carriageway or shoulders. • Casted drain block and drain cover will not be stacked on the road. • To ensure the elimination of excavation hazards, excavation will be carried in the presence of a competent person. • Suitable barricading will be provided around the excavation site. • Suitable personal protective equipment will be provided to the workers.	Contractor	PIU, TAQAC
B.3.8	Handling of Cement Bags	• Cement bags will be stored and emptied in covered areas to control fugitive dust emissions. • While handling and emptying cement bags, workers will wear masks, hand gloves, and protective goggles. • Manual transferring of cement bags from one place to another place will not be allowed. For this purpose, the trolley will be used.	Contractor	PIU, TAQAC

B.3.9	Work-zone safety Management	• The Contractor shall prepare the construction safety plan as per provisions under the IRC 67-2001, SP-55 for safe work zone to be duly approved by the environmental specialist of PIU/PMU prior to the start of road works. • Temporary barricades shall be provided to delineate the construction zone as well as material stacking areas. The construction site and the labour facility (if any) shall be appropriately barricaded to prevent entry and accidental tress passing of workers, staff, and others into the construction site. • All operational areas shall be access controlled. Watch and ward facilities at all times shall be provided by the contractor. • Proper retro-reflective warning signage will be installed on the access road next to the construction site about the movement of construction machinery and vehicles. • In excavations for longitudinal surface road drains, culverts, etc., a high visibility warning and retro-reflective signage shall be displayed in vermicular language and English. The entry of unauthorized persons should be restricted. Excavation of 1.5 meters deep or greater will be adequately barricaded. • There shall be adequate lighting arrangement at night to prevent mishaps after construction activity ceases for the day • All the retro safety signage as per IRC 55 will be erected at the construction site for generating awareness among the local community and road users during the construction.	Contractor	PIU, TAQAC
B.3.10	Sensitive Receptors-Impact Management	• At each sensitive receptor-like schools, mosques/ religious places, shrines, community centers, graveyards, etc and in general residential houses, the construction operations in these areas should be limited to the time period from 7:30 am to 6:00 pm. • Periodic maintenance and calibration of construction equipment/ vehicles to meet applicable CPCB emission standards. • Contractor to ensure regular dust suppression measures by way of standard and efficient water sprinkling through water tankers at these designated sensitive receptors. • Noise barriers shall be installed during the construction phase to protect the school from the noise from construction activities. • Adequate barricading and safety measures to protect dust pollution and noise impacts on sensitive receptors like schools and religious places etc. due to vehicle movement to be ensured prior to the start of work and their effectiveness to be checked during construction.	Contractor	PIU, TAQAC

B.3.11	Occupational Health and Safety of Workers	• The contractor will prepare and follow the OHS plan, including provisions for an emergency response plan. • All workers will be provided with required personal protective equipment • Emergency Telephone Numbers shall be displayed at camp and plant site. • Medical facilities shall be provided for workers at the Labour camp and plant site.	Contractor	PIU, TAQAC
B.4 **B.4.1**	**Pollution** **Water Pollution**			
B.4.1.1	Water Pollution from construction material	• The contractor will take all precautionary measures to prevent entering of wastewater into streams, water bodies or the irrigation system during construction. The contractor will avoid construction works close to the streams or water bodies during monsoon. • Contractor shall not wash his vehicles in river water and shall not enter riverbed for that purpose. • Any type of construction wastes will not be disposed off in rivers or water bodies.	Contractor	PIU, TAQAC
B.4.1.2	Water Pollution from Fuel and Lubricants	• The Contractor will ensure that all construction vehicle parking locations, fuel/lubricants storage sites, vehicle, machinery, and equipment maintenance, and refueling sites will be located at least 250 m away from rivers and irrigation canal/ponds. The Contractor will submit all locations and layout plans of such sites prior to their establishment and will be approved by the Environmental Specialist of PIU. The contractor will ensure that all vehicle/machinery and equipment operation, maintenance and refueling will be carried out in such a fashion that spillage of fuels and lubricants does not contaminate the ground. Wastewater from vehicle parking, fuel storage areas, workshops, wash down and refueling areas will be treated in an oil interceptor before discharging into on land or into surface water bodies or into another treatment system. • In all, fuel storage and refueling areas are located on areas supporting vegetation, the topsoil will be stripped, stockpiled and returned after cessation of such storage. • The contractor will arrange for collection, storing and disposal of oily wastes to the pre-identified disposal sites • All oil spills, used oil will be disposed off in accordance with J&K State Pollution Control Board (JKSPCB) guidelines.	Contractor	PIU, TAQAC

B.4.1.3	Waste Water from Labour Camp	• Wastewater generated from the sanitary facilities at labour camp will be treated in a septic tank followed by soak pit. • No untreated raw sewage/wastewater will be discharged into any water body. • Workers will not be allowed for open defecation. Proper toilets fitted with the septic tank and soak pit will be provided for workers at the campsite. • At the bridge construction site, portable toilets shall be provided for workers and sewage from portable toilets shall be passed through a septic tank followed by soak pit.	Contractor	PIU, TAQAC
B.4.2	**Air Pollution**			
B.4.2.1	Dust Pollution	• Frequent dust suppression will be planned for this stretch of the road by use of water tankers. • The contractor will procure the construction machinery, which conforms to the pollution control norms specified by the MoEF&CC/CPCB/J&KSPCB. • The excavated earth /construction materials will be stored properly so that it does not generate fugitive emissions. • Regular maintenance of vehicles to be used for material transportation and equipment will be carried and vehicular pollution check should be made mandatory. • Mask and other PPE should be provided as a mandatory effort to the construction workers in dust prone areas.	Contractor	PIU, TAQAC
B.4.2.2	Emission from Construction Vehicles, Equipment, and Machinery	• The contractor will ensure that all vehicles, equipment, and machinery used for construction works are regularly maintained and conform that pollution emission levels and comply with the requirements of CPCB and/Motor Vehicles Rules. The contractor will submit Pollution under Control (PUC) certificates for all vehicles for the project. • DG set will be provided with a chimney of adequate height as per CPCB guidelines (Height of stack in meter = Height of the building + 0.2 √KVA). The environmental monitoring is to be conducted as per the monitoring plan.	Contractor	PIU, TAQAC

B.4.3	**Noise Pollution**			
B.4.3.1	Noise Levels from Construction Vehicles and Equipment's	The contractor will confirm the following: • All construction equipment used in excavation, concreting, etc, will strictly conform to the MoEF&CC/CPCB/J&KSPCB noise standards. • All vehicles and equipment used in construction works will be fitted with exhaust silencers/mufflers. • Maintenance and servicing of all construction vehicles and machinery will be done regularly. • Only acoustic enclosures fitted DG sets will be allowed at the construction site and labour camp. At the construction sites within 150 m of the nearest habitation, noisy construction work and use of high noise generation equipment will be stopped during the night time between 10.00 pm to 6.00 am. • Working hours of the construction activities will be restricted around educational institutes/health centres (silence zones) up to a distance of 100 m from the sensitive receptors. • Noise monitoring shall be carried out in construction areas through the approved monitoring agency.	Contractor	PIU, TAQAC
B.5	Archaeological Resources and Cultural properties			
B.5.1	Chance Found Archaeological Property	• All fossils, coins, articles of the value of antiquity, structures, and other remains or things of geological or archaeological interest discovered on the site shall be the property of the Government and shall be dealt with as per provisions of the relevant legislation. • The contractor will take reasonable precautions to prevent his workmen or any other persons from removing and damaging any such article or thing. He will, immediately upon discovery thereof and before removal acquaints the Environmental Expert of the PIU of such discovery and carry out the PIU instructions for dealing with the same, waiting which all work shall be stopped. • The PIU will seek direction from the Archaeological Survey of India (ASI) before instructing the Contractor to recommence the work in the site.	Contractor	PIU, PMU TAQAC
B.5.2	Impacts on Cultural Properties	• All necessary and adequate care shall be taken to minimize the impact on cultural properties which includes cultural sites and remains, places of worship including mosques, temples, shrines, etc., graveyards, monuments and any other important structures as identified during design stage. • Relocation and enhancement measures shall be taken up as per the design and in consultation with the local community. Access to such properties from the road shall be maintained clear and clean.	Contractor	PIU, TAQAC
B.6	**Personal Safety**			

B.6.1	Personal Safety Measures for Labours and Staff	The contractor will take necessary measures for the personal safety of workers: • Protective safety shoes, gumboots, hand gloves, protective goggles, etc (as required) will be provided to the workers employed in excavation, steel rebaring, and bending concrete works, erection of pump station, etc. • Welder's protective eye-shields will be provided to workers who are engaged in welding works. • Earplugs will be provided to the workers exposed to high noise levels. • Safety vests will be used by workers when on a construction site. • The Contractor will comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches and safe means of entry and egress. The contractor will make sure that during the construction work all relevant provisions of Building and other Construction Workers (Regulation of Employment and Conditions of Services) Act, 1996 are adhered to. • The Contractor will not employ any person below the age of 14 years for any work.	Contractor	PIU, TAQAC
B.6.2	Traffic and Safety	• The Contractor will take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades, including signs, markings, flags, lights and flagmen as proposed in the traffic control plan/drawings and as required by the Environmental Expert for the information and protection of traffic approaching or passing through the section of any existing crossroads. • The Contractor will ensure that all signs, barricades, pavement markings are provided as per the MoRTH specifications. • Before taking up construction, a Traffic Control Plan will be devised and implemented to the satisfaction of the Environmental Expert of PIU.	Contractor	PIU TAQAC
B.6.3	Emergency Management	• Emergency numbers will be displayed at the construction sites and campsite, • First boxes will be made available at the construction site and campsite, • Fire extinguishers for petroleum oil fire and electrical fire will be made available at the campsite, fuel storage site, construction site, etc. • Designated vehicles, which can be used as an ambulance, will be available at the construction sites all the time.	Contractor	PIU, TAQAC

B.6.4	Risk Force Measure	• The contractor will make required arrangements so that in case of any mishap during, operation of machinery/ construction vehicles, dismantling, excavation, concrete pouring, hot asphalt handling and erection of pumps, all necessary steps can be taken for prompt first aid treatment. • Construction Safety Plan for all the road stretches, embankment development, protection works, works road longitudinal drains, ancillary sites to be prepared by the contractor and will identify necessary actions in the event of an emergency.	Contractor	PIU, TAQAC
B.6.5	First Aid Facility	The contractor will arrange for : • A readily available first aid unit including an adequate supply of sterilized dressing materials, burn ointment and appliances as per the state Factories Rules will be maintained all the time by the contractor. • The availability of first aid trained persons will be ensured at the project site during the construction phase. • Availability of suitable transport will be ensured at all times to take an injured or sick person(s) to the hospital.	Contractor	PIU, TAQAC
B.6.6	Informatory Signs and Hoardings	The Contractor will provide, erect and maintain informatory/safety signs, hoardings written in English and local language, wherever required or as suggested by the Environmental Specialist of PIU.	Contractor	PIU TAQAC
B.7	**Labour Camp and Project Site Management**			

B.7.1	Accommodation for Labourers	• The contractor will follow all relevant provisions of the Building and the other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 for construction and maintenance of labour camp. • The location, layout and basic facility provision of each labour camp will be submitted to Environmental Expert of PIU prior to their construction. • The construction will commence only upon the written approval of the Environmental Expert of PIU. • The contractor will maintain necessary well ventilated living accommodation, toilets, bathrooms and ancillary facilities in a functional and hygienic manner. • Proper ventilation along with standard exhaust fans will be provided in labour accommodation rooms. • Regular cleaning and sweeping will be ensured at the labour campsite. • Systematic waste collection management at labour camp to be managed as per SWM Rules 2016. • Standard First Aid Kits/units including an adequate of sterilized dressing materials.	Contractor	PIU, TAQAC
B.7.2	HIV/AIDS Prevention Measures	• Necessary HIV/AIDS prevention measures will be taken at labour camp • HIV/AIDS awareness program will be organized by the contractor's Environment & Safety Officer.	Contractor	PIU, TAQAC
B.7.3	Potable Water for Workers	• The contractor will construct and maintain labour accommodation in such a fashion that uncontaminated clean water is available for drinking, cooking, bathing, and washing. The contractor will also provide potable water facilities within the precincts of workplace/pump stations in an accessible place, as per standards set by the Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996. • The contractor will also provide the following: a) Supply of sufficient quantity of potable water (as per IS) at construction site/labour camp (site at suitable and easily accessible places and regular maintenance of such facilities). b) If any water storage tank is provided that will be kept such that the bottom of the tank at least 1 meter above the surrounding ground level. c) If water is drawn from any existing well/ hand pump, which is within 30 meters proximity of any toilet, drain or another source of pollution, the well will be disinfected before water is used for the drinking. • Environmental Expert of PIU will be required to inspect the labour camp once in a week to ensure the compliance of the EMP.	Contractor	PIU, TAQAC

B.7.4	Sanitation and Sewage System at Labour Camp	The contractor will ensure that : • The sewage system for the camp will be designed, built and operated in such a fashion that no health hazard occurs and no pollution to the air, groundwater or adjacent watercourses take place, • Separate toilets/bathrooms, as required, will be provided for men and women, marked in vernacular language, • Toilets will be provided with a septic tank followed by a soak pit. • Adequate water supply will be provided in all toilets and urinals, • Night soil can be disposed of with the help of municipality or disposed of by putting a layer of it at the bottom of a permanent pit prepared for the purpose and covered with 15 cm layer of waste or refuse and then covered with a layer of earth for a fortnight.	Contractor	PIU, TAQAC
B.7.5	Waste Disposal	• The contractor will provide garbage bins in the camp & construction site and ensure that these are regularly emptied and disposed off in a hygienic manner according to Solid Waste Management Plan as per Solid Waste Management Rule 2016. • Burning of wastes at construction sites, labour camp and roadside will not be allowed. • The solid waste generated at the construction site & labour camp will be collected in covered waste bins and segregated as biodegradable (food waste, paper, etc) and non-biodegradable (plastic, polyethylene bag, etc) wastes. Polyethylene/plastic wastes will be stored in empty cement bags and to be sent for recycling through scrap dealer. Biodegradable (food waste, paper, etc) solid waste will be disposed off in the compost pit.	Contractor	PIU, TAQAC
B.8	**Environmental Monitoring**			
B.8.1	Environmental Monitoring-Construction Stage	• The PIU will carry out environmental monitoring for Ambient Air Quality, Noise levels, and Water Quality on a six-monthly basis as per the environmental monitoring plan and in accordance with instruction of Environmental Specialist of PMU.	PIU	PMU, TAQAC

B.8.2	Compensatory Plantation	• Indigenous trees like Willow and Poplar trees in between 20-30 may be required to be cut down/pruned as they come close or protrude towards the road pavement. • Loss of trees will be compensated by a 1:3 ratio (i.e. for loss of 1 tree 3 trees will be planted) or greater and transplantation of the same trees may be envisaged wherever applicable. Compensatory plantation will be taken in the Parimpora-Soibugh area. • Regular monitoring will be carried out for plantation along the project road for cutting of trees. • Regular monitoring will be carried out for plantation along the project road for cutting of trees.	PIU	PMU, TAQAC
C.	**Contractor's Demobilization**			
C.1	Clean-up Operations, Restoration and Rehabilitation	• The contractor will prepare the project and labour campsite restoration plan, which will be approved by the PIU / Environmental Expert. The clean-up and restoration operations are to be implemented by the contractor prior to demobilization from the construction site and labour camp. The contractor will clear all temporary structures, debris, construction wastes, garbage, night soils, etc in environmental sound manner. • All disposal pits or trenches will be filled in and effectively sealed off. • Construction places including camp and any other area used/affected due to the project operations will be left clean and tidy at the contractor's expense to the entire satisfaction to the PIU.	Contractor	PIU, TAQAC
C.2	Land Rehabilitation	• All surfaces hardened due to construction activities will be ripped & imported materials thereon removed. • All rubbles to be removed from the site to an approved disposal site. Burying of rubble on-site is prohibited. • Surfaces are to be checked for waste products from activities such as concreting or asphalting and cleared in a manner approved by the Engineer. • All embankments are to be trimmed, shaped and replanted to the satisfaction of the PIU. • Borrow pits are to be closed and rehabilitated in accordance with the pre-approved management plan for each borrow pit. The Contractor shall liaise with the PIU regarding these requirements.	Contractor	PIU, TAQAC
D	**Post Construction Stage**			
D.1	Environmental Monitoring- Post Construction Stage	• The environmental monitoring laboratory of JTFRP-PMU will carry out environmental monitoring for Ambient Air Quality, Noise levels, and Water Quality on a six-monthly basis as per environmental monitoring plan and in accordance to instruction of Environmental Specialist of PMU.	PIU	PMU, TAQAC

D.2	Monitoring of Afforested and Landscape areas	Continuous watch and monitoring of afforested and landscape shall be done for its performance and survival rate. The plantation will be properly guarded by watch and ward personnel. Provision will be made for manure application and watering on a schedule.	PIU	PMU
D.3	Soil Erosion and Monitoring of Borrow Areas	Visual monitoring and inspection of soil erosion at borrow areas, quarries (if closed and rehabilitated), embankments and other places expected to be affected, will be carried out once in every three months.	PIU	PMU

9.5. Clause for Nonconformity to Environmental Management Plan (EMP) - Protection of the Environment

The Contractor will implement necessary mitigation measures for which responsibility is assigned to him as stipulated in the EMP. Any lapse in implementing the same will attract the damage clause as detailed below:

- Any complaints of public, within the scope of the Contractor, formally registered with the PIU and communicated to the Contractor, which is not properly addressed within the time period intimated by the PIU shall be treated as a major lapse.
- Non-conformity to any of the mitigation measures like unsafe conditions, non-collection of excavated material (during the laying of drainage pipes) regularly and other unattended Health, Safety & Environment (HSE) issues, as stipulated in the EMP Report (other than stated above) shall be considered as a minor lapse.
- On observing any lapses, PIU shall issue a notice to the Contractor, to rectify the same.
- Any minor lapse for which notice was issued and not rectified, first and second reminders shall be given after ten days from the original notice date and first reminder date respectively. Any minor lapse, which is not rectified, shall be treated as a major lapse from the date of issuing the second reminder.
- If a major lapse is not rectified upon receiving the notice PIU shall invoke reduction, in the subsequent interim payment certificate.
- For major lapses, 10% of the interim payment certificate will be withheld, subject to a maximum limit of about 0.5% of the contract value.
- If the lapse is not rectified within one month after withholding the payment, **the amount withheld shall be forfeited immediately.**

9.6. Environmental Monitoring Plan

The monitoring programme consists of performance indicators, reporting formats and necessary budgetary provisions. The contractors monitoring plan should be in accordance with the baseline environmental monitoring, locations provided in the Environmental impact assessment report.

The monitoring plan has the following objectives:

- To ensure effective implementation of EMP
- To evaluate the performance of mitigation measures proposed in the EMP
- To comply with all applicable environmental, safety, labour and local legislation
- To ensure that public opinions and obligations are taken into account and respected to the required satisfaction level
- To modify the mitigation measures or implementing additional measures, if required

The monitoring requirement for the different environmental components have been prepared is presented in Table 9.2 below;

9.7. Performance Monitoring Indicators

Physical, biological and environmental management components identified as of particular significance in affecting the environment at critical locations have been suggested as Performance Indicators (PIs). The Performance Indicators shall be evaluated under three heads as:

- Environmental condition Indicators to determine efficacy of environmental management measures in control of air, noise, water and soil pollution;
- Environmental management indicators to determine compliance with the suggested environmental management measures
- Operational performance indicators have also been devised to determine efficacy and utility of the proposed mitigation measures

Table 9.2: The Performance Indicators and monitoring plans prepared for Project Implementation

S.No.	Indicator	Details	Stage	Responsibility
A	**Environmental Condition Indicators and Monitoring Plan**			
1	Air Quality	The parameters to be monitored, frequency and duration of monitoring as well as the locations to be monitored will be six monthly summer and post monsoon seasons	Construction Post construction	PMU, PIU Environmental Monitoring Laboratory of PMU through TAQAC
2	Noise Levels	Quarterly, Hourly Level equivalent (Leq).	Construction Post Construction	PMU, PIU Environmental Monitoring Laboratory of PMU through TAQAC
3	Water Quality	Near by rivers, six monthly summer and post monsoon seasons	Construction Post Construction	PMU, PIU Environmental Monitoring Laboratory of PMU through TAQAC agency
B	**Environmental Management Indicators and Monitoring Plan**			
1	Construction Camp	Location of construction camps has to be identified and parameters indicative of environment in the area has to be reported.	Pre Construction	PIU/Contractor
2	Borrow Areas	Locations of borrow areas have to be identified and parameters indicative of environment in the area has to be reported	Pre Construction	PIU/Contractor
3	Tree Protection	Protective Measures of	Pre	Contractor/PIU

		Scheduled Trees	Construction/ Construction	
3	Tree Cutting	Progress of Tree removal marked for cutting is to be reported	Pre Construction	PIU/Contractor to Forest Department
4	Tree Plantation	Progress of measures suggested as part of the strategy is to be reported	By end of the Construction	PIU/Forest Department
5	Status Regarding Rehabilitation of Borrow Areas	The PIU will undertake site visits to determine how many borrow areas have been rehabilitated in line with the land owner's request and to their full satisfaction	After completion of Construction/ borrowing is complete in particular borrow area. Operation Phase	The PIU will be responsible to direct the contractor for fully rehabilitation.

9.8. Monitoring Parameters and Standards

The environmental monitoring plan is discussed below:

9.8.1. Ambient Air Quality Monitoring (AAQM)

The ambient air quality parameters viz: Sulphur Dioxide (SO_2), Nitrogen Dioxide (NO_2), Carbon Monoxide (CO), Particulate Matter (PM_{10}, $PM_{2.5}$), shall be monitored six monthly at identified locations from the start of the construction activity. The ambient air quality parameters shall be monitored in accordance with the National Ambient Air Quality Standards. The duration and the pollution parameters to be monitored and the responsible institutional arrangements are detailed out in the Environmental Monitoring Plan.

9.8.2. Noise Quality Monitoring

The noise levels shall be monitored at designated locations in accordance with the Ambient Noise Quality standards. The duration and the noise pollution parameters to be monitored and the responsible institutional arrangements are detailed in the Environmental Monitoring Plan.

9.8.3. Surface Water Quality Monitoring

Surface Water quality parameters such as pH, BOD, COD, DO coli form count, total suspended solids, total dissolved solids, Hardness, Conductivity etc. shall be monitored at all identified locations during the construction stage as per standards prescribed by Central Pollution Control Board. The duration and the pollution parameters to be

monitored and the responsible institutional arrangements are detailed out in the Environmental Monitoring Plan

9.9. Monitoring Plans for Environment Condition

For each of the environmental components, the environmental monitoring plan specifies the parameters to be monitored; location of the monitoring sites and duration of monitoring. The monitoring plan also specifies the applicable standards, implementation and supervising responsibilities. The monitoring plan for the various environmental condition indicators of the project in construction stages is presented in **Table 9.6**. Monitoring plan does not include the requirement of arising out of regulation provision such as obtaining NoC/Consent for plant site operation.

Furthermore, periodical site monitoring should be carried –out by the Environmental Expert of PIU for surveillance & monitoring of road safety during the road construction. The brief description of measures has been given in Table below:

Table 9.6: Brief Description of Measures

Sl. No.	Locations of Work Site	Site Safety Measures
1	Construction Sites	Caution boards, Safety Cones, Delineators
2	Deep Cutting	The construction zone should be barricaded with G.I Sheet or arrangement to be made as per plan approved by the PIU / PMU. [Provide Safety Sign Boards and Safety Barriers marked with reflective tapes]
3	Temporary Diversion (if any)	Diversion Board, Barricading [Provide 'Diversion Ahead' boards at 50m, 100m and 150m ahead of diversions with reflective tape for illumination at night at the all diverted locations]
4	Safety for the Workers	Helmets, Safety-Shoes, Goggles, Dusk mask. Etc

Table 9.7: Environmental Monitoring Plan

Attribute	Project Stage	Parameter	Special Guidance	Standards	Frequency	Duration	Location	Implementation
Air	Construction Phase	PM_{10}, $PM_{2.5}$, SO_2,NO_2,CO	Use method specified in National Ambient Air Quality Standards (NAAQM).	National Ambient Air Quality Standards (NAAQM).	Six Monthly (Summer and Post Monsoon Seasons)	24 hours Sampling	Along the road corridor, Batching Plant, Workers Camp site, Project Office Site	PIU through Environmental Monitoring Laboratory
Surface Water from Rivers	Construction Phase	pH, BOD, COD, Oil& Grease, Total Suspended Solid (TSS), Total Dissolved Solid (TDS)	Grab sample collected from source and Analyses as per standard Methods for Examination of Water and Wastewater	Indian Standards: for Inland Surface Water (IS: 2296, 1962	Six Monthly (Summer and Post Monsoon Seasons)	Grab Sampling	Along the road Surface water sources	PIU through Environmental Monitoring Laboratory
Noise	Construction Phase	Hourly Level Equivalent (Leq) on dB (A} scale	Equivalent noise levels using an integrated noise level meter kept at it distance of 1 m from edge of pavement	MoEF Noise Rules. 2000	Quaterly (Summer and Post Monsoon Seasons)	Leq in dB(A) of daytime and night time	Along the road corridor, Batching and HMP Plant, Workers Camp site,	PIU through Environmental Monitoring Laboratory
Borrow Area	Construction Phase	As per Guidelines	Visual Observations	-	Prior to opening, At least once in a month during operation, Post Rehabilitation.		Borrow area Location	Contractor/PIU, TAQAC
Tree Plantation	Operation Phase	Survival Rate	Plantation of tall saplings	National Green Highways policy and IRC guidelines (IRC : SP:21-2019)	Quarterly to two years post plantation	-	Areas where plantation is being done	Contractor/PIU TAQAC

9.10. Reporting System

The contractor will follow the reporting system for implementation of environmental management plan and environmental management indicators. The Contractor will report the PIU on corrective measures and implementation status of mitigation measures as per the environmental management plan. The EMP compliance report will comprise with the photographic evidences (with date, time and geo-reference) for implemented mitigation measures in the monitoring reports.

Table 9.7: The reporting requirements are stated in table below :

S.No	Item	Stage	Contractor
			Implementation & Reporting to PIU/PMU
1.	Setting up of construction Camp	Pre-Construction	One Time
2.	Identification of disposal locations for constructional & other wastes from road project	Pre-Construction	One Time
3.	Tree cutting	Pre-Construction	One Time
4.	Top Soil Preservations	Pre-Construction	One Time
5.	EMP Implementation Report	Construction	Monthly
6.	Rehabilitation Borrow area/ quarry area/	Construction	Monthly
7.	Pollution Monitoring	Construction	Quarterly- Except during spells of precipitation.
8	Cleaning and Restoration on Demobilization	On completion of construction of road project	One Time

The contractor will take all reasonable steps to protect the environment on & off the project site and to avoid, minimize and mitigate impacts due to the project roads work activities creating pollution to environment and other causes as a consequence of methods of operations.

9.11. Budgetary Provision for EMP

Mitigation measures proposed in the EMP will be implemented by the Contractor and under the supervision/ monitoring by the PIU/TAQAC. The works to be undertaken by the contractor have been quantified and the quantities included in the respective BOQ items. The essentials of environmental health and safety measures to be followed by the contractor have been included in the annexures of main EIA report.

The indicative split up of capital and recurring cost for the environmental management for the project is presented in following Table 9.8;

Table 9.8: Budgetary Allocation- Indicative Cost for EMP Implementation for Road Subprojects Under Package-4 (Bijbehara-Waghama Road and Sangam Khudwani Road

S. No.	Component	Item	Unit	Unit Cost (INR)	Quantity	Total Cost (2 road subprojects)	Responsibility
A	**Pre-Construction Stage**						
1	Air	Baseline Monitoring Ambient Air Quality at 4 locations especially near sensitive receptors/settlement sections	No.	7000/-	24 hr sample, One time monitoring 4 Locations ($PM_{2.5}$, PM_{10}, SO_2 and NO_2)	28000	PMU
2	Water	Surface Water Quality at 4 locations (River Jhelum/ Surface Water Body/ Spring/ Irrigation Channel) 2 Ground Water/ Public Water Source	No.	5000/- 7000/-	Grab Samples at 4 Locations (pH, TSS, TDS, BOD, COD, Oil & Grease, Turbidity) Parameters as per IS 10500:2012	20000 14000	PMU PMU
3	Noise	Noise Measurements at 4 locations near sensitive receptors/Settlement	No.	3000	Hourly measurements for 24 hours. 4 Samples	12000	PMU
B. Construction Stage							
~~4~~	Protection /Safety-Scheduled Species of Trees	Reflective strips for safety. About 11 trees	No.	1000	Reflective strips on the tree (Chinar, Walnut and Mulberry Trees)	11000	PMU/ Contractor
~~5~~	Tree Cutting	Trees (Mainly Poplar & Willows) about 90 trees)	No.	Part of Civil Works Cost			PMU/ Contractor
6	Air	Ambient Air Quality at 4 locations within construction zones and operational plants sites. (3 times in a year except monsoon)	No.	7000/-	24 hr sample, One time monitoring 4 Locations (Six monthly) ($PM_{2.5}$, PM_{10}, SO_2 and NO_2)	140000	PMU

7	Water	Surface Water Quality at 4 locations (six monthly)	No.	5000/-	Grab Samples at 4 Locations (pH, TSS, TDS, BOD, COD, Oil & Grease, Turbidity)	60000	PMU
		2 Ground Water/ Public Water Source (six monthly)		7000/-	Parameters as per IS 10500:2012	32000	PMU
8	Noise	Noise measurements at 4 locations near sensitive receptors/ Settlements within construction zone (Quarterly)	No.	3000/-	Hourly measurements for 24 hours. 4 Samples	72000	PMU
9	Air	Dust Suppression Measures	To be included in Civil Works Cost				
10	Labour camp and Ancillary Facilities	Labour Camp and all associated facilities as per EMP	Cost included in DPR				
11	First Aid Kits	First Aid Kits at the construction site, camp and ancillary sites	Cost included in DPR			-	
12	Compensatory Plantation	[12]Replantation of Trees 1:3)	No.	4000/-	270	1080000	PMU
Project Enhancement by PMU-JTFRP							
13	Embankment Protection	Tree plantation/ Grass engraining with indigenous shrubs	Lump Sum			100000	PMU/ Contractor
14	Beautification of Bunds (River Jhelum at Bijbehara -	Tree Plantation (Pine Trees)	Lump Sum			300000	PMU

[12] Replantation of trees under compensatory plantation shall include *Pinus sp*. or *Cedrus deodara* as evergreen coniferous species. This will also serve as improvement of aesthetics under landscape management / enhancement of the sites and endorsing of planation of rich evergreen species to increase oxygen footprints throughout the year and elimination of air pollutants. Replantation will be carried in River Jhelum embankments, educational institutes/ schools, open spaces/ parks etc.

	Ch 1+050)						
15	Restoration/ rejuvenation of Water Spring at Kitriteng	Construction of compound walls, cleaning, restoring, beautification etc.	No.	Lump sum	Lump sum	500000	PMU/ Contractor
C	**Operation Stage (Post Construction Monitoring)**						
16	Air	Ambient Air Quality at 4 locations near sensitive receptors	No.	7000/-	24 hourly sample, one time monitoring (Post Construction)	28000	
17	Noise	Noise Levels at 4 locations near sensitive receptors	No.	3000/-	One time monitoring (Post Evaluation) 4 Samples	12000	
Total Budget						**2409000**	

9.12. FORMATS FOR REPORTING

Formats for reporting/monitoring the progress/parameters achieved will be finalized by PIU/ TAQAC in consultation with the successful bidder .

9.13. ENVIRONMENTAL COMPLIANCE REPORT

The contractor shall submit a monthly progress report as per the reporting format approved by the PIU on the status of the implementation of the EMP. Environmental Compliance report will systematically contain copy of regulatory permissions/consents/clearance, geo referenced photographs with date and time for EMP/mitigation measures implementation, environmental monitoring report, accidents report, etc. .

ANNEXURE I: Environment and Social Screening Report (Data Sheets)

Part A: General Information

1. Name of the sub-project	Improvement & up-gradation of Bijbehara-Waghama Road via Kitriteng in District Anantnag, Kashmir	
2. Type of proposed activity (tick the applicable option and provide details)		
▪ Road	√	
▪ Bridge		
▪ Fire Station		
▪ Hospital/Health Facility		
▪ Educational Institute		
▪ Building for Livelihoods		-
▪ Flood Infrastructure Related		-
▪ Other Public Building		-.
▪ Any Other (Please Specify)		-
3. Location of the proposed sub-project		
▪ Name of the Region	Kashmir (J&K State)	
▪ Name of the District	Anantnag	
▪ Name of the Block	Anantnag	
▪ Name of the Settlement	Bijbehara, Kitriteng, Hayar, Waghama, Hassain Pora Tavela	
▪ Latitude	Start of the Road = 33°47'59.62"N End of the Road = 33°50'05.10"N	
▪ Longitude	Start of the Road = 75° 5'39.97"E End of the Road = 75° 07'21.35"E	

4a. Proposed Nature of Work (tick the applicable options)	
▪ Minor Repairs	-
▪ Major Repairs/Rehabilitation	-
▪ Upgrading/Major Improvement	√
▪ Expansion of the facility	-
▪ New Construction	-
▪ Any Other	-

4b. Size of the sub-project (approx. area in sq. mt/hac or length in mt/km, as relevant)	7.343 Km (Main Road) & 1.053 Km (Link Road)
5. Land Requirement (in hac./sq.mt.)	
▪ Total Requirement	The subproject is strengthening of the existing road. Hence no land acquisition is envisaged
▪ Private Land	Nil
▪ Govt. Land	Nil
▪ Forest Land	Nil
6. Implementing Agency Details (sub-project level)	
▪ Name of the Department/Agency	PIU
▪ Name of the contact person	Mr. Musthasin Masoodi
▪ Designation	Executive Engineer
▪ Contact Number	+91-9622461409
▪ E-mail Id	musthasinmasoodi@gmail.com
7. Screening Exercise Details	
▪ Date on which it was carried out	16.09.2019
▪ Name of the Person	Mr. Akhter R. Bhat
▪ Contact Number	+91-9419552221; 7006543364
▪ E-mail Id	akhter.bhat3@gmail.com

Part B (1): Environment Screening

Question	Yes	No	Details
1. **Is the sub-project located in whole or part within 1 km of the following environmentally sensitive areas?**			
a. Biosphere Reserve		No	
b. National Park		No	
c. Wildlife/Bird Sanctuary		No	
d. Wildlife/Bird Reserve		No	
e. Important Bird Areas (IBAs)		No	
f. Habitat of migratory birds (outside protected areas)		No	

g. Breeding/Foraging/Migratory route of Wild Animals (outside protected areas)		No	
h. Area with threatened/rare/ endangered fauna (outside protected areas)		No	
i. Area with threatened/rare/ endangered flora (outside protected areas)		No	
j. Reserved/Protected Forest		No	
k. Other categories of Forest		No	
l. Wetland		No	
m. Natural Lakes		No	
n. Rivers/Streams	Yes		Jhelum River and one Nallah is crossing the road
Question	**Yes**	**No**	**Details**
o. Swamps/Mudflats		No	
p. Zoological Park		No	
q. Botanical Garden		No	
4. Is the sub-project located in whole or part within 500 mts. of any of the following sensitive features?			
a. World Heritage Sites		No	
b. Archaeological monuments/ sites (under ASI's central/state list)		No	
c. Historic Places/Monuments/ Buildings/Other Assets (not listed under ASI list but considered locally important or carry a sentimental value)		No	
d. Religious Places (regionally or locally important)	Yes		5 Mosques exist along the road corridor at an average distance of 08 meters
e. Reservoirs/Dams		No	
f. Canals		No	

g. Public Water Supply Areas from Rivers/Surface Water Bodies/ Ground Water Sources		No	
4. What is the High Flood Level in the sub-project area?	NA		
5. Is any scheduled/protected tree-like Chinar, Mulberry or Deodar likely to be affected/ cut due to the project?		No	All efforts shall be made to avoid unnecessary cutting of the trees. Necessary approval/Permission will be obtained from the concerned department if tree felling involved.
6. Is the sub-project located in a landslide/heavy erosion-prone area or affected by such a problem?		No	
7. Is sub-project located in an area that faces water paucity or water quality issues?		No	

Part B (2): Result/Outcome of Environmental Screening Exercise

Part B (2): Result/Outcome of Environmental Screening Exercise		
1.	Environment Impact Assessment Required	No
2.	Environment Clearance Required	No
3.	Forest land Clearance/Diversion Required	No
4.	Tree Cutting Permission Required	No
5.	ASI (Centre/State) Permission Required	No
6.	Permission from ULB/Local Body/ Department Required	No -
7	Any other clearance/permission required	Consent to Establish (CTE) and Consent to Operate (CTO) from J&K SPCB will be required for Hot mix Plants, Wet Mix Plants, Stone Crushers, PUC's and other fitness certificates of equipment, etc.

Part C (1): Social Screening

1. Does the sub-project activity require the acquisition of land?			
Yes		No	✓
Give the following details:	Private Land (sqmts/hac.)		Nil

	Govt. Land (sqmts/hac.)	Nil
	Forest Land (sqmts/hac.)	Nil

2. Does the proposed sub-project activity result in demolition/removal of existing structures?			
Yes		No	✓
If so, give the following details:			
Number of public structures/buildings		Nil	
Number of common property resources (such as religious/cultural/drinking water/wells/etc.)		Nil	
Number of private structures (located on private or public land)		Nil	
3. Does the proposed project activity result in loss of crops/trees?			
Yes		No	✓
4. Does the proposed project activity result in loss of direct livelihood/employment?			
Yes		No	✓
5. Does the proposed activity result in loss of community forest/pastures on which nearby residents/local population are dependent?			
Yes		No	✓
If yes, give the details of the extent of area to be lost (in acres/hac)			
6. Does the proposed project activity affect scheduled tribe/caste communities?			
Yes		No	✓

Part C (2): Result/Outcome of Social Screening Exercise

S. No	Result/Outcome	Outcome
1	Answer to all the questions is 'No' and only forest land is being acquired	No SIA/RAP required
2	Answer to any question is 'Yes' and the sub-project does not affect more than 200 people (i.e. either complete or partial loss of assets and/or livelihood)	No RAP is required
3	Answer to any question is 'Yes' and the sub-project affects more than 200 people (i.e. either complete or partial loss of assets and/or livelihood)	No SIA/RAP required

Outcome of Social Screening:

As per the screening exercise, the proposed sub project does not have significant environmental and social issues. The proposed sub-project is the "Improvement & Up-gradation of the existing road which is under the R&B and does not involve land acquisition of private or government land.

No EIA and SIA required for the proposed subproject. However, Environmental Assessment Report and EMP will be prepared and implemented to address the environmental and social issues during the execution of the sub project.

Statutory Clearances/ No Objection Certificate

The subproject is "Improvement and Up-gradation of Bijbehara-Waghama road via Kitriteng" of existing road, which is operational and being maintained by R&B Department. Tree cutting permission, if any and Statutory clearances and NOC's/ permission for establishment or operation of hot mix, batch mix, crusher, generators, vehicles, material etc shall be required to be obtained by the Contractor prior to the start of work.

Environmental and Social Screening Checklist

Part-A: General Information

1. Name of the sub-project	Improvement & Up-gradation of Sangam-Khudwani Road in Anantnag district of Kashmir	
2. Type of proposed activity (tick the applicable option and provide details)		
▪ Road	√	
▪ Bridge		
▪ Fire Station		
▪ Hospital/Health Facility		
▪ Educational Institute		
▪ Building for Livelihoods		-
▪ Flood Infrastructure Related		-
▪ Other Public Building		-.
▪ Any Other (Please Specify)		-
3. Location of the proposed sub-project		
▪ Name of the Region	Kashmir (J&K State)	
▪ Name of the District	Anantnag	
▪ Name of the Block	Anantnag	
▪ Name of the Settlement	Sangam, Hassan Pora Tavela, Arwani, Wanpoh, Qaimoh	
▪ Latitude	Start of the Road = 33°48'58.05"N , End of the Road = 33°43'27.04"N	
▪ Longitude	Start of the Road = 75° 4'40.72"E, End of the Road = 75° 5'22.88"E	
4a. Proposed Nature of Work (tick the applicable options)		
▪ Minor Repairs	-	
▪ Major Repairs/Rehabilitation	-	
▪ Upgrading/Major Improvement	√	
▪ Expansion of the facility	-	
▪ New Construction	-	
▪ Any Other	-	
4b. Size of the sub-project (approx. area in sq. mt/hac or length in mt/km, as relevant)	4.793 Km	
5. Land Requirement (in hac./sq.mt.)		
▪ Total Requirement	The subproject is strengthening of the existing road. Hence no land acquisition is envisaged	

▪ Private Land	Nil
▪ Govt. Land	Nil
▪ Forest Land	Nil
6. Implementing Agency Details (sub-project level)	
▪ Name of the Department/Agency	PIU
▪ Name of the contact person	Mr. Musthasin Masoodi
▪ Designation	Executive Engineer
▪ Contact Number	+91-9622461409
▪ E-mail Id	musthasinmasoodi@gmail.com
7. Screening Exercise Details	
▪ Date on which it was carried out	16.09.2019
▪ Name of the Person	Mr. Akhter Bhat
▪ Contact Number	+91-9419552221; 7006543364
▪ E-mail Id	akhter.bhat3@gmail.com

Part-B (1): Environmental Screening

Question	Yes	No	Details
2. Is the sub-project located in whole or part within 1 km of the following environmentally sensitive areas?			
a. Biosphere Reserve		No	
b. National Park		No	
c. Wildlife/Bird Sanctuary		No	
d. Wildlife/Bird Reserve		No	
e. Important Bird Areas (IBAs)		No	
f. Habitat of migratory birds (outside protected areas)		No	
g. Breeding/Foraging/Migratory route of Wild Animals (outside protected areas)		No	
h. Area with threatened/rare/ endangered fauna (outside protected areas)		No	
i. Area with threatened/rare/ endangered flora (outside protected areas)		No	

j. Reserved/Protected Forest		No	
k. Other categories of Forest		No	
l. Wetland		No	
m. Natural Lakes		No	
n. Rivers/ Streams	Yes		River Jhelum and Vishaw Nallah, is within 1 Km of proposed road
Question	**Yes**	**No**	**Details**
o. Swamps/Mudflats		No	
p. Zoological Park		No	
q. Botanical Garden		No	
4. Is the sub-project located in whole or part within 500 mts. of any of the following sensitive features?			
a. World Heritage Sites		No	
b. Archaeological monuments/ sites (under ASI's central/state list)		No	
c. Historic Places/Monuments/ Buildings/Other Assets (not listed under ASI list but considered locally important or carry a sentimental value)		No	
d. Religious Places (regionally or locally important)	Yes		2 Mosques exist along the road corridor at distance of meters 8 m and 120 m
e. Reservoirs/Dams		No	
f. Canals	Yes		Small Irrigation Canals are coming within the 500 mts of project road.
g. Public Water Supply Areas from Rivers/Surface Water Bodies/Ground Water Sources		No	
4. What is the High Flood Level in the sub-project area?	HFL – 5-7 ft Year - 2014		

5. Is any scheduled/protected tree-like Chinar, Mulberry or Deodar likely to be affected/ cut due to the project?		No	All efforts shall be made to avoid unnecessary cutting of the trees. Necessary approval/Permission will be obtained from the concerned department if tree felling is involved.
6. Is the sub-project located in a landslide/heavy erosion-prone area or affected by such a problem?		No	
7. Is sub-project located in an area that faces water paucity or water quality issues?		No	

Part B (2): Result/Outcome of Environmental Screening Exercise		
1	Environment Impact Assessment Required	No
2	Environment Clearance Required	No
3	Forest land Clearance/Diversion Required	No
4	Tree Cutting Permission Required	No
5	ASI (Centre/State) Permission Required	No
6	Permission from ULB/Local Body/Department Required	No -
7	Any other clearance/permission required	Consent to Establish (CTE) and Consent to Operate (CTO) from J&K SPCB will be required for Hot mix Plants, Wet Mix Plants, Stone Crushers, PUC's and other fitness certificates of equipment, etc.

Part C (1): Social Screening

7. Does the sub-project activity require the acquisition of land?			
Yes		No	✓
Give the following details:	Private Land (sqmts/hac.)		Nil
	Govt. Land (sqmts/hac.)		Nil
	Forest Land (sqmts/hac.)		Nil
8. Does the proposed sub-project activity result in demolition/removal of existing structures?			
Yes		No	✓
If so, give the following details:			
Number of public structures/buildings		Nil	
Number of common property resources (such as religious/cultural/drinking water/wells/etc.)		Nil	

Number of private structures (located on private or public land)		Nil	
9. Does the proposed project activity result in loss of crops/trees?			
Yes		No	✓
10. Does the proposed project activity result in loss of direct livelihood/employment?			
Yes		No	✓
11. Does the proposed activity result in loss of community forest/pastures on which nearby residents/local population are dependent?			
Yes		No	✓
If yes, give the details of the extent of area to be lost (in acres/hac)			
12. Does the proposed project activity affect scheduled tribe/caste communities?			
Yes		No	✓

Part C (2): Result/Outcome of Social Screening Exercise

S. No	Result/Outcome	Outcome
1	Answer to all the questions is 'No' and only forest land is being acquired	No SIA/RAP required
2	Answer to any question is 'Yes' and the sub-project does not affect more than 200 people (i.e. either complete or partial loss of assets and/or livelihood)	No RAP is required
3	Answer to any question is 'Yes' and the sub-project affects more than 200 people (i.e. either complete or partial loss of assets and/or livelihood)	No SIA/RAP required

Outcome of Screening:

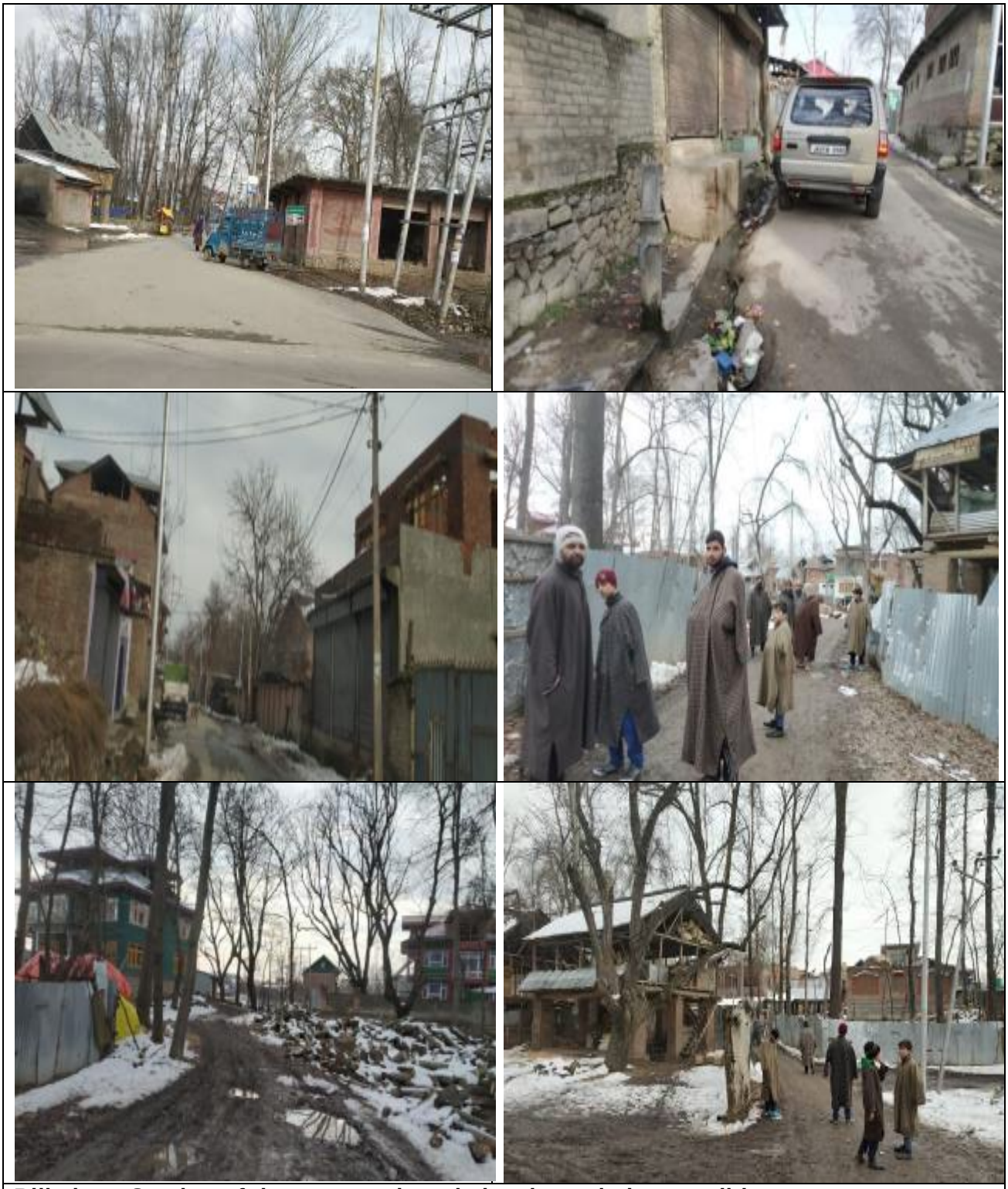
As per the screening exercise, the proposed sub project does not have significant environmental and social issues. The proposed sub-project is the "Improvement & Up-gradation of the existing road which is being maintained by R&B department and does not involve land acquisition of private or government land.

No EIA and SIA required for the proposed subproject. However, Environmental Assessment Report and ESMP will be prepared and implemented to address the environmental and social issues during the execution of the sub project.

Statutory Clearances/ No Objection Certificate

The subproject is "Improvement and Up-gradation of Sangam Khudwani" existing road, which is operational and being maintained by R&B Department. Tree cutting permission, if any and Statutory clearances and NOC's/ permission for establishment or operation of hot mix, batch mix, crusher, generators, vehicles, material etc shall be required to be obtained by the Contractor prior to the start of work.

ANNEXURE-2: Photographs showing Existing Road Condition of Bijbehara-Waghama Road via Kitriteng and Sangam-Khudwani Road



Bijbehara Section of the proposed road showing existing condition




Measuring of distance from Chinar Tree to road central alignment/ checking of available RoW at Kitriteng link road and Waghama section.


Under construction bridge being constructed by JKPCC at Ch 1+050


Bijbehara-Waghama road near Gund Nowroze towards Waghamaa.


Kitriteng Spring (above) is located along the road on RHS at Kitriteng.






Chinar & Walnut Trees (Scheduled trees) located along the project corridor (Bijbehara and Kitriteng areas).



Indigenous species of Poplar and Willow trees are growing close to the road alignment at Kitriteng & Waghama side.




2 Hand Pumps and Surface Water Bodies are River Jhelum, Nallah (Kitrteng) and small irrigation channels are located within the Project Influence Area (PIA)



Schools and Religious places located along the project road

Sangam Khudwani Road

Site photos of Sangam-Khudwani Road showing existing road features which is in highly dilipidated condition**.** School and religious places are also exists along the road. A bus bay as evident in the above picture is in degraded state.

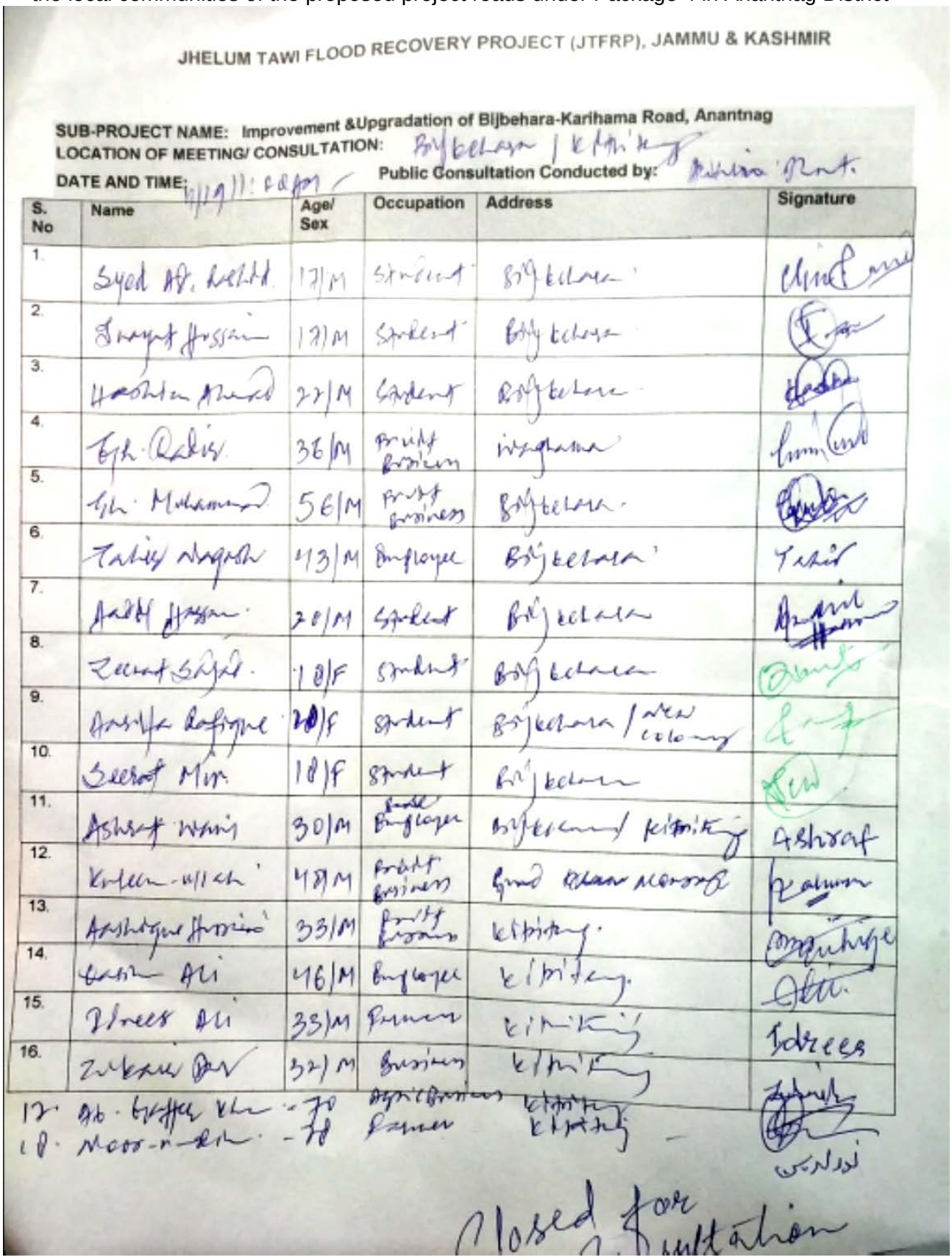
ANNEXURE III: Public Consultation Photos of the Project Road.








ANNEXURE IV: List of consulted participants and their signatures during consultation with the local communities of the proposed project roads under Package 4 in Anantnag District



JHELUM TAWI FLOOD RECOVERY PROJECT (JTFRP), JAMMU & KASHMIR

SUB-PROJECT NAME: Improvement &Upgradation of Bijbehara-Karihama Road, Anantnag
LOCATION OF MEETING/ CONSULTATION: Bijbehara / Kirihama
DATE AND TIME: 9/12/11: 2 pm
Public Consultation Conducted by:

S. No	Name	Age/ Sex	Occupation	Address	Signature
1.	Syed Ab. Rashid	17/M	Student	Bijbehara	
2.	Inayat Hussain	17/M	Student	Bijbehara	
3.	Hashim Ahmad	22/M	Student	Bijbehara	
4.	Gh. Rabi	36/M	Private Business	Irrigation	
5.	Gh. Mohammad	56/M	Private Business	Bijbehara	
6.	Tahir Nazir	43/M	Employee	Bijbehara	Tahir
7.	Aabid Hassan	20/M	Student	Bijbehara	
8.	Zeenat Sajad	18/F	Student	Bijbehara	
9.	Aasifa Rafiq	20/F	Student	Bijbehara / New colony	
10.	Seerat Min	18/F	Student	Bijbehara	
11.	Ashraf Wani	30/M	Govt Employee	Bijbehara / Kirihama	Ashraf
12.	Kulam-ul-Hasan	47/M	Private Business	Govt Degree College	
13.	Ayshatyar Hussain	33/M	Private Business	Kirihama	
14.	Nasir Ali	46/M	Employee	Kirihama	
15.	Idrees Ali	35/M	Farmer	Kirihama	Idrees
16.	Zubair Dar	32/M	Business	Kirihama	
17.	Gh. Hyder Khan	70	Agriculture	Kirihama	
18.	Noor-u-din	78	Farmer	Kirihama	

Closed for consultation

Jhelum & Tawi Flood Recovery Project

Name of the Sub Project: Sangam Khudwani Road (4.793 Km)

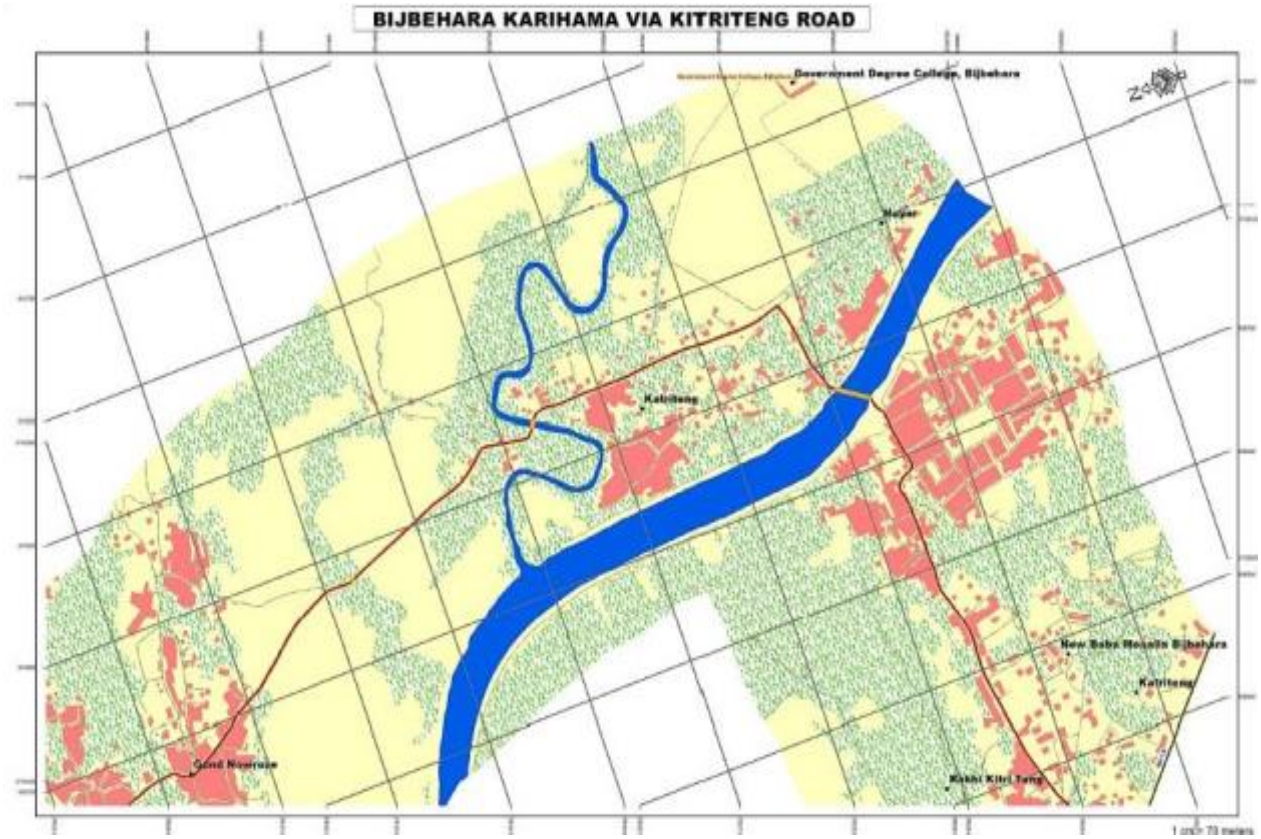
Location: Sangam village / Arwani village / Wanpoh.

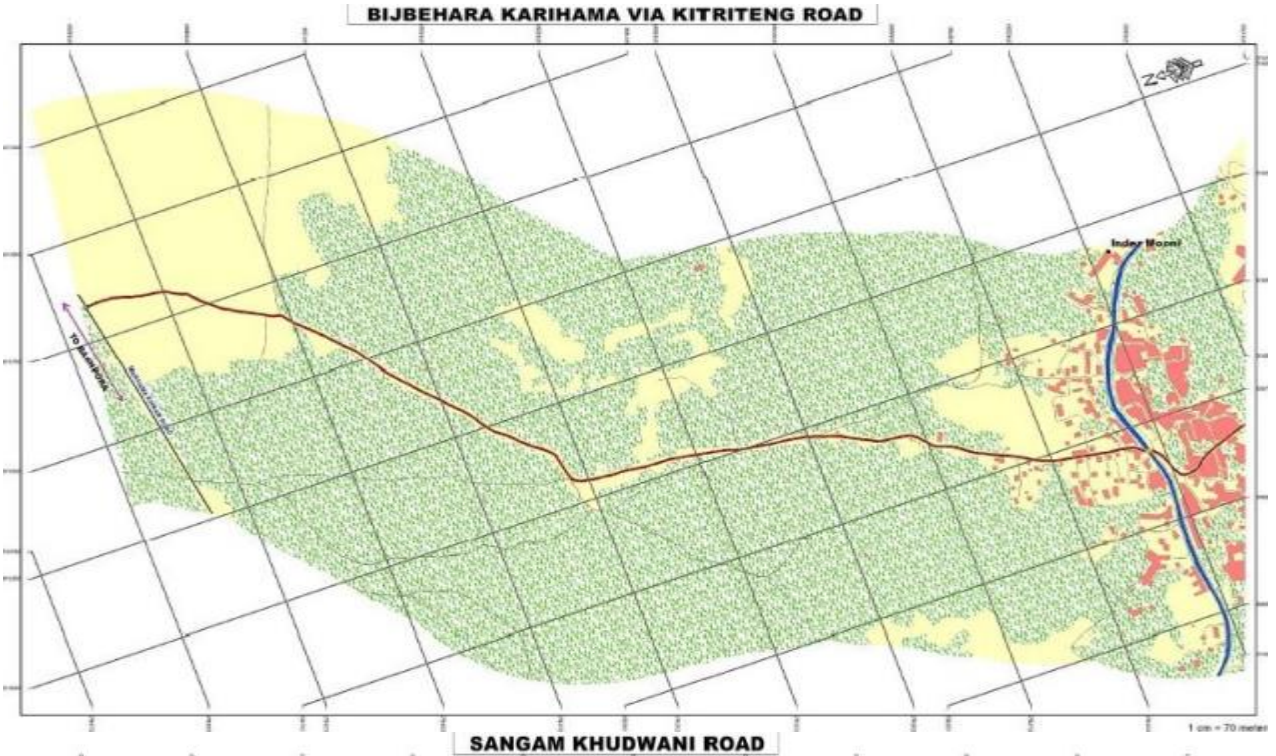
Time: 12:00 noon

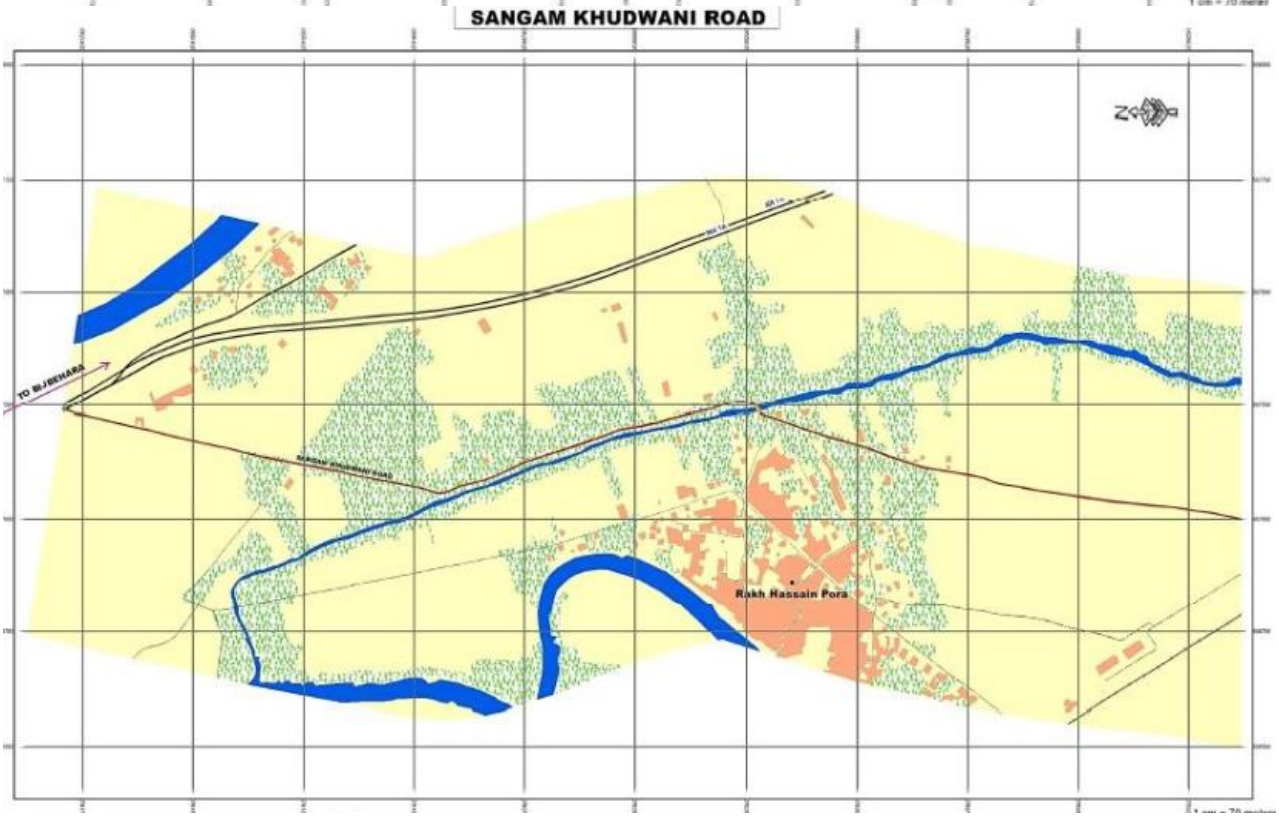
S.No	Name	Address	Occupation	Signature
1	Mr. Javaid Ahmad	Sangam	Student	
2	Mr. Noor Mohd	Sangam	Farmer	—
3	Mr. Gh. Qadir	Arwani	Govt. Employee	
4	Mr. Riyaz Ahd.	Wanpoh	Business	
5	Mr. Ab. Karim	Rajmal	Farmer	—
6	Mr. Rouf Ahmad	Arwani	Student	
7	Ms. Rugaya	Arwani	Student	
8	Ms. Shameema	Sangam	Home wife	—
9	Mr. Mudasir	Wanpoh	Labour	—
10	Ms. Shahzada	Wanpoh	Home wife	—
11	Ms. Ulfat	Sangam	Student	ULFAT JAN
12	Ms. Sonober	Sangam	Student	
13	Ms. Dilshada	Arwani	Home wife	—

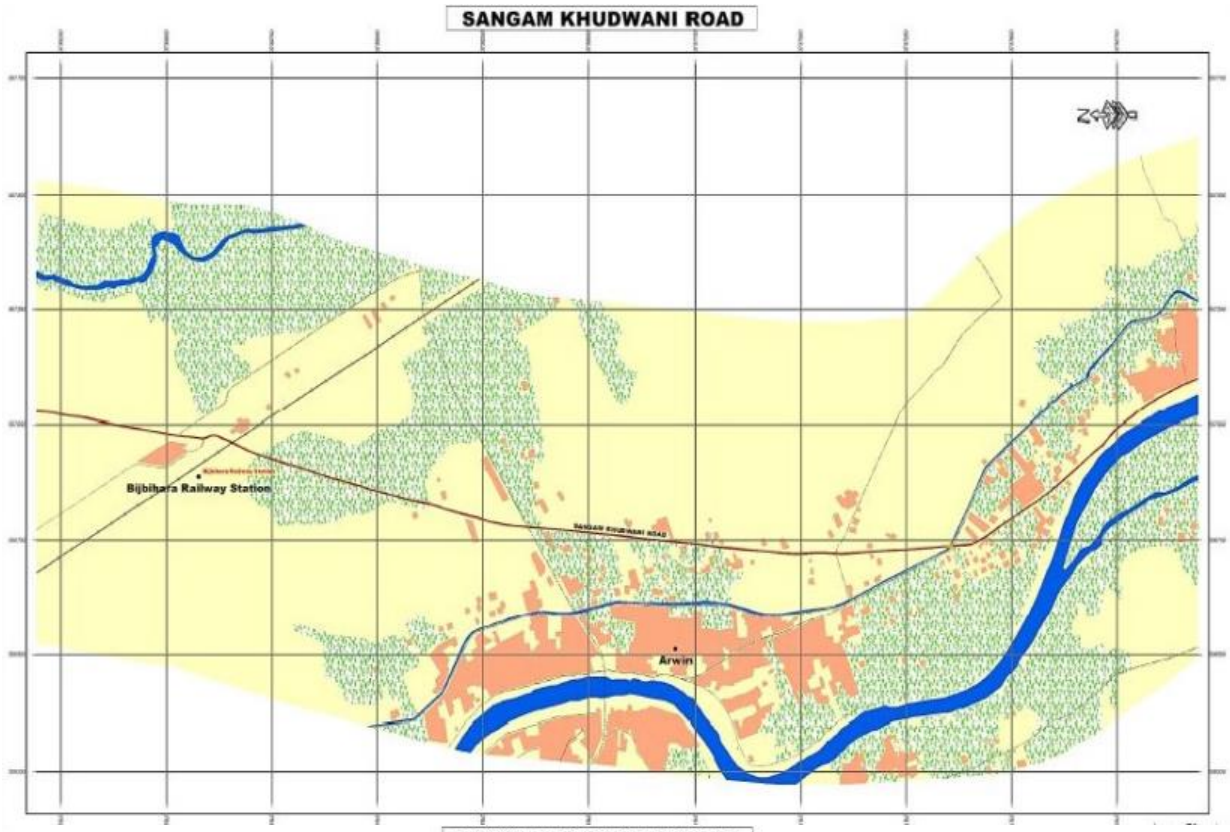
ANNEXURE-V: GIS/LULC Maps of Road Package-4

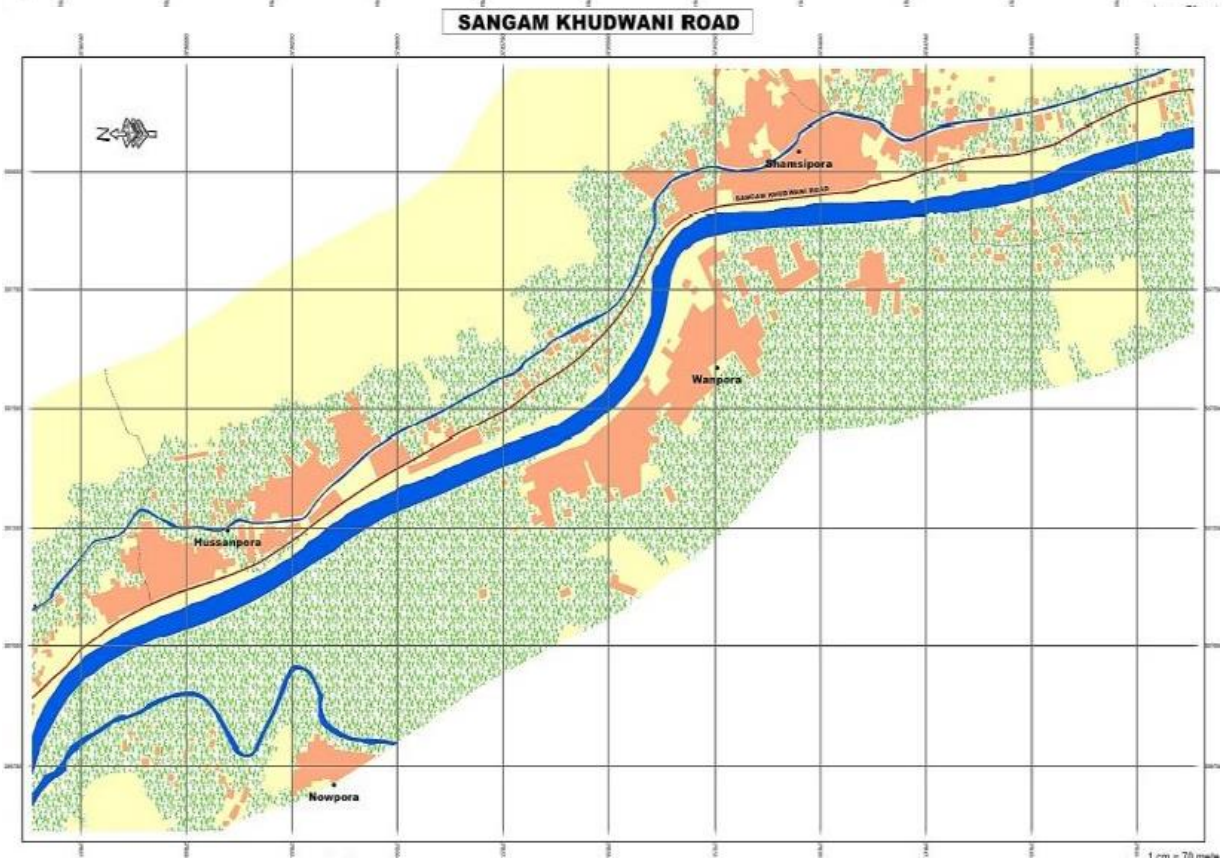
A. Bijbehara-Waghama Road via Kitriteng in District Anantnag

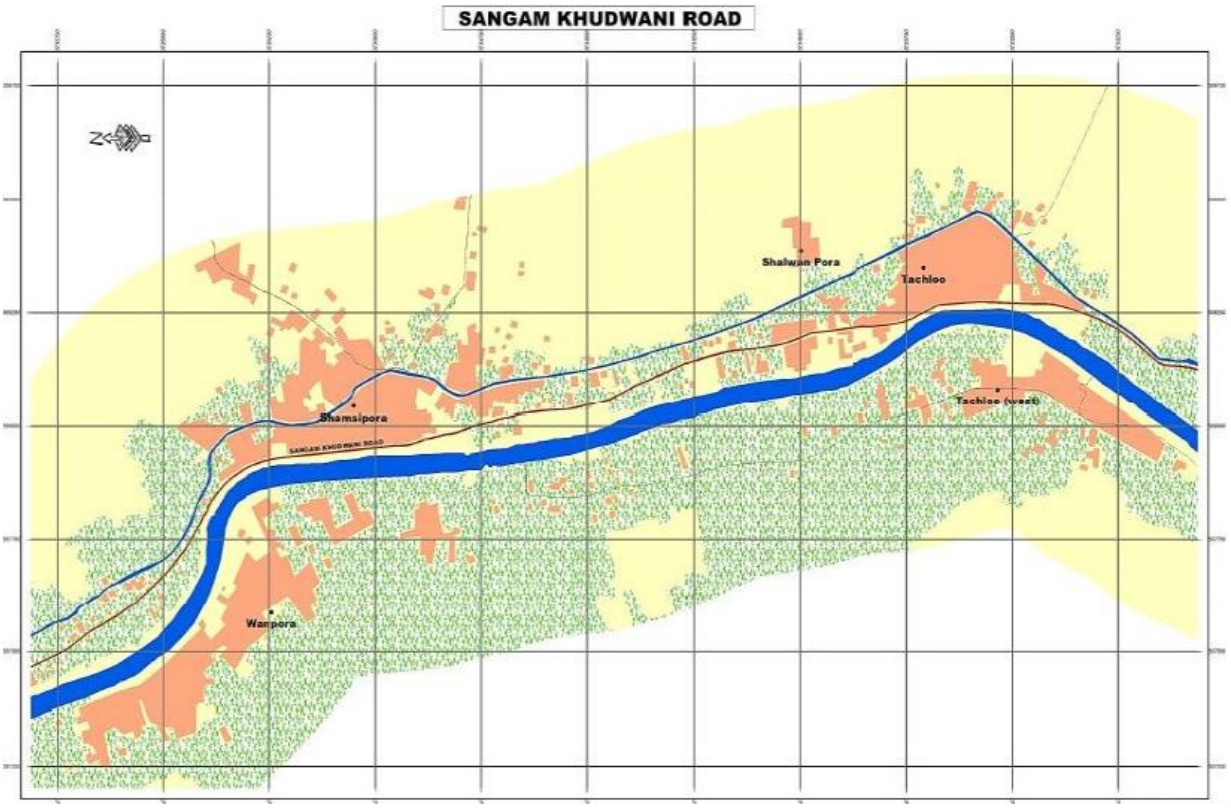


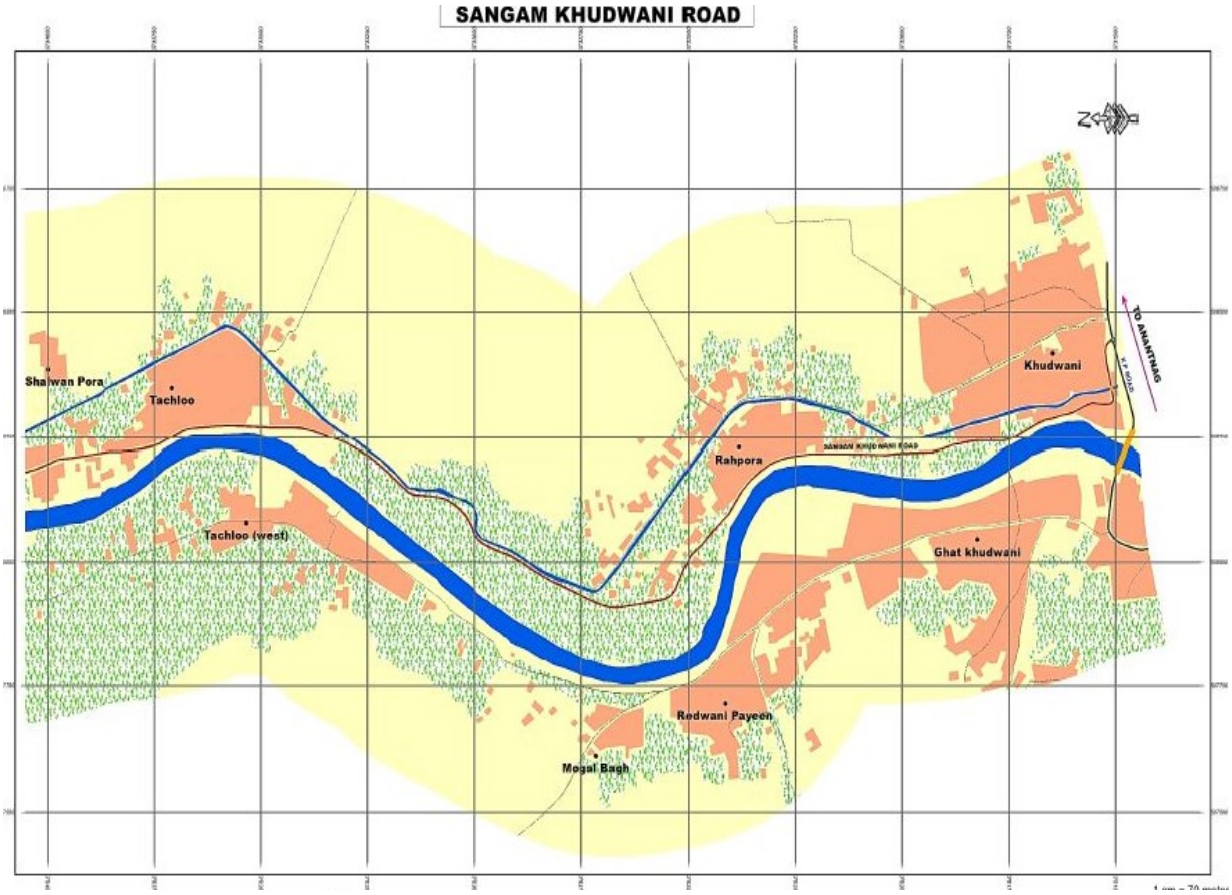

BIJBEHARA KARIHAMA VIA KITRITENG ROAD
Inder Momi
TO BIJBEHARA


SANGAM KHUDWANI ROAD
TO BIJBEHARA
Rakh Hassain Pora


SANGAM KHUDWANI ROAD
Bijbihara Railway Station
Arwin


SANGAM KHUDWANI ROAD
Shamsipora
Wanpora
Hussanpora
Nowpora


SANGAM KHUDWANI ROAD
Shalwan Pora
Tachloo
Shamaipora
Tachloo (west)
Wanpora


SANGAM KHUDWANI ROAD
Shalwan Pora
Tachloo
Tachloo (west)
Rahpora
Khudwani
TO ANANTNAG
Ghat khudwani
Redwani Payeen
Mogal Bagh

Annexure VI: Guidelines For Siting, Management And Redevelopment Of Labour Camp

A. Overview

Labour camp include accommodation for workers/labourers along with other basic amenities such as kitchen, potable water supply, sanitation (toilets, bathrooms, washing areas and water supply for such needs), first aid room as well as garbage collection and disposal facility. The guidelines outlined here aims to facilitate the contractor in implementing the measures in the EMP there by reducing the impact on the environment.

B. Criteria for Locating the Site

To the extent possible, fertile lands shall be avoided for locating camp site.

C. Finalization of Selected Site

After identification of the site, the Contractor should fill up the prescribed reporting format provided in EMP as annexure and submit the same for approval to the Environmental Expert of PIU. The selected site shall be approved by Environmental Expert of PIU, after considering the compliance. No agreements or payments shall be made to the land owner/s prior to receipt of a written approval from the Environmental Expert of PIU. Any consequence of rejection prior to the approval shall be the responsibility of the Contractor and shall be restored at his own cost. After obtaining a written approval from the Environmental Expert of PIU for the selected site, the Contractor has to enter into an agreement with the landowner to obtain his/her consent before commencing any operation/activities in the land. The agreement should also mention its type, duration, amount and mode of payment as well as the preferences of the owner regarding site maintenance and redevelopment.

D. Designing And Setting Up of Labour Camp

The following facilities should be provided in a labour camp to ensure safe, clean and hygienic accommodation for the workers.

(i) **Site preparation**: The site should be graded and rendered free from depressions such that the water does not get stagnant anywhere. Fencing should be constructed all around the camp to prevent the trespassing of humans and animals. The approved layout plan should be strictly adhered to while setting up the camp.

(ii) **Accommodation**: Contractor will follow all relevant provisions of the Building and the other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 for construction and maintenance of labour camp. The height of the worker's and labour accommodation shall not be less than 3m from floor level to the lowest part of the roof. The camp shall be floored with concrete, shall be kept clean, with proper cross ventilation, and the space provided shall be on the basis of one sqm per head or as per the relevant regulation, whichever is higher. Fire and electrical safety pre-cautions shall be adhered to. Cooking, sanitation and washing areas shall be provided separately. The contractor will maintain necessary living accommodation and ancillary facilities (including provision of clean fuel to prevent damage to forests and to prevent fuel wood cutting and burning by labour) in functional and hygienic manner. The site must be graded and rendered free from depressions such that water does not get stagnant

anywhere. The entire boundary of the site should be fenced all around with barbed wire so as to prevent the trespassing of humans and animals.

(iii) **Drinking Water**: The Contractor should provide potable water within the precincts of every workplace in a cool and shaded area, which is easily accessible as per standards set by the Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996. All potable water storage facilities will be on a safely raised platform that is at least 1m above the surrounding ground level. Such facilities shall be regularly maintained from health and hygiene point of view. If necessary, water purifier unit shall be installed for providing potable water.

(iv) **Sanitation Facilities**: Adequate nos. of toilets shall be provided separately for males and females (depending on their strength), with markings for identification in vernacular language. All such facilities must have adequate water supply with proper drainage and disposal facility. They shall be maintained, cleaned and disinfected daily using proper disinfectants. Location and design of soak pit should be in such a way that it doesn't pollute the ground water. Drains and ditches should be treated with bleaching powder on a regular basis. The sewage system for the camp must be properly designed, built and operated so that no health hazard occurs and no pollution to the air, ground or adjacent watercourses takes place.

Portable toilets may be brought to use at construction site and the night soil from such units has to be disposed through designated septic tanks so as to prevent pollution of the surrounding areas. In the main camp, no night soil or sewerage shall be disposed of at any place other than the septic tanks constructed at the site. All these facilities shall be inspected on a weekly basis to check the hygiene standards.

(v) **Waste Disposal**: The Contractor should provide garbage bins in the camp and ensure that these are regularly emptied and disposed off in a hygienic manner. No incineration or burning of wastes shall be carried out by the Contractor. Separate bins shall be provided for biodegradable and non-biodegradable wastes. The disposal of kitchen waste and other biodegradable matter shall be carried out in pits covered with a layer of earth within the camp site. Discarded plastic bags, paper and paper products, bottles, packaging material, gunny bags, hessian, metal containers, strips and scraps of metal, PVC pipe scrubber and poly urethane foam, auto mobile spares, tubes, tires, belts, filters, waste oil, drums and other such materials shall be either reused or sold /given out for recycling.

(vi) **Day Crèche Facility**: At construction site, provision of a day crèche shall be made so as to enable women to leave behind their children while going to work. At least one attendant shall be provided to take care of the children at the crèche. At construction site where 20 or more women are employed, there shall be at least one shelter for use of children under the age of 6 years belonging to such women.

Shelters shall not be constructed to a standard lower than that of thatched roof, mud walls and floor with wooden planks spread over mud floor and covered with matting. Such areas shall be safely barricaded (no sharp sheets or barbed wires that may injure a child) from rest of the camp for the safety of children. Shelters shall be provided with suitable and sufficient openings for light and ventilation. There shall be adequate provision to keep the place clean. The size of a crèche may vary according to the number of children on a camp site.

(vii) Mess and Kitchen Facilities: The Contractor shall adhere to the sanitary/hygiene requirements of local medical, health and municipal authorities at all times. Adoption of such precautions as may be necessary to prevent soil and water pollution at the site while operating mess or kitchen facilities.

(viii) First Aid Facilities: At every workplace, a readily available first-aid unit including an adequate supply of sterilized dressing materials and appliances should be provided. Suitable transport should be provided to facilitate taking injured and ill persons to the nearest hospital. Adequate personal protective equipments and fire fighting equipments as detailed out in EMP should be made available in the camp and provided to the staff / workers.

(ix) Health Care Facilities: Health problems of the workers should be taken care of by providing basic health care facilities. If there is no hospital or clinic, which can be accessed in half an hour's time, then a temporary health center should be set up for the construction camp. The health centre should have at least a doctor and a nurse, duty staff, medicines and minimum medical facilities to tackle first aid requirements or minor accidental cases, linkage with nearest higher order hospital to refer patients of major illnesses or critical cases.

The health centre should carryout quarterly awareness programme of HIV – AIDS with the help of AIDS control society as well as about community living and hygiene practices in day to day living. Posters should be exhibited in the health care clinic.

E. Operation of Labour Camp

Throughout the functioning period of the camp, hygienic environment must be ensured by (i) provision of safe drinking water, (ii) proper maintenance of toilets including daily cleaning and disinfection using proper disinfectants, (iii) regular cleaning of drains by removing the silt and solid waste, (if any) and (iv) appropriate waste management practices. While it is of utmost importance to ensure that fire-fighting equipments like fire extinguishers are in working condition, it should also be monitored that construction workers use the personal protective equipments provided to them and they are replaced when necessary. All these facilities should be inspected on a weekly basis to achieve the desired levels of safety and hygiene standards.

F. Preparation of Labour Camp Management And Re-development Plan

After the site for the labour camp has been finalized and approved by Environmental Expert of PIU, the Contractor should prepare a labour camp management and redevelopment plan to be submitted to PIU for approval prior to setting up of the camp and it should comprise the following details:

Section–1: Details of site: Copy of approved site identification report along with location plan, showing the site, its survey no., access road, project stretch, distance form the project stretch, surrounding features and land use like residences, water bodies etc., photograph of the site showing the topography and other existing features.

Section-2: Site preparation: Activities that should be undertaken for preparing the site based on EMP and this guideline.

Section-3: Arrangements/ facilities within the camp: List of facilities to be provided along with its details like area, no of people to be accommodated and a

layout plan showing the plan of the site with all the facilities planned like quarters, labour camp, mess, common facilities, toilet facilities, etc.

Section-4: Mitigation measures that should be undertaken as per the EMP and this guideline while setting up of the camp and operation of the camp should be separately listed out here.

Sectoin-5: Other details: Any other relevant detail like list of awareness camp to be provided to workers, details of information dissemination etc. should be included.

Section 6: Re-development plan, which should indicate following points: (i) List of structures to be demolished and list of the clean-up activities that needs to be undertaken, (ii) Proposed use of the land in the post construction phase, if it is a public property, (iii) Presence of existing facilities that could be put in use by the land owner if it is a leased out private land or by the community in case of a public property.

Section-7: Annexure-(a) Working drawings: Electrical plan showing the electrical network planned for the site, location of generators, master switch boards etc. and plumbing drawing showing the network of water supply lines, water tank, drainage facilities etc. (b) Copy of permissions obtained from local governing body / community etc. as applicable, (c) Copy of agreement entered with site owner, in case of leased out site.

All the drawings should have north direction marked in it along with prevailing wind direction. Necessary dimensions and specifications should be provided where ever necessary. The labour camp management plan should be submitted to the Environmental Expert of PIU for a written approval before any physical work is undertaken on a particular site. The Environmental Expert of PIU will carefully examine the proposals in light of the various EMP and regulatory provisions and provide suggestions, as necessary to the Contractor who shall incorporate it in the management plan. Contractor shall be responsible for satisfactory and timely implementation of these EMP requirements.

G. Re-development of The Labour Camp

The Contractor should clear all temporary structures; dispose all building debris, garbage, night soils and any other waste as per the approved debris management plan. All disposal pits or trenches should be filled in, disinfected and effectively sealed off. Entire camp area should be left clean and tidy, in a manner keeping the adjacent lands neat and clear, at the Contractor's expense, to the entire satisfaction of landowner and the Environmental Expert of PIU.

These activities should be completed by the Contractor prior to demobilization. Once the Contractor finishes his job, he needs to obtain a certificate from the owner, stating that the site has been re-developed to his/her satisfaction and in tune with the agreement. Then following documents needs to be submitted to the Environmental Expert of PIU by the

- Copy of approved site identification report
- Photographs of the concerned site 'before' and 'after' setting up the camp.
- Certificate from the owner stating his/her satisfaction about status of re-development of the site.

Engineer-in-charge/Environmental Specialist of PIU shall ensure, through site verification that all clean-up and restoration operations are completed satisfactorily and a written

approval should be given to the Contractor mentioning the same before the 'works completion' certificate is issued/recommended. The PIU shall ensure through site inspection that the Contractor has restored the site properly & completely. The site can then be handed over to the concerned owner or local bodies or for local communities as the case may be. Certification/documentation pertaining to approval for clean-up and restoration operations and thereafter handing-over to the owner shall be properly maintained by the Contractor.

Annexure VII: Guidelines to Ensure Worker's Safety During Construction

In order to ensure worker's safety while undertaking various operations/stages of construction many safety measures needs to be followed, which are listed down below:

A. Labour Camp/ Site Office

- Install perimeter fencing.
- Ensure good visibility and safe access at site entrances.
- Provide adequate warning signs at the entrance and exit, as necessary.
- Provide adequate space/area for loading and unloading, storage of materials, equipment and machineries.
- Display emergency procedure and statutory notices at conspicuous locations.
- Provide areas for collecting garbage and other waste material, and also arrange for their regular/periodic disposal.
- Arrange appropriate storage, transportation and use of fuel, other flammable materials and explosives in line with the license requirements obtained from concerned authorities.
- Provide defined access roads and movement areas within the site.
- Ensure availability of first aid facilities and display notices at various work places showing the location of first aid facilities and emergency contact numbers. Provide and enforce use of PPE at construction sites.

B. House Keeping Practices

- Provide proper slope in kitchen, canteens, washrooms, toilets and bathrooms for easy and immediate draining of water.
- Keep all walkways and circulation areas clear and unobstructed at all times.
- Ensure that spillages of oil and grease are avoided and in case of accidental spills, these are immediately collected.
- Use metal bins for collection of oily and greasy rags.
- Do not leave tools on the floor or in any location where they can be easily dislodged.
- Keep windows and light fittings clean.
- Maintain the workplace floors dry and in a non-slippery condition
- Provide and maintain proper drainage system to prevent water logging and unhygienic conditions.
- Ensure that protruding nails in boards or walls are moved or bent over or removed so that they do not constitute a hazard to people.
- Store all flammable materials like HSD in appropriate container with proper cover and labels – as required for various products.
- Display 'no smoking' signs in areas with high risks of fire, (*eg.* near fuelling areas, diesel/oils/lubricant/paint storage area, hessians, rubber, wood and plastic etc.) in and around working area.

C. Safety During Excavation

- During excavation of foundations, necessary safety measures will be taken by the contractor.
- Excavation of 1.5 meters deep or greater require a sides protection unless the excavation is made entirely in stable rock
- Safe access and egress will be require including ladders, steps, ramps, or other safe means of exit of workers in excavated depth of 4 feet (1.22 meters) or deeper
- Excavated earth will be collected and disposed in pre-identified site with the approval of PIU.
- To ensure elimination of excavation hazards, excavation will be carried in the presence of competent person.
- Suitable barricading will be provided

D. Handling of Cement Bags

- Cement bags will be stored and emptied in covered area to control fugitive dust emissions.
- While handling and empting cement bags, workers will wear mask and goggle and hand gloves.
- Manual transferring of cement bags from one place to another place will not be allowed. For this purpose, trolley will be used.

E. Steel Bars Reinforcement for Foundation and Roof

- Manual cutting of steel bars for reinforcement will be discouraged
- Only skilled workers will be deployed by the contractor for steel bar bending and rebaring reinforced structures.
- Correct hand and power tools will be used to tie and cut steel bars.
- Workers engaged in steel bar bending and reinforcement will be provided helmet, suitably strong and flexible leather gloves and safety shoes.
- Workers will take extra caution and attention when walking on steel bar mattes and areas that contain exposed steel bar.
- First aid facilities will be provided at the site to provide first aid incase of cuts or injuries to workers. After providing first aid, injured worker will be taken to hospital for further treatment.

F. Operation of Trucks And Dumpers

- Ensure that only trained, authorized and licensed drivers operate the vehicles.
- Enlist help of another worker before reversing the vehicle.
- Switch-off the engine when not in use to save fuel, prevent accidents and unnecessary noise and air pollution.
- Lower the tipping bodies when the machine is unattended, but if it is necessary to leave them in the raised position they should be blocked to prevent their fall by fixing a sturdy support below.

- Carryout periodic servicing as per the manufacturer's requirements. All records of maintenance and repairs should be in writing and available for verification.
- Keep the vehicle tidy and the cabin free from clumsy utilities, which might obstruct the controls and create hazards.
- Avoid carrying additional passengers in the cabin or on the body of the dumper, while in field operation other than the connected workers.
- Provide stop blocks when the vehicle is tipping into or running alongside excavations or when it is parked.
- Do not overload the vehicle.
- Carry only well secured loads and use proper covers and fasteners.

G. Manual Handling and Lifting

- Avoid manual handling of heavy materials.
- Pre-assess the actual requirement of manpower in case of emergency situations.
- All concerned persons shall be trained in proper methods of lifting and carrying.
- In all manual operations where groups of workers are involved, a team leader with necessary training to handle the entire work force in unison has to be provided for.
- Watch and ward to control/supervise/guide movement of equipments and machineries, loading and unloading operations, stability of the stockpiled materials and irregularly shaped objects have to be provided for safety and security of workers.
- Carriageway used by the workers must be free from objects.
- Loading and unloading from vehicles shall be under strict supervision.

H. Electrical Hazards

- Statutory warning leaflets/posters are to be distributed/displayed by the Contractor in the vicinity of work site for the benefit of all workers, officers and supervisors as well as the public, indicating the do's and don'ts and warning related to electrical hazards associated with operations to be executed/in progress.
- All wires shall be treated as live wires.
- Report about dangling wires to the site-in-charge and do not touch them.
- Only a qualified electrician should attempt electrical repairs.
- Train all workers about electrical safety.
- Shut down the equipment that is sparking or getting over heated or emitting smoke at the time of operation, if it is not the normal way of working of such machines.
- Inform technical person/s for required maintenance.
- Never use damaged wires for electrical connection.

I. Use And Storage of Flammable Gas

- Store filled gas/LPG cylinder in a secure area – mark this as a no smoking area.
- Transport, store, use and secure cylinders in upright position.
- Ensure proper ventilation at the ground level in locations where LPG is in use.
- Avoid physical damage to the cylinders.

- Never weld near the cylinder.
- Store empty cylinders secured and upright.
- Make sure that the cylinder is closed immediately after use.
- Investigate immediately if there is the smell of LPG or gas.
- Never use destenched gas/LPG on site.
- Make sure that there is no other unrelated fire in the vicinity of the cylinder.

J. Gas Welding

The welders and welding unit should follow all the basic principles of welding for safety and security:

- Use face shield to protect the eyes.
- Use goggles, particularly when chipping slag and cutting strips.
- Use gloves long enough to protect wrists and forearms against heat, sparks, molten metal and radiation hazards.
- Use high-top boots/gum boots to prevent sparks, splinters, sharp edges of metal and hot welded strips, welding rods, electric cables etc. from injuring the legs.
- Avoid inhaling the noxious fumes and gasses from burning electrodes by using gas masks and screen of the work area to prevent the glair moving outside it.
- Keep the key hung from the regulator control for split seconds operations to stop the valve in case of any accidental damage or leakage to supply pipeline that may catch fire and cause accidents in case Acetylene or LPG cylinder.
- The welding area should have sufficient openings with fixed exhaust ventilators or adequate air flow openings to remove poisonous fumes and gases.
- Take precautions of wearing hard hats or fiber helmets to prevent injury due to fall of any object and accidental injury from projections while welding.
- Welders operating above ground should have adequate safety belt secured to stable platform to prevent accidental fall or injury from the scaffold. All electrical and gas connection lines up to the welder should be sufficiently insulated and protected from sharp edges and sharp objects. These shall not come into contact with hot metal.
- Do not use gas cylinders for supporting work or as rollers.
- While using LPG cylinders for welding, follow all safety precautions as has been prescribed by the supplier company.
- Avoid fire hazards and accidents by posting safety supervisors to oversee the activities of workers.
- Do not store explosives, high inflammable materials, loose hanging overhead objects, hot welded strips etc. near gas cylinders.
- Close all valves, switches and circuits while leaving the work place under proper lock and key. In case of mobile units, proper carriage procedures have to be followed for safety and security of men and materials.

K. Fire Safety Practices

- Store flammable material in proper areas having adequate fire protection systems.

- Display sufficient warning signs.
- Install fire alarm wherever required and test regularly.
- Inspect fire extinguishers regularly and replace as necessary.
- Train selected personal on use of fire extinguishers
- Fire escape route should be kept clear at all times and clearly indicated
- Display escape route maps prominently on each side.
- Provide sufficient exit signs at prominent locations for directing people to the escape staircases and routes.
- Train workers about the escape route and assembly point/s.
- Carryout fire drill periodically.

L. Noise Hazards And its Control

- Plan camp lay-out in a manner that ensures barriers/buffers between residential/ office units and high noise generating zones.
- Use sound meters to measure the level of noise and if it exceeds 75 dB(A), then ensure preventive measures.
- Make personnel aware of noisy areas by using suitable warning signs and insist on use of ear protectors/ear plugs to prevent excess noise affecting the workmen.
- Reduce noise at source by: use of improved equipments; regular and proper maintenance of the machinery as per the manufacturer's manual; by replacing rickety and noisy equipments and machineries. Screening locations with noise absorbing material; making changes in the process/equipment; controlling machine speeds; ensuring that two noise-generating machines are not running at the same time close to each other at same location; using cutting oils and hydraulic noise breakers; providing vibration and noise absorbing platform and firm embedding of equipments with fasteners.
- Appoint a competent person to: carryout a detailed noise assessment of the site; designate ear protection zone/s; give training/instructions on the necessary precautionary measures to be observed by site personnel including using suitable type of ear protection equipments.

M. Personal Protective Equipment

General

- Provision of personal protective equipment has to be made over and above all measures taken for removing or controlling safety hazards on a work site.
- Ensure that sufficient personal protective equipments are provided and that they are readily available for every person who may need to use them.
- The Contractor's Project Manager shall ensure that all persons make full and proper use of the personal protective equipment provided.
- Provide instruction/s and training for the proper use and care of personal protective equipment.
- Ensure that the personal protective equipments are in good condition.

- Train workers to report unintentional damages for replacement and to always keep the personal protective equipment clean.
- PPE includes, but may not be limited to, hard hats, goggles, ear plugs, gloves, air filters/masks, boots, ropes etc.

Head Protection

- Hard hats are compulsory for all workers, supervisors and managers/officials while working and/or inspecting a work site.
- Hard hat areas shall be demarcated clearly.

Hearing Protection

- Provide ear plugs or ear muffs to the workers and to those who need to get in and out of a high noise area frequently. Use re-usable earplugs when the reduction required (15-25 dBA) is not excessive. Use earmuffs where a large attenuation of upto 40 dBA is demanded.
- Do not use dry cotton wool for hearing protection because it doesn't provide any such protection.
- Provide disposable ear plugs for infrequent visitors and ensure that these are never re-used.
- Replenish ear plugs from time to time for those who need to work continuously for a long period in a high noise area/s.
- Use ear muffs with replaceable ear cushions because they deteriorate with age or may be damaged in use.
- Avoid wearing spectacles with ear muffs.
- Use soap and water or the recommended solvent for cleaning ear muffs.

Respiratory (Protective) Equipment

- Wear suitable mask for protection when there is a potential for small particles entering the lungs, e.g. emptying of cement bags, etc.
- Provide training to all persons using the masks/respirators for their correct fitting, use, limitations and symptoms of exposure.
- Clean and inspect all respirators before and after use.
- Store respirators properly when not in use.

Safety Footwear

- Wear suitable footwear for work
- Use safety footwear on site or in other dangerous areas.
- Wear suitable safety shoes or ankle boots when working anywhere where there is high risk of foot injuries from slippery or uneven ground, sharp objects, falling objects etc.
- All safety footwear, including safety shoes, ankle boots and rubber boots, should be fitted with steel toecaps.

- Avoid wearing flip flops, high heeled shoes, slippers, light sport shoes in situations where there is a risk of foot injury.
- Keep shoelace knots tight.

Hand Protection

- Wear suitable gloves for selected activities such as welding, bending steel bars, cutting and manual handling of materials and equipment.
- Do not wear gloves where there is a risk of them becoming entangled in moving parts of machinery.
- Wash hands properly with disinfectant soap and clean water before drinking or eating.
- Wash hands immediately after each operation on site when the situation warrants.

N. First Aid

- Provide first aid boxes at every work site in a cool and shaded place.
- Ensure that training on the use of the first aid box is provided to at least every supervisor on the site.
- Display the list of persons along with their contact numbers who are trained on providing first aid.
- Ensure that every first aid box is marked "First Aid" in English and in local language.
- Check for expiry dates and replace the contents, as necessary.
- Maintain a register on health records including injuries/accidents.

O. Reporting of Accident and Investigations

- Any accident at the site will be reported.
- Carryout the investigation as quickly as possible.
- Investigation should be carried out both internally as well as through third party.
- Conduct interviews with as many witnesses as necessary including the affected persons and supervising officials.
- Do not rely on any one/limited source of evidence.
- Check all the log books, stock registers, issue registers, movement registers on site
- After completion of the investigation/enquiry, a summary of the facts recorded, sequence of happenings, persons-in-charge, persons examined, equipments and machineries tested, follow-up of action as per legal requirements, copy of station diary entry, hospital entry, safety regulations etc. to be prepared with a comparative analysis for proper assessment.

ANNEXURE VIII: Reporting Format Camp Site

S.No	Project Details			Date of reporting
1.	Name of project			
2.	Name and address of the Contractor			
3.	Contract date and duration			
B	**Site Details**			
1.	Place Name		Landmark	
2.	Area of site		Current land use	
3.	Ownership of the land	Owned / leased	Survey no.	
4.	If leased / rented, name, address and contact details of owner			
5.	Distance from construction site			
6.	Distance from Water Body, Forest (if any)			
7.	Distance from the Populated Area			
8.	No of trees with girth> 0.3m on the site			
9.	No of trees to be cut			
10.	Is top soil conservation required (Yes/ No)			
List of enclosures:	(a) Location map			
	(b) Layout plan			
	(c) Photographs of the site			
	(d) List of machinery, equipments and vehicles to be used			
	(e) List of schools and hospitals with in 200 m distance from the boundary of the camp			
C. Submission Details	Submitted by (Environment & Safety Officer of Contractor)			**Approved / Rejected by (Environmental Officer of PIU)**
Signature & date				
Name				
Designation				
Remarks by Environmental Expert of PIU				

*** All distances are to be measured from the boundary of the site.**

Note: Contractor has to fill and submit this format to the Environmental Expert of PIU upon identification of labour camp site. Subsequently, the Environmental Expert of PIU has to visit the site and approve / reject the site with reasons. The Environmental Expert of PIU has to give a copy of this format to the contractor after his approval / rejection with remarks. On approval of a site, the Contractor has to prepare the Management and Redevelopment Plan for this site as per the Guidelines given in EMP and submit to Environmental Expert of PIU for approval

Annexure IX: Format For Register of Complaints (Grievance) and it's Reporting

A	Project Details	Information			
1.	Name of project				
2.	Name and address of the Contractor				
3.	Contract date and duration				
B	Details of Complaint Received		Site Name		
Sl. No.	Date of Complaint	Name and address of person with contact details	Complaint	Action taken with date	Signature of ESO of Contractor
1					
2					
3					

A register in this format shall be maintained at each site office of the contractor. This same format shall be used to compile and report the details of complaints received at all site to the Environmental Expert of PIU along with the Monthly Report of the Contractor. The Environmental Expert of PIU has to give instruction to the Contractor, if any further action has to be taken on any complaint.

Annexure X: Checklist For Monitoring of Labour Camp Management

A	Project Details	Date of Monitoring:		
1.	Name of project.			
2.	Name and address of the Contractor			
3.	Contract date and duration			
4.	Name of Labour Camp			
B	Monitoring Details			
Sl. No.	Environmental Management Measures	Environmental Expert's observation (Yes / No / Not Applicable)	Corrective Actions Proposed	Remarks
1.	Whether the camp are floored with concrete?			
2.	Are all the first aid facilities provided in the camp?			
3.	Whether the camp is located in such a way that there are no residences, public institutions or biosensitive area with in a radius of 500 m from the camp?			
4.	Whether the vehicle movement in and out of the camp is in a controlled manner?			
5.	Whether LPG for cooking is provided?			
6.	Whether safe drinking water is provided?			
7.	Whether all the drains and channels are covered?			
8.	Whether a green belt is provided along the periphery of camp?			
9.	Whether day care centres are provided with in the camp?			
10.	Whether sanitation facilities are provided separately for male and female?			
11.	Whether separate garbage bins are provided to collect the garbage?			
12.	Whether septic tanks with soak pits are provided?			
13.	Whether the location of soak pit is in such a away that it does not pollute the ground water?			
14.	Whether a qualified safety officer is appointed for ensuring safety?			

15.	Whether proper fencing of the camp is done?			
16.	Whether the workers are well aware of cleanliness, hygiene, community livings, AIDS etc.?			
17.	Whether all applicable clearances are obtained and valid till date?			
Signature of Environment and Safety Officer (ESO) of the Contractor with date			**Signature of Environmental Expert of PIU with date**	
Note: The Environmental Expert of PIU has to use this format to monitor the implementation of Environmental Management Measures for each Labour Camp Quarterly. Corrective actions with specific timeframe should be proposed for each Environmental Management Measure, which is not implemented satisfactorily. A copy of the filled up format should be given to the ESO of the Contractor. Environmental Expert of PIU has to attach this format to the Quarterly Report, with details of corrective action taken by the Contractor.				

ANNEXURE XI: Check List For Monitoring of Redevelopment of Labour Camp Site

A	Project Details	Date of Monitoring:		
1.	Name of project			
2.	Name and address of the Contractor			
3.	Contract date and duration			
4.	Name of Labour Camp			
B	Monitoring Details			
Sl. No.	Environmental Management Measures	Environmental Expert's observation (Yes / No / Not Applicable)	Corrective Actions Proposed	Remarks
1.	Are all the temporary structures cleared as per the list in the redevelopment plan?			
2.	Are all building debris, garbage, night soils and POL waste disposed off safely?			
3.	Are all disposal pits or trenches filled, disinfected and effectively sealed off?			
4.	Are the facilities that could be put to re-use maintained well?			
5.	Are all the spills within the camp site effectively disposed off from the site?			
6.	All the area within the camp site is leveled and spread over with stored top soil.			
7.	Has the residual top soil been utilized effectively?			
8.	Has the entire camp area been made clean and tidy without disturbing the adjacent lands?			
9.	Are the 'before' and 'after' scenarios of the site documented through photographs and submitted to PIU?			
10.	Are the conditions mentioned by the owner in the agreement adhered to?			
11	If not, mention the details of the conditions that are not adhered to and further steps to be taken.			
12.	Can 'works completion' certificate be issued to this			

	site?			
Signature of Environment and Safety Officer (ESO) of the Contractor with date			**Signature of Environmental Expert of PIU with date**	
Note: The Environmental Expert of PIU has to use this format to monitor the implementation of Environmental Management Measures for the redevelopment of each Labour Camp Site as and when it is closed. Corrective actions with specific timeframe should be proposed for each Environmental Management Measure, which is not implemented satisfactorily. A copy of the filled up format should be given to the ESO of the Contractor. Environmental Expert of PIU has to attach this format to the Quarterly Report, with details of corrective action taken by the Contractor.				

ANNEXURE XII: Reporting Format for Occupational Health And Safety Measures

A	Project Details	Date of Reporting:	
1.	Name of project.		
2.	Name and address of the Contractor		
3.	Contract date and duration		
B	Implementation Status of Health and Safety Measures		
Sl. No.	**Health and Safety Measures**	**Implementation Status (Yes / No)**	**Remarks**
1	Appointment of qualified Environment and Safety Officer		
2	Approval for Construction Safety Management Plan by the Environmental Expert of PIU.		
3	Provision for flags and warning lights for potential hazards		
4	Provision of adequate staging, form work and access (ladders with handrail) for works at a height of more than 3.0 m		
5	Provision of adequate shoring / bracing / barricading / lighting for all deep excavations of more than 3.0 m depth.		
6	Provision for sufficient lighting especially for night time work		
7	Construction Workers safety – Provision of personnel protective equipment's		
	A. Helmets		
	B. Safety Shoe		
	C. Gumboot		
	D. Dust masks		
	E. Hand Gloves		
	F. Safety Belts		
	G. Reflective Jackets		
	H. Earplugs for labour		
8	Workers engaged in welding work shall be provided with welder protective shields		
9	All vehicles are provided with reverse horns.		
10	All scaffolds, ladders and other safety devices shall be maintained in as safe and sound condition		
11	Regular health checkup for labour/ Contractor's personnel		

12	Ensuring the sanitary conditions and all waste disposal procedures & methods in the camp.		
13	Provision for insurance coverage to the workers		
C.	Submission Details		

	Submitted by (Environment & Safety Officer of Contractor)	Approved by (Environmental Officer of PIU)
Signature & date		
Name		
Designation		

Remarks by Environmental Expert of PIU

Note: Contractor has to fill and submit this format to the Environmental Expert of PIU along with the Monthly Report. The Environmental Expert of PIU has to visit the site and verify the details. Further mitigation measures, if required, can be suggested by the Environmental Expert of PIU. The Environmental Expert of PIU has to give back a copy of this format to the contractor after his approval with remarks.

Annexure XIII: Format For Register of Accidents and It's Reporting

A	Project Details	Date of Reporting:
1.	Name of project	
2.	Name and address of the Contractor	
3.	Contract date and duration	
B	**Details of Accident and People Involved in Accident**	
	Name of site where accident happened	
	Name and address of people involved in the accident	
	Whether Contractor's personnel or General public	
	Details of Injury	
	Details of treatment given	
	Details of compensation given	

C	**Type of Accident (√)**			
	Fall of person from a height			**Explosion**
	Slip, trip or fall on same level			**Fire**
	Struck against fixed objects			**Contact with hot or corrosive substance**
	Struck by flying or falling objects			**Contact with poisonous gas or toxic substances.**
	Struck by moving objects			**Contact with poisonous gas or toxic substances**
	Struck / caught by cable			**Hand tool accident**
	Stepping on hail etc.			**Vehicle / Mobile plant accident**
	Handling without machinery			**Machinery operation accident**
	Crushing / burying			**Other (please specify)**
	Drowning or asphyxiation			

D	**Agent Involved in Accident (√)**			
	Machinery			**Stair edge**
	Portable power appliance			**Excavation**
	Vehicle or associated equipment /machinery			**Ladder**
	Material being handled, used or stored			**Scaffolding**
	Gas, vapor, dust, fume or oxygen			**Construction formwork, shuttering and false work.**
	Hand tools			**Electricity supply cable, wiring switchboard and associated equipment**
	Floor edge			**Nail or chipping**
	Floor opening			**Other (Please specify)**
	Left shaft			

E	**Unsafe Action Relevant to the Accident (√)**			
	Operating without authority			**Failure to use proper footwear**
	Failure to secure objects			**Failure to use eye protector**
	Making safety devices inoperative			**Failure to use respirator**
	Working on moving or dangerous equipment			**Failure to use proper clothing**
	Using un-safety equipment			**Failure to use warn others or given proper signals**

	Adopting unsafe position or posture			**Horseplay**
	Operating or working at unsafe speed			**No unsafe action**
	Unsafe loading, Placing, mixing et			**Others (please specify)**
	Failure to use helmet			
F	**Lack of Safety Measures Relevant to the Accident (√)**			
	No protective gear			**Unsafe layout of job, etc.**
	Defective protective gear			**Unsafe process of job methods**
	Improper dress / footwear			**Poor housekeeping**
	Improper guarding			**Lack of warning system**
	Improper ventilation			**Defective tool, machinery or materials**
	Improper illumination			**No unsafe condition**
	Improper procedure			**Others (please specify)**
G	**Personal Factor Relevant to the Accident (√)**			
	Incorrect attitude /motive			**No unsafe personal factor.**
	Unsafe act by another person			**Other (please specify)**
H	**Details of Corrective and Preventive action taken**			
1				
2				
3				
4				
I	**Submission Details**			

	Submitted by (Environment & Safety Officer of Contractor)	**Approved by (Environmental Officer of PIU)**
Signature & date		
Name		
Designation		
Remarks by Environmental Expert of PIU		

Note: Contractor has to fill this format as and when an accident happens and submit to the PIU along with the Monthly Report. The Environmental Expert of PIU has to visit the site and verify the details. Additional safety measures, if required, can be suggested by the PIU. The Environmental Expert of PIU has to give back a copy of this format to the contractor after his approval with remarks.

ANNEXURE XIV: Reporting Format For Environmental Pollution Monitoring

A	Project Details				Date of Reporting:		
1.	Name of project						
2.	Name and address of the Contractor						
3.	Contract date and duration						
B	Environmental Monitoring Details						
Sl. No	Details of Monitoring Location	Period of Monitoring	Details of values exceeding the relevant standards		Reasons for pollution	Details of Corrective actions taken	Remarks
a.	Ambient Air Monitoring						
1.							
2.							
b.	Water Monitoring						
1.							
2.							
c.	Noise Monitoring*						
1.							
2.							
C	Submission Details						

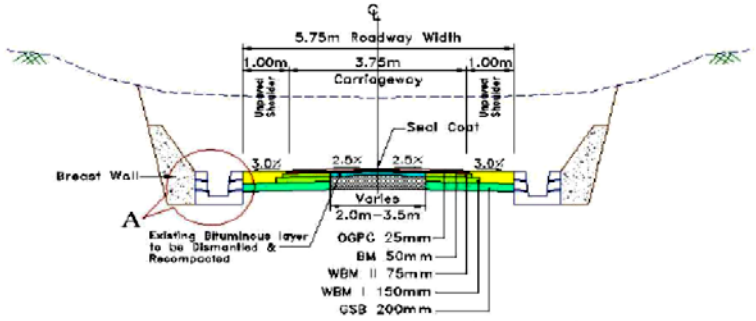
	Submitted by (Environment & Safety Officer of Contractor)	Approved by (Environmental Officer of PIU)
Signature & date		
Name		
Designation		
Remarks by PIU		

*** Noise monitoring at the site will be done by the PIU (ERA), using the Noise Meter. The PIU has to give the monitoring results to the Contractor for corrective actions, if any, required and including in this report.**

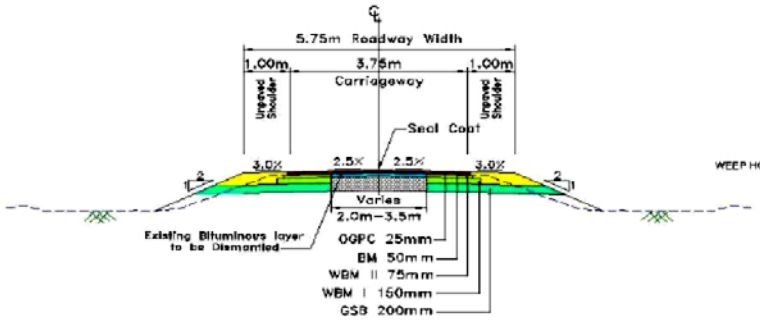
Note: The Contractor has to conduct Environmental Monitoring through a NABL approved Laboratory as per the Environmental Monitoring Plan given in the EMP, fill this format and submit to the PIU along with the Monthly Report, if monitoring was due in that month. A copy of the monitoring report given by the Laboratory has to be attached to this format. The PIU has to visit the site and verify the details. Additional mitigation measures, if required, can be suggested by the PIU. The Environmental Expert of PIU has to give back a copy of this format to the contractor after his approval with remarks.

ANNEXURE XV: Typical Cross Sections of Roads under Package-4

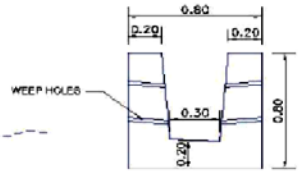
Component A: Bijbehara-Waghama Road Via Kitriteng Road in District: Anantnag



TYPE - 1 : TYPICAL CROSS SECTION OF SINGLE LANE CARRIAGEWAY AT CONCENTRIC WIDENING WITH BOTH SIDE DRAIN



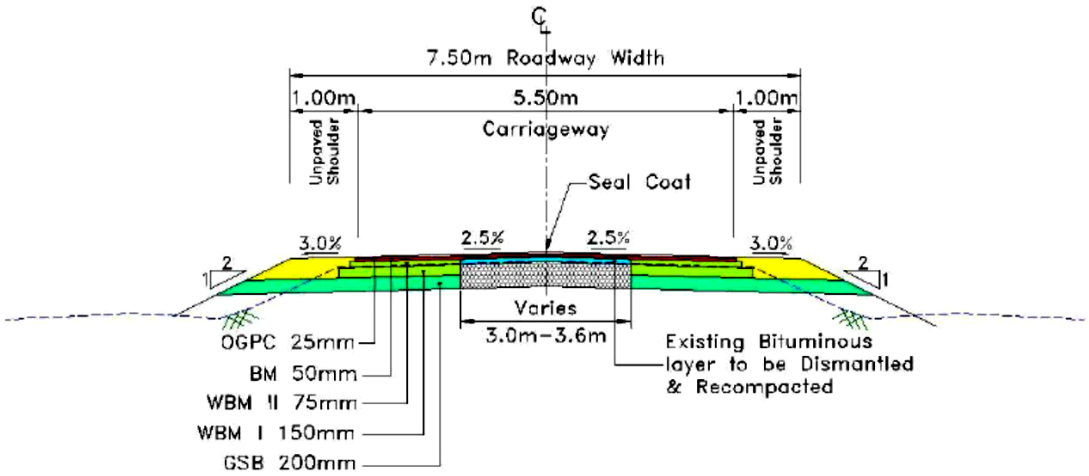
TYPE - 2 : TYPICAL CROSS SECTION OF SINGLE LANE CARRIAGEWAY CONCENTRIC WIDENING



Detail -A
Typical Lined Drain

Note:
1. Existing pavement to be dismantled upto the level to provide complete pavement layer (including 100mm thick subgrade of CBR not<10%) and re-compacted.

Component B: Sangam-Khudwani Road in District: Anantnag



TYPE - 1 : TYPICAL CROSS SECTION OF INTERMEDIATE LANE CARRIAGEWAY AT CONCENTRIC WIDENING STRETCH

Note:
1. Existing Bituminous layer to dismantled and re-compacted.
2. Below Bituminous Macadam, layer thickness (WBM-maximum 225mm/GSB) shall be decided based on re-compacted level and FRL of the proposed road.

ANNEXURE: XVI-List of Environmental Standards

1. National Ambient Air Quality Standards

Pollutant	Time Weighted Average	Concentration in Ambient Air	
		Industrial, Residential, Rural and Other Areas	Ecologically Sensitive Area (notified by Central Government)
Sulphur Dioxide (SO_2), $\mu g/m^3$	Annual*	50	20
	24 hours**	80	80
Nitrogen Dioxide (NO_2), $\mu g/m^3$	Annual*	40	30
	24 hours**	80	80
Particulate Matter (size less than 10 µm) or PM_{10} $\mu g/m^3$	Annual*	60	60
	24 hours**	100	100
Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$ $\mu g/m^3$	Annual*	40	40
	24 hours**	60	60
Ozone (O_3) $\mu g/m^3$	8 hours*	100	100
	1 hour**	180	180
Lead (Pb) $\mu g/m^3$	Annual*	0.50	0.50
	24 hours**	1.0	1.0
Carbon Monoxide (CO) mg/m^3	8 hours*	02	02
	1 hour**	04	04
Ammonia (NH_3) $\mu g/m^3$	Annual*	100	100
	24 hours**	400	400
Benzene (C_6H_6) $\mu g/m^3$	Annual*	5	5
Benzo(a)Pyrene (BaP)-particulate phase only, ng/m^3	Annual*	1	1
Arsenic(As), ng/m^3	Annual*	6	60
Nickel (Ni), ng/m^3	Annual*	20	20
* Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals.			
** 24 hourly or 8 hourly or 1 hourly monitored values, as applicable, shall be complied with 98% of the time; they may exceed the limits but not on two consecutive days of monitoring.			
Source: National Ambient Air Quality Standards, Central Pollution Control Board Notification in the Gazette of India, Extraordinary, New Delhi, 18th November, 2009			

2. National Ambient Noise Level Standards

Area Code	Category of Area	Limits in dB (A) Leq.

		Daytime	Night time
A	Industrial	75	70
B	Commercial	65	55
C	Residential	55	45
D	Silence	50	40

Source: *Central Pollution Control Board, New Delhi.*
Note-1 Day time is reckoned in between 6 AM to 10 PM
Note-2 Night time is reckoned in between 10 PM to 6 AM
Note-3 Silence zone is defined as areas up to 100 meters around such as premises as hospitals, educational institutions and courts. The silence zones are to be declared by the Competent Authority
Note-4 Mixed categories of areas should be declared as one of the four above mentioned categories, by the Competent Authority and the corresponding standard shall apply.

3. Surface Water Quality

S. No	Parameters	IS:2296 (Class C)	Method Adopted
1	pH	6.5-8.5	pH meter
2	BOD (3 day, 27^0C)	3.0	DO-Azide modification of Wrinkler's method
3	Temperature (^{0}C)	NS	Thermometer
4	Dissolved oxygen	4	Azide modification of Wrinkler's method
5	Color (Hazen)	300	Visual Comparison method
7	Chloride (Cl)	600	Argentometric Titration
8	Total Dissolved Solids	1500	Gravimetric Analysis
9	Sulphates (SO_4)	400	Barium Chloride method
10	Oil and Grease	0.1	Partition -Gravimetric method
11	Nitrates	50	Chromotropic acid
12	Total Coliform (MPN/100 ml)	5000	Multiple Tube Fermentation Technique

NS: Not specified. All the values in mg/l if otherwise mentioned