ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT

DESIGN AND CONSTRUCTION OF 58.0 MTR SPAN (2-LANE) STEEL MOTORABLE BRIDGE FROM KATHEEL GANJOO TO BARSOA OVER GHORDI NALLAH AND 50.0 MTR SPAN (2- LANE) MOTORABLE BRIDGE FROM BARSOA TO PATRI OVER BARMEEN NALLAH RAMNAGAR (COMPLETE JOB) IN UDHAMPUR DISTRICT

Jhelum and Tawi Flood Disaster Recovery Project (JTFRP)

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Under Jhelum and Tawi Flood Disaster Recovery Project (JTFRP)

Contents

EXECUTIVE SUMMARY

The catastrophic deluge of September 2014 seriously impacted on the economic growth of erstwhile State of Jammu and Kashmir. These floods resulted in massive infrastructure damages in the various parts of the State and siltation of major water bodies. In connection to a devastating flood, a mission of the World Bank visited the erstwhile State during February 1-6, 2015 on request of Government of India to review and assess the damages 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 2 11,975 million (US$ 3,550.45), most of which is allocated to the housing, livelihoods, and roads and bridges, collectively representing 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 GoJKUT, ***"Jhelum and Tawi Flood Disaster Recovery Project (JTFRP)"*** has been launched to focus on restoring critical infrastructure using international best practice on resilient infrastructure.

The objective of component 2 ***"Reconstruction of Roads and Bridges"*** 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 covered under the 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 a disaster.

The environmental assessment scope includes screening and scoping, environmental assessment and devising of environmental management plan (EMP) for each bridge subprojects under component-2 of Jhelum Tawi Flood Recovery Project. The objective of Environment screening is to identify the potentially significant environmental issues of the sub-projects at an early stage for an affective Environmental Assessment.

Under the above-mentioned component, one of the identified bridge sub-project is *"**Design and Construction of 58.0 mtr span (2- Lane) Steel motorable bridge from Katheel Ganjoo to Barsoa over Ghordi Nallah and 50.0 mtr span (2-lane) motorable bridge from Barsoa to Patri over Barmeen Nallah Ramnagar (Complete Job) in Udhampur District"***

As per the EIA notification 2006 and subsequent amendments, for the construction of the proposed bridges at Ramnagar, the Environmental Clearance 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&K PCB for establishing and operation of Hot Mix Plant, WMM Plant and RMC plant for the subprojects.

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

Project Location

The proposed construction of the bridge is located in Kaunallah village in tehsil Ramnagar of District

Udhampur. The motorable bridges would be constructed from Katheel Ganjoo to Barsoa over Ghordi Nallah (58.0 mtr span of 2- Lane) and from Barsoa to Patri (50.0 mtr span of 2-lane) over Barmeen Nallah Ramnagar (Complete Job).

Name of the Project	**Project Location with Coordinates**
Design and Construction of 58.0 mtr span (2- Lane) Steel motorable bridge from Katheel Ganjoo to Barsoa over Ghordi Nallah and 50.0 mtr span (2-lane) motorable bridge from Barsoa to Patri over Barmeen Nallah Ramnagar (Complete Job) in Udhampur District	Geo-Coordinates: Lat: 32°49'43.59"N Long: 75°12'6.75"E

Screening and Environmental Assessment

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 and Social screening is to identify the potentially significant environmental and social issues of the sub-project at an early stage for detailed environmental impacts. The Environmental Assessment for the bridge subproject includes establishing an 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 the necessary budget and institutional roles for effective implementation. The EMP developed shall form the part of EPC contract for its implementation. Public consultation was conducted at the project location on 30/08/2018, 11/11/2018 and 20/06/2019 with local people as part of environment and social screening study. People have expressed keen interest in the proposed subproject during the public consultation. People in general were very enthusiastic about the benefits of the subproject. The sub-project triggers acquisition of land. The land required for the sub-project will be voluntarily donated by the people. The screening study reveals that there are no likely significant Environmental.

- Policy and Legal Regulatory Instruments: National and State/U.T. 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 of 1991
- Central Motor Vehicle Act 1988 and the 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
- 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 subproject is Engineering, Procurement and Construction (EPC) mode contract for ***"Design and Construction of 58.0 mtr span (2- Lane) Steel motorable bridge from Katheel Ganjoo to Barsoa over Ghordi Nallah and 50.0 mtr span (2-lane) motorable bridge from Barsoa to Patri over Barmeen Nallah Ramnagar (Complete Job) in Udhampur District"*** and environmental 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 bridge project will include design and construction of Ramnagar bridge having a total span of Design and Construction of 58.0 mtr span (2- Lane) Steel motorable bridge from Katheel Ganjoo to Barsoa over Ghordi Nallah and 50.0 mtr span (2-lane) motorable bridge from Barsoa to Patri over Barmeen Nallah Ramnagar (Complete Job) in Udhampur District including approach roads and nallah training works.

Public Consultation

Consultation during project preparation is an integral part of the Environmental assessment process. It not only minimizes the risks but involves the public as stakeholders in project preparation process, promotes public understanding of the project and leads to timely completion of the project. The views and suggestions received during stakeholder's consultations also helps in better identification of Environmental impacts and incorporation of mitigation measures in EMP to address these impacts. Public consultation was conducted at the project location on 30/08/2018, 11/11/2018 and 20/06/2019 with local people as part of environment and social screening study. People have expressed keen interest in the proposed subproject during the Public consultation. People in general were very enthusiastic about the benefits of the subproject. The screening study reveals that there are no likely significant Environmental. Consultation has been done in accordance with the World Bank's ESMF-JTFRP requirement which is the pre-requisite for the social and environmental safeguards. The purpose and objective of stakeholder's consultation is the identification and involvement of potential Project Affected people, nearby communities and other stakeholders in order to make them cognizant about the proposed bridge sub-project activities. During the consultation process of the proposed sub-project, people have expressed keen interest in the consultation process and were aware of the proposed bridges at Ramnagar. People, in general, were very enthusiastic about the benefits of the proposed bridges

at Ramnagar and the perceived benefits are direct motorable connectivity of the affected villages to the main town.

Some of the responses with suggestions received from the residents and stakeholders during the consultation are (i) engagement of locals at the construction site (ii) development of amusement park in the middle of the bridges.

Assessment of Impacts

The environmental assessment study carried out at the proposed bridges at Ramnagar and its approaches in terms of the potential environmental impacts that may occur as a result of the implementation of the project. The anticipated environmental impacts identified during the construction phase which comprise of transitory/ insignificant increase in air and noise pollution, soil erosion, change in water quality or contamination 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 bridges at Ramnagar project will have significant positive impacts and to address the problem of connectivity and high-quality motorable access to the adjoining areas through improved design and environmental enhancement measures. The project mitigation measures have 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 the environmental impact assessment report. The comprehensive Environmental Management Plan (EMP) for the proposed bridges at Ramnagar has been developed, which elaborates on the mitigation measures, means of implementation for the proposed measures, monitoring strategy and the budgets involved in the implementation of the proposed mitigation measures.

1. INTRODUCTION

1.1 Project Background

During the first week of September 2014, the Jammu and Kashmir region witnessed devastating floods across the majority of its districts, caused by multi-day heavy rainfall events, causing major flooding and landslides. The worst affected districts are Srinagar, Anantnag, Udhampur, Pulwama, Ganderbal, Kulgam, Budgam, Rajouri, Udhampur and Reasi. As many as 60 major and minor roads have been cut off and over 30 bridges washed away. The preliminary assessment of property damage was estimated between INR 50,000 million to INR 60,000 million. Approximately 277 people died. 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. Jammu and Kashmir experienced the worst floods in the past 60 years during the first week of September 2014. 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 558 mm of rain in the June- September period, as against the normal 477.4 mm.

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 erstwhile 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 erstwhile state to increase resilience.

The Project Development Objective (PDO) is to support the recovery and increase disaster resilience in targeted areas of the erstwhile state and increase the capacity of the erstwhile state's 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 the component-2 of Jhelum Tawi Flood Recovery Project (JTFRP), Design and Construction of 58.0 mtr span (2- Lane) Steel motorable bridge from Katheel Ganjoo to Barsoa over Ghordi Nallah and 50.0 mtr span (2-lane) motorable bridge from Barsoa to Patri over Barmeen Nallah in Ramnagar (Complete Job) in Udhampur District has been approved under Engineering, Procurement and Construction (EPC) mode.

1.2 Description of the Project

The proposed sub-project involves Design and construction of 58.0 mtr span (2-Lane) motorable bridge from Katheel Ganjoo to Barsoa over Ghordi Nallah and 50.0 mtr span (2-lane) motorable bridge from Barsoa to Patri over Barmeen Nallah at Ramnagar in Udhampur District. Due to the lack of bridges over these Nallahs, the villages of Pathri, Katheel Ganjoo, Barsoa in Udhampur district remained disconnected from rest of the population for many days during floods of 2014. In light of the frequent flash floods in the nallahs during rainy season, two number motorable bridges with approach roads (total length of roads-4500 mts) have been proposed over Barmeen nallah and Ghordi nallah to provide all weather connectivity to the area. The proposed approach roads of the bridges shall link Koo-Jhonu road (from Km 3rd) and PMGSY road, both of which originate from Udhampur Ramnagar road. The Geographical location of the proposed sub-project is 32°49'45"N 75°12'6"E. Udhampur is a district in the Indian Union territory of Jammu and Kashmir. Covering an area of 4,550 square kilometres (1,760 sq mi) in the Himalayan mountains, the district has its headquarters in the town of Udhampur. At an elevation of 2,024 metres (6,640 ft) the mountain resort of Patnitop and the temple at Sudh Mahadev believed to be over 2800 years old, are other popular tourist attractions of the district. Temperature varies considerably in the Udhampur District, as the altitude ranges from 600– 3,000 metres (2,000–9,800 ft). Chenab, Ans, Tawi and Ujh are the main rivers. The district is rich in minerals such as coal, bauxite, gypsum and limestone. Udhampur district comprises seven tehsils (Chenani, Ramnagar Tehsil, Majalta and seven blocks, namely, Dudu Basantgarh, Gordi, Chenani, Bajalta, Panchari, Ramnagar and Udhampur. The 2011 census indicates the population of the district to be 554,985. There are 871 females for every 1000 males in the district. The overall literacy rate is 54.16%, with 66.43% for males and 39.89% for females. The district has a population density of 211 inhabitants per square kilometre (550/sq mi). Its population growth rate over the decade 2001–2011 was 20.86%.

The proposed work "Design and Construction of 58.0 mtr span (2- Lane) Steel motorable bridge from Katheel Ganjoo to Barsoa over Ghordi Nallah and 50.0 mtr span (2-lane) motorable bridge from Barsoa to Patri over Barmeen Nallah Ramnagar (Complete Job) in Udhampur District" to be carried out in the tehsil Ramnagar of Udhampur district would connect the villages like (a) Kuhnallah, (b) Barta, (c) Barshua, (d) Bari, (e) Sanetar and (f) Bhatyari of the area.

1.3 Scope for Conducting the EIA study

Environmental impact assessment study of the bridge project to identify and evaluate impacts on the environment due to the various stage of project implementation and provide inputs to project road design team to incorporate necessary measures in design to minimise such impacts through suitable engineering interventions. 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, the cost for environmental management and evaluation of potential environmental impacts due to the proposed bridges at Ramnagar.

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

- collect any additional data relevant to the study area.
- undertake environmental monitoring 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 bridge work at proposed site;
- 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 after the implementation of the proposed subproject

1.4 Need and Benefits of The Proposed Bridge

The proposed bridges project is located in near Village Kaunullah in tehsil Ramnagar of District Udhampur. In the wet season, the village across the gets disconnected with other habitations and people of the area especially students, patients face lot of difficulties during episodes of high precipitation. The proposed work "Design and Construction of 58.0 mtr span (2- Lane) Steel motorable bridge from Katheel Ganjoo to Barsoa over Ghordi Nallah and 50.0 mtr span (2-lane) motorable bridge from Barsoa to Patri over Barmeen Nallah Ramnagar (Complete Job) in Udhampur District" to be carried out in the tehsil Ramnagar of Udhampur district would connect the villages like (a) Kuhnallah, (b) Barta, (c) Barshua, (d) Bari, (e) Sanetar and (f) Bhatyari of the area. To redress the demand of the public, it was proposed to construct bridges over Ghordi Nallah and Barmeen Nallah in tehsil Ramnagar of Udhampur District including the approach roads.

1.5 The need for the Environmental Assessment

The EIA for the subproject 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 (EMP) 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 "Design and Construction of 58.0 mtr span (2- Lane) Steel motorable bridge from Katheel Ganjoo to Barsoa over Ghordi Nallah and 50.0 mtr span (2-lane) motorable bridge from Barsoa to Patri over Barmeen Nallah Ramnagar (Complete Job) in Udhampur District" under Jhelum and Tawi Flood Recovery Project (JTFRP) and integration of the same into 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 prospects. Further, this report also provides scoping inputs in determining the major environmental issues and defines the scope of work for conducting an 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 Impact Assessment (EIA)

The EIA for this bridge project includes establishing an 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 (EMP)

An Environmental Management Plan designed for the implementation of the subproject shall consist of an overall framework which will be a guiding 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

To accomplish the above objectives, an assessment study was made in line with the guidelines stipulated by the World Bank and ESMF of JTFRP for environmental assessment.

1.9.1 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 to understand the salient environmental features of the project area, sensitive areas with regards to the proposed project activities, and a 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.

1.9.2 Review and Assessment of Applicable Environmental Regulations

Discussions with different stakeholders and review of the various regulations and guidelines for EIA 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.

1.9.3 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 bridge works.

1.9.4 Baseline 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. Besides, 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.

1.9.5 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 due to the construction, and operation of the project corridor.

1.9.6 Environment Management Plan

The major components of the environment management plan comprised preparation of mitigation plans 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

2. APPROACH & METHODOLOGY

2.1 Reconnaissance Survey

The reconnaissance survey was conducted on **January 06, 2021** in the project domain area of the proposed site in Udhampur District. The site visits 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

To conduct an environmental assessment study of the proposed Design and Construction of 58.0 mtr span (2-Lane) Steel motorable bridge from Katheel Ganjoo to Barsoa over Ghordi Nallah and 50.0 mtr span (2- lane) motorable bridge from Barsoa to Patri over Barmeen Nallah Ramnagar (Complete Job) in Udhampur District, it is imperative to define the area for environmental impacts/ project influence area are being considered. The project will support infrastructure and the proposed construction of the Ramnagar Bridge which is confined within the existing alignment of the approach roads which connects with the existing roads.

The project impact area has been considered as Right of Way (ROW) of the project corridor and project influence area has been measured as 500 meters from the centre line of the bridge on both sides.

2.3 Screening Methodology

The screening exercise was done through reconnaissance survey. Public consultation meetings were arranged with the local community and conducted near the proposed bridge site with locals, officials and community. Field survey and data collection were carried out as per the screening checklist provided in ESMF of the project. The information has been gathered through primary as well as secondary sources, with the support of Contractor/PMU/PIU team members. The objective behind the environmental screening was to delineate affected environmental features and issue like soil erosion, slope stability/ embankment measures, scheduled trees protection, sensitive receptors- schools/ religious places and residential area, human settlements, water, natural resources etc. in the project area, 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 environmental impact and screening studies. For this purpose, a data-sheet was devised to collect quantitative and qualitative 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 flora and fauna, climate, pollution along with socio-economic, demographic, land-use pattern, land ownership details etc. of the subprojects were also studied and reviewed. National and State/U.T environmental guidelines were also reviewed before carrying out baseline studies. A detailed survey has been carried out by the Environmental Specialist who is responsible for the documentation of the environmental investigations and issues, to evaluate the existing

environmental setting and conditions of the proposed project area. Potential significant impacts were identified based on an analytical review of project activities, baseline data, land use, environmental factors, socioeconomic conditions and review of the assessment of potential impacts identified in previous similar kind of projects. A participatory process was adopted while performing environmental 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

For the construction of Ramnagar Bridges, many activities have been undertaken like specific literature reviews and surveys were carried out referring publication & using the 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 bridge project 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 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 (Air, Noise and Water quality) of the proposed Design and Construction of 58.0 mtr span (2- Lane) Steel motorable bridge from Katheel Ganjoo to Barsoa over Ghordi Nallah and 50.0 mtr span (2-lane) motorable bridge from Barsoa to Patri over Barmeen Nallah Ramnagar (Complete Job) in Udhampur District in J&K will be carried during pre-construction stage (that is before the execution of works) to generate the latest baseline data so that it can be correlated for the comparative analysis with the monitoring data 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 risks of proposed development options. This helps to analyze the options critically with 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. There had been a long pending demand of bridges at the proposed site. Since the village gets disconnected with other habitations and people of the area especially students, patients, and elderly face lot of difficulties due to the non-availability of bridge connectivity as they cross the nallah which usually remain with the lean flow and inaccessible during episodes of precipitation. Based on this assessment the present option of construction of new bridges which are motorable and having a span of 58.0 mtr

span (2- Lane) over Ghordi Nallah and 50.0 mtr span (2-lane) over Barmeen Nallah is the best applicable solution and socio-economically viable option.

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 study. Stakeholders were informed about the subproject components and likely environmental impacts before seeking their views. Consultation has 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 the 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.

EIA Report for the construction of Design and Construction of 58.0 mtr span (2- Lane) Steel motorable bridge from Katheel Ganjoo to Barsoa over Ghordi Nallah and 50.0 mtr span (2-lane) motorable bridge from Barsoa to Patri over Barmeen Nallah Ramnagar (Complete Job) in Udhampur District and its executive summary shall be disclosed at JTFRP/PIU website as per provisions of World Bank disclosure policies

3. PROJECT DESCRIPTION

3.1 Project Area

Udhampur district is one of the 22 districts in the Jammu and Kashmir. Udhampur city is the administrative headquarters of the district. Udhampur lies in the southern part of the Union Territory of Jammu and Kashmir. 66 km far from Jammu by National highway NH44. It is bounded on the West by Reasi District, in the North by Ramban, in North-East by Doda District, in South-East by Samba & Kathua Districts and the South-West by Jammu District. Area of the district is 2,380 Sq.Kms. As per the 2011 population census the total population of the district is 5,57,689, with a rural population of 4,49,481 and urban population of 1,08,208. The Sex Ratio of the district is 870 Females per 1000 Males.

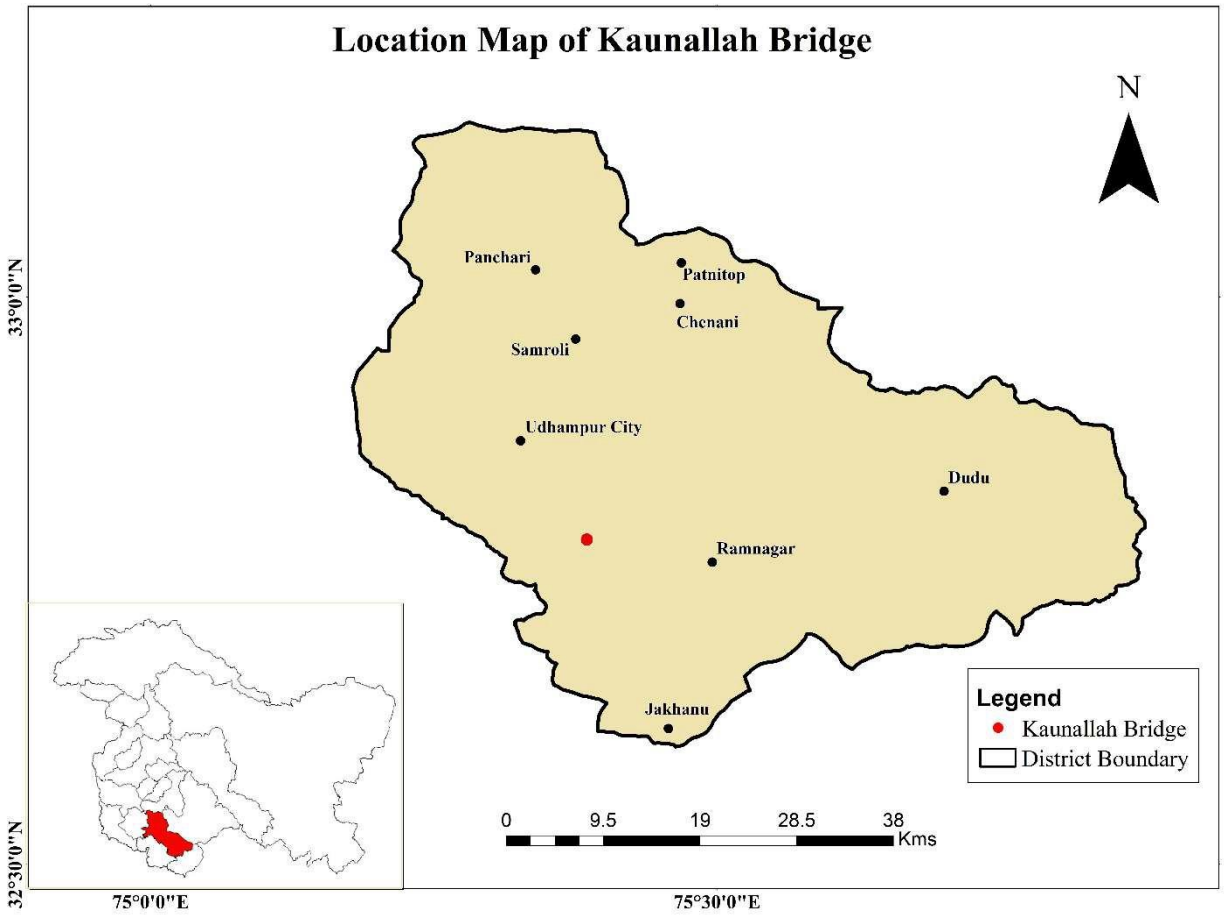


Figure 3.1: Map of Udhampur District, Jammu and Kashmir

The literacy rate of the district is 68.49% with a Male literacy of 78.36% and female literacy of 57.10%. Udhampur district has 04 Sub Divisions – Chenani, Ramnagar, Dudu and Basantgarh; 08 tehsils - Udhampur, Chenani, Basantgarh, Ramnagar, Latti, Moungri, Panchari, Majalta; and 17 Blocks - Chanunta, Chenani, Dudu, Ghordi, Jaganoo, Khoon, Kulwanta, Latti Marothi, Majalta, Moungri, Narsoo, Panchari, Parli Dhar, Ramnagar, Sewna, Tikri, Udhampur. Total number of towns

are 04- Udhampur, Ramnagar, Chenani and Kud. There are 01 Municipal Council in Udhampur and 02 Municipal Committees in Ramnagar and Chenani. There are 357 Villages in Udhampur district, and the number of Panchayats is 236. The district of Udhampur is located in the Shivalik range of Himalayas and the terrain is mostly mountainous. The upper reaches of the district experience snowfall in the winter season. The city itself is in a relatively flatter part of the district at an elevation of 756 metres (2480 feet) and it rarely experiences any snowfall. The city's climate is subtropical. Summer temperatures may exceed 40 degrees while temperatures below freezing have been recorded in winter. The annual rainfall is 130 cm, mainly in monsoons and winters.

The component 3 of "Jhelum and Tawi Flood Disaster Recovery Project" 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 by 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. There was persistent demand from the public of the area for construction of the said bridges to provide connectivity to the people of the area and the proposal for construction of new bridges had subsequently been submitted to higher authorities.

3.2 Project Location and Outline

The project area is located in Kaunullah village of Ramnagar tehsil of Udhampur, JKUT. Kaunullah village is located at a distance of about 18 km Udhampur City and at a distance of about 21 km from Ramnagar town. At the proposed site, two bridges have been proposed be constructed on the Ghordi Nallah and Barmeen Nallah respectively of 58.0 m and 50.0 m length. During high precipitation in the rainy season, the villages across the Ghordi Nallah and Barmeen Nallah gets disconnected with other habitations and people of the area especially students, patients face a lot of difficulties in absence of connectivity over these two Nallahs. To address the demand of the public, it was proposed to construct "Construction of 58.0 mtr span (2- Lane) Steel motorable bridge from Katheel Ganjoo to Barsoa over Ghordi Nallah and 50.0 mtr span (2-lane) motorable bridge from Barsoa to Patri over Barmeen Nallah" under Jhelum and Tawi Flood Recovery Project (JTFRP). The proposed work "Design and Construction of 58.0 mtr span (2- Lane) Steel motorable bridge from Katheel Ganjoo to Barsoa over Ghordi Nallah and 50.0 mtr span (2-lane) motorable bridge from Barsoa to Patri over Barmeen Nallah Ramnagar (Complete Job) in Udhampur District" to be carried out in the tehsil Ramnagar of Udhampur district would connect the villages like (a) Kuhnallah, (b) Barta, (c) Barshua, (d) Bari, (e) Sanetar and (f) Bhatyari of the area. Barmeen nallah and Ghordi nallah are perennial in nature and people cross these nallahs by foot during dry season as water level comes down whereas during rainy season people usually takes other long route to reach their destinations. As reported during screening exercise, two school children lost their lives while crossing these streams due to flash floods few years back. These two nallahs converge near a small hamlet called Barsoa (Ramnagar block). This small hamlet will first time get road connectivity and presently they have to cover approximately 2.5 kms of distance by foot to get transportation facility site at Kaunullah, Ramnagar, Udhampur District. There has been a long pending demand for the construction of bridges at the proposed site from the public of the area for construction of a motorable bridge to provide connectivity to the

people of the area. The inhabitants living in the villages across the Ghordi Nallah and Barmeen Nallah are disconnected from the main town for want of road connectivity especially during the times of peak waters in the Ghordi Nallah and Barmeen Nullah. Villages across the Nullah are mostly the marginal farmers with small land holdings. Lack of connectivity is major hurdle for inhabitants to sell of their agricultural produce to the local market. A LULC classification of Udhampur district has been provided below:

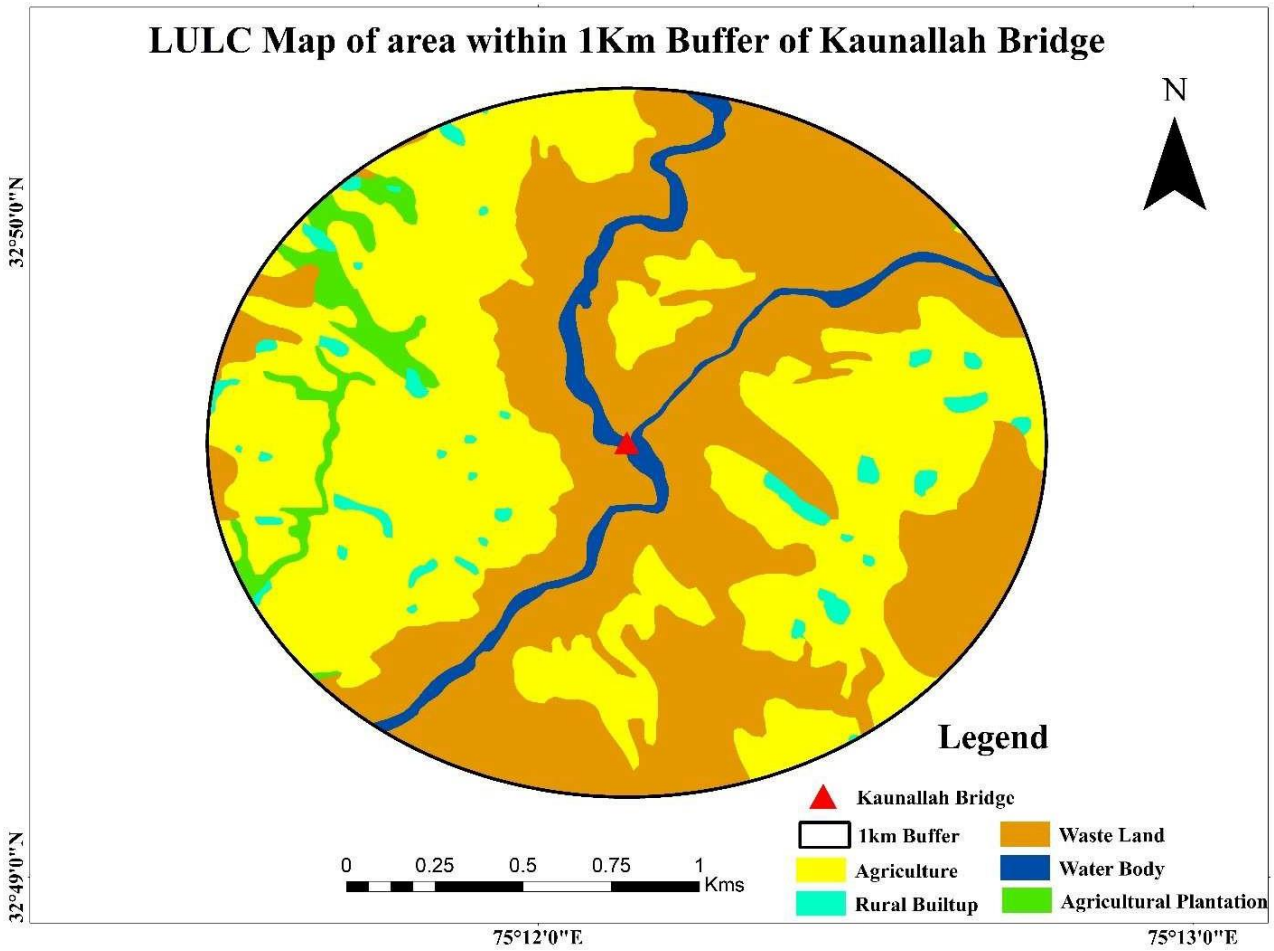


Figure 3.3: Land use Land cover map of proposed Ramnagar bridge, Udhampur

Figure 3.3: Location of bridges at the proposed site

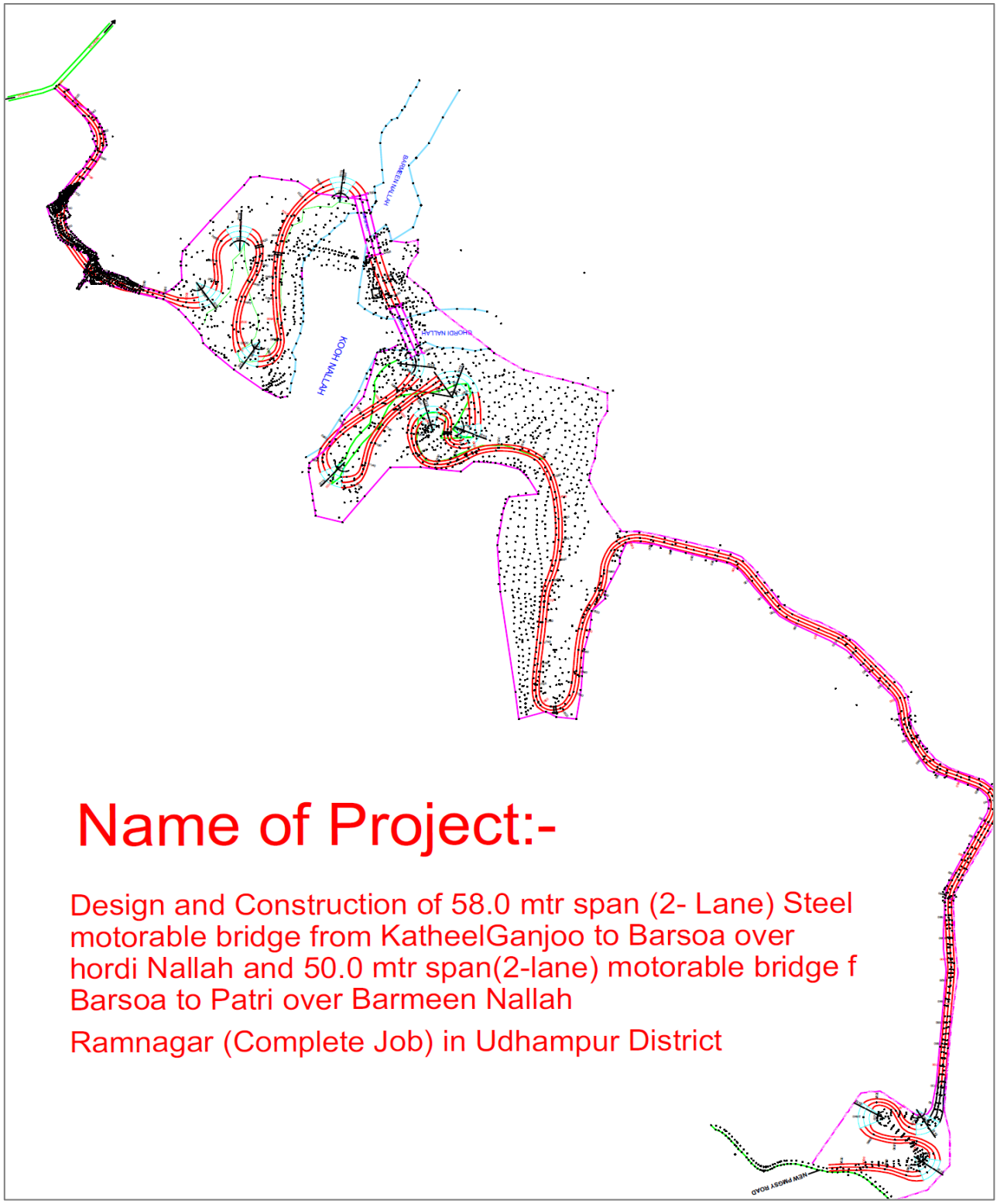


Figure 3.4: Model Plan of the project

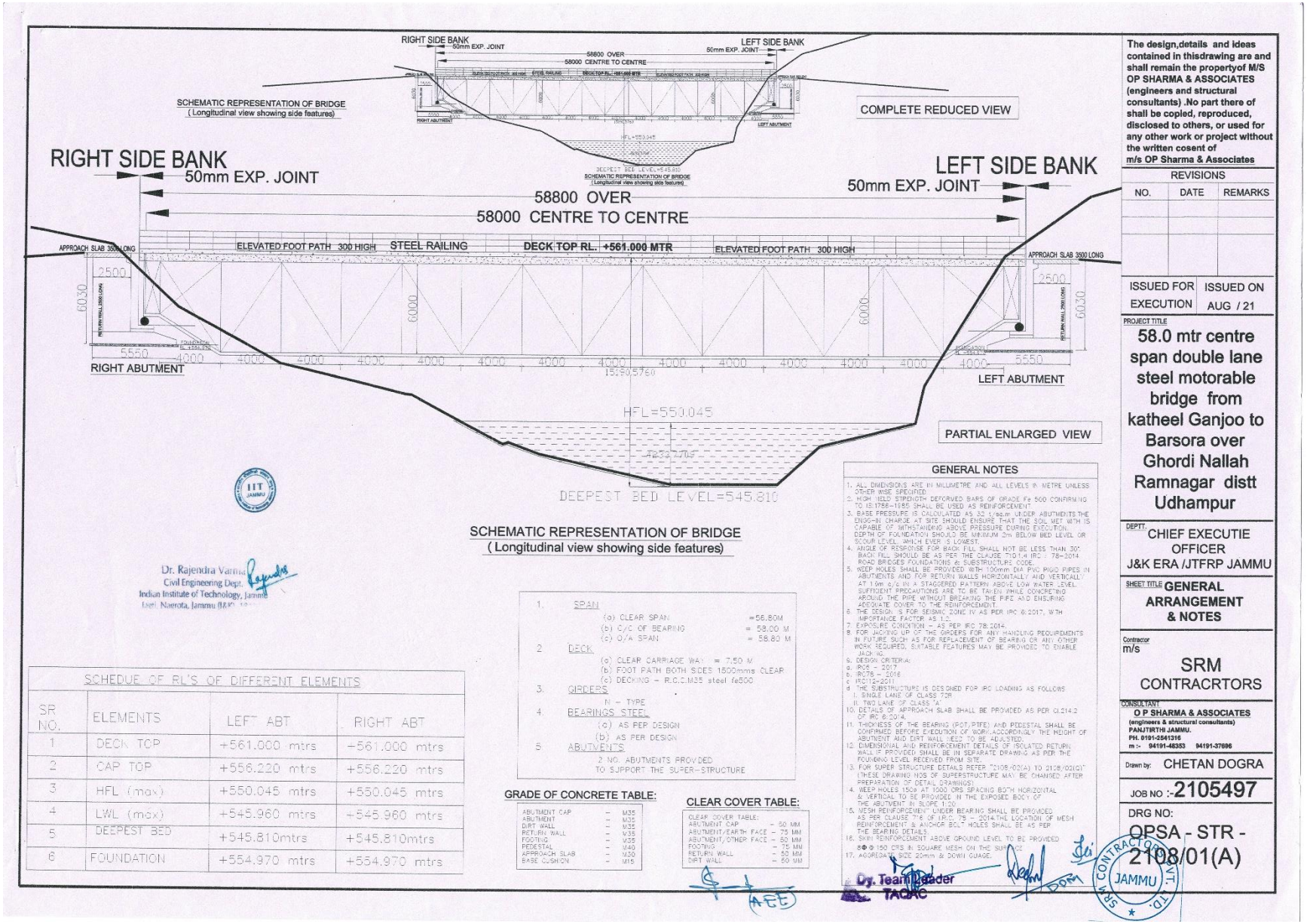


Figure 3.6: Approved dimension details for plier and foundation of the proposed 58.0 mtr span (2- Lane) Steel motorable bridge from Katheel Ganjoo to Barsoa over Ghordi Nallah

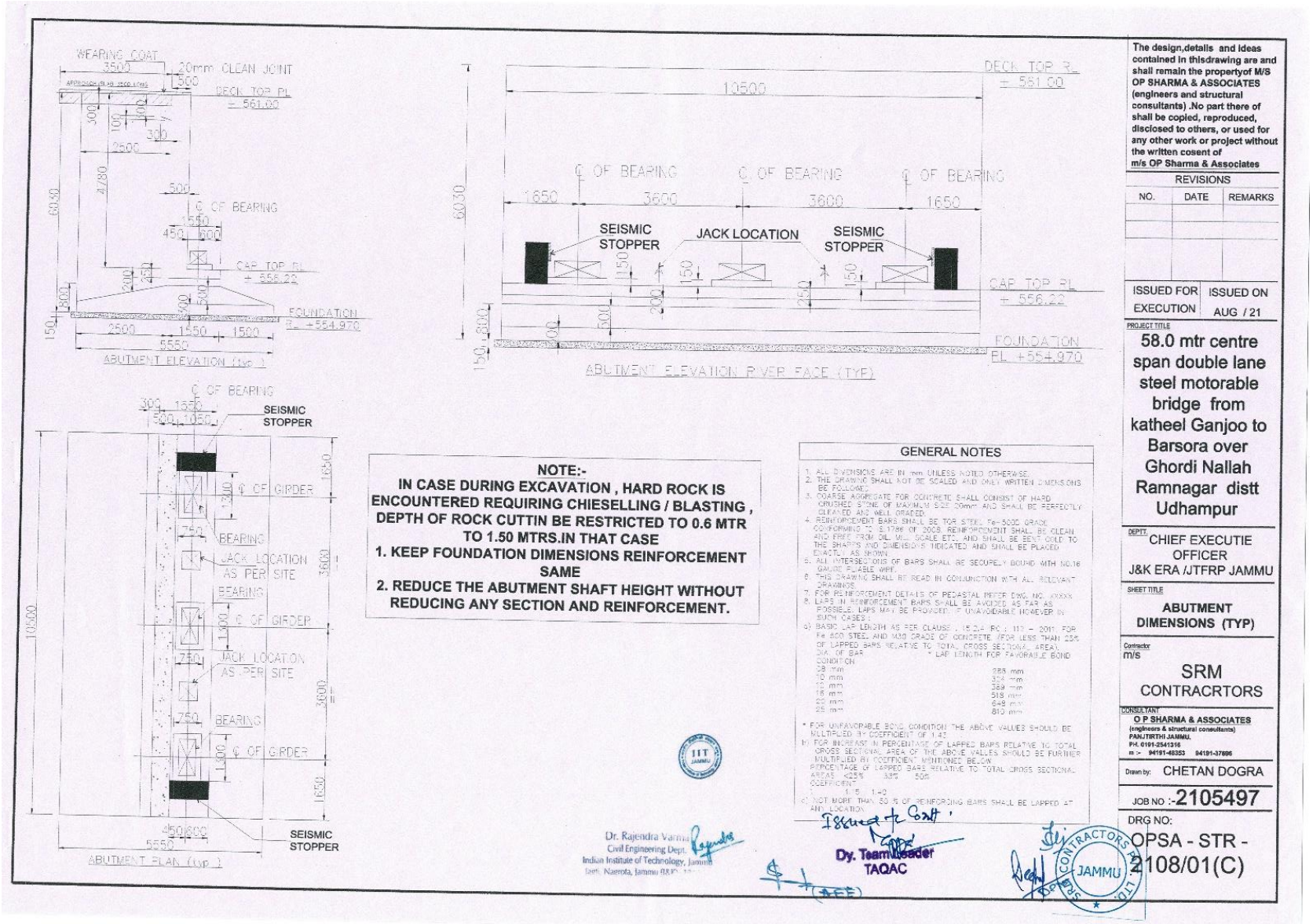


Figure 3.6: Abutment dimensions of the proposed 58.0 mtr span (2- Lane) Steel motorable bridge from Katheel Ganjoo to Barsoa over Ghordi Nallah 3.3 Applicability of Abutment Parts

3.7 Topography and Physiography of Bridges:

Topography around the proposed bridge at propose site is undulated. On both the east as well as on the west side of the proposed site, the terrain is hilly. Agricultural fields are located towards the western end of the bridge, while eastern side is predominantly a shrub dominated area. The area is flood prone, in September 2014 unprecedented flood was experienced in Ghordi Nallah Barmeen Nallah Nullah over which the bridge is proposed to be constructed.

4. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

This chapter presents the national and local environmental legislation and regulations; and the World Bank policies, which applies to the proposed project entitled as "Design and Construction of 58.0 mtr span (2- Lane) Steel motorable bridge from Katheel Ganjoo to Barsoa over Ghordi Nallah and 50.0 mtr span (2- lane) motorable bridge from Barsoa to Patri over Barmeen Nallah Ramnagar (Complete Job) in Udhampur District". The various principles are applicable and regulatory clearances required for the bridge project has also been incorporated in this section.

4.1 Legal Framework

The Government of India has laid out various policy guidelines, acts and regulations of 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 State Pollution Control Board (JKSPCB) at the local level in the present context to the proposed bridge project at Ramnagar.

4.2 Applicable National and Local Regulations

The key environmental and other regulations relevant to the proposed "Design and Construction of 58.0 mtr span (2- Lane) Steel motorable bridge from Katheel Ganjoo to Barsoa over Ghordi Nallah and 50.0 mtr span (2- lane) motorable bridge from Barsoa to Patri over Barmeen Nallah Ramnagar (Complete Job) in Udhampur Districtis presented in Table 4.1

Table 4.1: Environmental Regulations Relevant to construction of 58 m bridge over Ghordi Nallah and 50 m bridge over Barmeen Nallah in tehsil Ramnagar of Udhampur District is presented under

S. No.	Environmental and Other Regulations	Relevance to the Proposed Bridge Project	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 erstwhile state or the Government is not triggered.	The bridge project is not covered under the preview of EIA Notification 2006 and subsequent amendments. However, for the 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 construction of bridges in Ramnagar 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 **58.0 mtr span (2- Lane) Steel motorable bridge from Katheel Ganjoo to Barsoa over Ghordi Nallah and 50.0 mtr span (2-lane) motorable bridge from Barsoa to Patri over Barmeen Nallah Ramnagar** 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 the 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 construction of 3x55m bridge at Dalhan Poonch 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, before construction works.	J&KSPCB, Government of J&K
5.	Water Prevention and Control of Pollution) Act,1974	This act is applicable for the construction of proposed bridges 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, before construction works.	J&KPCB, 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 construction of 3x55m bridge at Dalhan Poonch regulate ambient noise levels The standards for noise for day & night have been promulgated by the MoEF&CC for various land uses. This act will be applicable to regulate noise nuisance during the construction phase	Noise levels are to be controlled during construction works for the proposed at Ramnagar in conformity with permissible standards	J&KPCB, Government of J&K
7.	Construction & Demolition Waste Management Rules, 2016	This rule shall apply 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, before the commencement of works	Municipal Corporation
8.	Wetland (Conservation and Management) Rules, 2017	This rule prohibits a range of activities in wetlands like settling up and expansion of industries, waste dumping, effluent discharge.	No wetland is located near or within the project influence area. Not Applicable	Local Wetland Authority
8.	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 the proposed bridge at Ramanagar.	Project operations are to be insured by the contractor to cover damage to the public life and/or property due to accidents/ negligence during the construction of the proposed bridge.	Local 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 proposed construction	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 bridge 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 apply 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&KPCB
13.	Solid Waste Management Rules, 2016	This rule applies 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, before the 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.	NONE	J&K Forest Department
15	The Ancient Monuments and Archaeological Sites and Remains Act, 1958, and the rules, 1959 guide for carrying out activities, including conservation, construction and reuse in and around the protected monuments.	Applicable only for chance finds.	For chance finds the provisions laid out in the act will be applicable. .	ASI Archaeological Survey of India

Table 4.2: Applicable State/U.T and National regulations

S.No	Act/Rules	Purpose	Remarks on Applicability
Land Acquisition and R&R			
1.	Land Acquisition Act 1990 (1943 AD)	The act provides the legal framework for land acquisition for public purposes in J&K. It enables the J&K Government to acquire private lands for public purposes and seeks to ensure that no person is deprived of land except under the act.	The sub-project can be categorized as Category S-2 as per ESMF. The project involves land acquisition for approach road to the bridge. However, this shall be donated by the landholders.
		The general process for land acquisition under the act is: Private Negotiation and /or Compulsory acquisition under the provision of the act.	
Labour			
2.	Workmen Compensation Act, 1923	It provides for payment of compensation by employers to their employees for injury by accident i.e. personal injury or occupational disease.	Awareness workshop for construction workers will be conducted
3.	Inter-state Migrant Workers Act, 1979	It protects workers whose servicesare requisitioned outside their native states in India. The contractor who employs or who employed five or more Inter-State migrant workmen need to obtain registration under this act	Awareness workshop for construction workers will be conducted
4.	The Child Labour (Prohibition & Regulation) Amendment Act, 2016	It prohibits the employment of children in certain specified hazardous occupations and processes and regulates the working conditions in others.	No child labour shall be employed on the subproject at any stage
5.	Minimum Wages Act, 1948	Payment of minimum rate of wages as fixed and periodically revised by the Local Government	Provision of minimum wages shall be followed
6.	Building and Other Construction Workers Welfare Cess Act, 1996	An Act to provide for the levy and collection of a Cess on the cost of construction incurred by employers.	Awareness workshop for construction workers will be conducted

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. The 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 3x55m span Bridge on Ghordi Nallah and Barmeen Nallah at Ramnagar in District Udhampur are given in Table 4.3.

Table 4.3: Relevant and Applicability of WB Safeguard Policies for Construction of 58 m bridge over Ghordi Nallah and 50 m bridge over Barmeen Nallah in tehsil Ramnagar of Udhampur District.

S. No.	World Bank Safeguard Policy	Key Features	Policy Applicability to Sub Project	Policy Triggered Or Not

1.	OP/BP 4.01 Environmental Assessment	An overall all governing policy intended to ensure Bank-financed projects are Environmentally sound and sustainable	All potential impacts due to the construction of proposed bridges to be assessed and necessary mitigation measures are to be incorporated accordingly.	Triggered
2.	OP/BP 4.04 Natural Habitats	The 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 site for construction of proposed bridges is not located in any forest area/ national park or wild sanctuary.	Not Triggered
3.	OP/BP 4.36 Forests	The policy is intended to support sustainable and conservation-oriented forest management, harness potential of forests to reduce poverty sustainably, integrate forests into sustainable economic development and protect vital local and global environmental services and values of forests.	The project site for construction of proposed bridges is not located in any forest area. ____	Not Triggered
5.	OP/BP 4.11 Physical Cultural Resources	The 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.	The proposed bridge site along with the approaches at Ramnagar does not have any cultural property resources (CPR) and therefore does NOT warrant shifting or affect CPRs. However, there may be a direct or indirect impact on nearby cultural properties	Triggered

MoRTH & IRC Specifications

Section 111	**Precautions for safeguarding the environment**
Clause 201.2	Preservation of Property/Amenities during clearing and grubbing
Clause 301.3.2	Stripping and storing of topsoil for reuse during excavation for roadway and drains
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

4.4 Applicability of International Conventions

Ramsar Convention on Wetlands of International Importance, 1971 (Not Applicable for the proposed Bridge project). 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 for the proposed Bridge Project). 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.

4.5 Indian Road Congress (IRC) Code of Practices

Key Indian Road Congress (IRC) Code of Practices applicable for the project concerning the environment are given below:

Table 4.4: Indian Road Congress Code of Practices

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 waterlogged 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
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.	Guidelines on Preparation and Implementation of Environment Management Plan	IRC:SP-108-2015	Preparation and Implementation of Environment Management Plan	Yes

4.6 Environmental Standards

Various environmental standards like National Ambient Air Quality Standards, Ambient Noise Standards, Drinking Water Standards applicable to the construction of **58 m bridge over Ghordi Nallah and 50 m bridge over Barmeen Nallah in tehsil Ramnagar of Udhampur District** 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

Table 4.5: 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)	8 hours*	0.50	0.50
	1 hour**	1.0	1.0

mg/m^3			
Ammonia (NH_3) $\mu g/m^3$	Annual* 24 hours**	100 400	100 400
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			

Table 4.6: 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 remises 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.

Table 4.7: 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 (CI)	600	Argentometric Titration
8	Total Dissolved Solids	1500	Gravimetric Analysis
9	Sulphates (SO4)	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

5. BASELINE ENVIRONMENTAL CONDITIONS

5.1 General

Udhampur district is situated in southeastern part of Jammu and Kashmir state and is bounded in the west by Rajouri district, in the north by Anantnag district, in the north east by Doda district, in the south east by Kathua district and in south west by Jammu district. The district headquarter at Udhampur town lies between 32°34' & 39° 30' North latitudes and 74°16' & 75°38' East longitudes. The district has a total geographical area of 4540 sq km. The National Highway NH-IA connects the area with the rest of the country. All tehsil and block headquarters of the district are well connected by roads. The district is divided in to 5 tehsils (Udhampur, Ramnagar, Chenani, Reasi and Gool Gulabgarh) and 07 blocks, 204 panchayats and 602 villages. There are 8 towns in the district Udhampur. Patnitop and Kud are the summer hill resorts of the district whereas the lake viz. Mansar Lake enhances the beauty of the district.

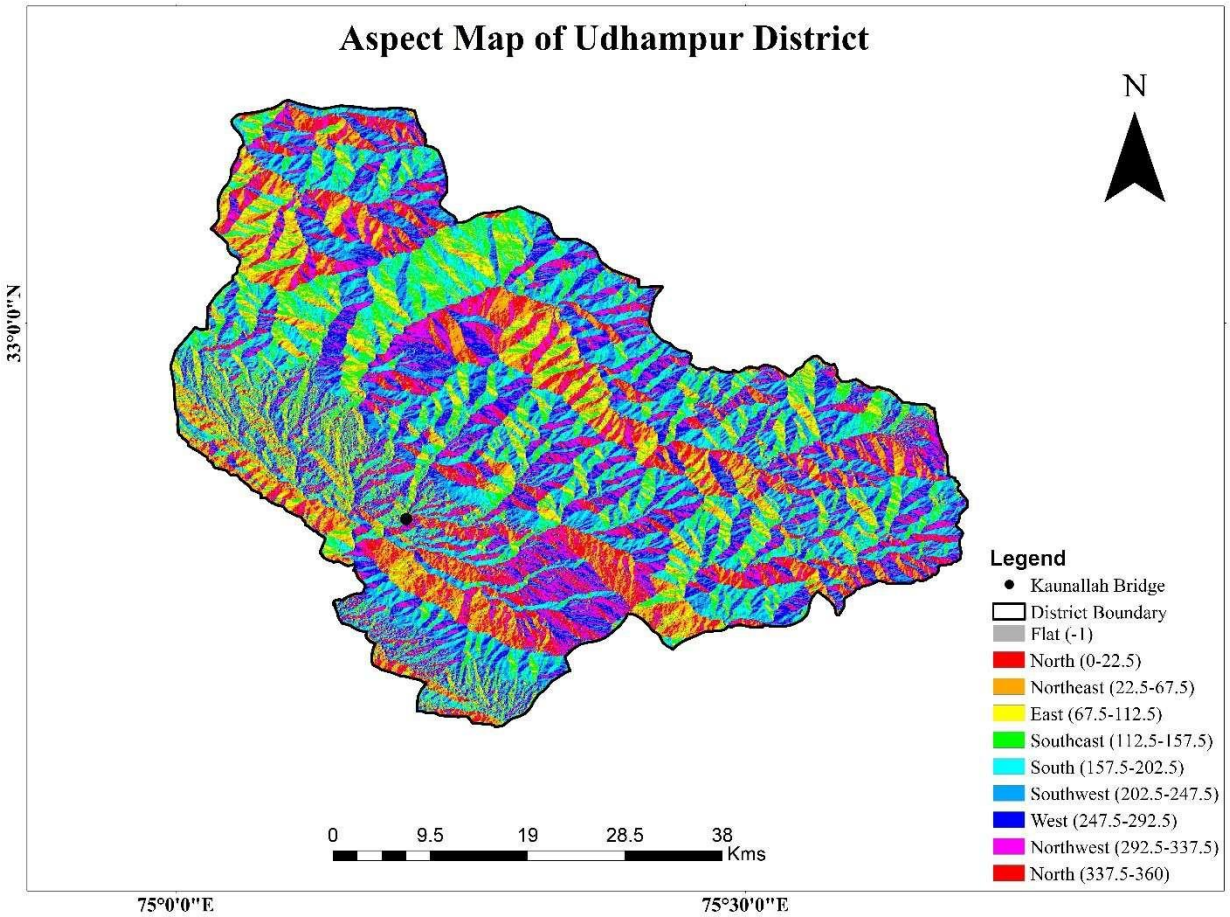


Figure 5.1: Aspect map of District Udhampur, Jammu and Kashmir

As per the 2011 Census, the population of the district is 870,071 persons which are about 6.93% of the total State population. The population density of the district is 211 persons per sq km. The percentage of urban population is only 29.15%. The rural and urban population is 525859 and 116627 respectively. The district has

sex ratio of 863 and literacy rate as 69.90%. Since the district lies in the mighty Himalayan Range, very small portion of the district (only 17% of total reporting area) is available for cultivation. Agriculture is the main source of livelihood as nearly more than 70% of working population is engaged in agriculture. According to village papers, Total area of district is 4310.11sq km, Forest area is 1917.74 sq km, area not available for cultivation is 1075.35 sq km, net area sown is 696.32 sq km and the areas under miscellaneous tree crops is 181.30 sq km. Total area under forest in the district is near about 44.49%.

Maize is main Kharif crop which comprises of 50.1% of the total cropped area. Other Kharif crops viz. Bajra is sown in small area. Rice is sown in only 98.52 Sq.km (8.8%) especially in the terraces deposits, wheat constitutes 36.2% of the total cropped area. About 5.0% of the total area sown in the district is irrigated which shows that 95% of cultivation is till dependent on rainfall. Canals provide bulk of irrigation. Khuls (diversion canal) is a traditional irrigation system in district Udhampur. The net area irrigated (2009-10) by different source is 50.43 sq.km Out of this, area irrigated by canals is 48.07 sq.km, by tank it is 0.07 sq.km and from other sources it is 2.29 sq.km. Due to variation in altitude from 600 to 3,000 meters above mean sea level. There is a wide variation in climatic conditions in different parts of the district experiencing a typical temperate climate in high altitude which experience snowfall and cold winter whereas tropical climate at low altitude. The summer season starts from April to June followed by rainy season from July to September. The October and November although generally dry and most pleasant season of the year. The winter season begins from December and ends in March.

The high altitude areas experience very cold winter and mild summer. The temperature in the snowfall zone varies between sub-zeros to about 35°C. Sub-tropical climate prevails in the low altitude area where there is cold winter but scorching summers. In Udhampur, temperature rises continuously after January and May is the hottest month (max. 42°C, min. 23°C) and January is coldest month (max. 17.4°C and min 2.8°C) of the year. Normal annual rainfall at Udhampur is 1400 mm. Mostly rainfall (~70% of the total annual rainfall) is received from southwest monsoon. The monsoon usually arrives in the first week of July and remains active up to September. Rainfall is also received during winter season due to western disturbances. Monthly rainfall of Udhampur district for the year of 2010 is plotted on graph given below. Places of interest to visit in the Udhampur are Panchari, Mongri, Kud, Jug Dhar, Sudhmahadev, Mantalai, Dudu-Basantgarh, Ramnagar. Patnitop and Sudh Mahadev are well known tourist places. The rich habitat diversity of the Udhampur district offers vast geographical and climatic conditions congenial for a correspondingly rich floral and faunal biodiversity. The forest in the Udhampur are broadly classified into following categories:

1) Alpine Forest: Only few plants species exist in this type of forest due to extreme climatic conditions. However, these are rich in herbaceous flora. The main Broad Leaved species present are Rhododendron campanulatum, Betula utilis with Viburnum and Euhorbia species

2) The Deodar – Kail Forests which occur between 1700-2500 m elevations. The common floral species in such forests includes *Quercus leucotrichophora* (Banj Oak), *Quercus floribunda* (Moru Oak), *Toona ciliata* (Hill Tum-Deri), *Aesculus indica* (Ban Kher), *Prunus cerasoides*(Bharat), *Juglans regia* (Walnut), *Fraxinus hookeriana* (ash), *Machilus duthei* (Sangla) and *Alnus nitida, Berberis lycium, Indigofera heterantha, Princepia utilis, Desmodium elegans, Rubus niveus, Parrotiopsis jacquemontiana, Viburnum grandiflorum, Daphne cannabina* etc..

3) The Fir *Forests* lies between 2100-3700m. Common species found in such forests are Fir *(Abies Pindrow)*

& Spruce (Picea smithiana) Other species found are Acer species, Horse Chestnut, Walnut, Ash etc.

4) Chir *(Pinus roxburghii) Forests having the* main crop in the low lying areas of tract is Chir pine (*Pinus roxburghii*), which being a heavy light demanderm occurs almost pure in the main stretch. Chir occurs between 500 to 1700m elevations. Chir forests are well developed between in the low lying areas of the entire Division. It is often found associated with many broad leaved species. The proportion of broad leaved species increases both along lower and upper limits of Chir. The chief associates on the lower limits are *Dodonaea viscosa* (Santha), *Carissa opaca* (Carna), *Mallotus philippensis* (Kamila), *Woodfordia fruticosa* (Lhawi), *Euphorbia royleana* (Thohar), *Emblica officinalis* (Aunia), *Acacia modesta* (phulli), *Cassia fistula* (Amaltas), *Adhatoda vasica* (Branker), *Myrsine africana*, *Berberis lycium* (Kameloo), *Zizyphus jujuba* (Ber), *Rubus ellipticus* and occasional *Pyrus pashia* (Batang).

5) The Oak forests have in Udhampur division have all the three Oak species e.g *Quercus leucotrichophora* (Banj), *Quercus floribunda* (Moru) and *Quercus semicarpifolia* (Kharshu). Banj oak occurs in appreciable stretch either in pure or admixture with Machilus, *Rhododendron arboreum*, *Lyonia ovalifolia* and *Olea ferruginea*. Kharsu Oak caps fir forests mostly in pure form. Out of the three, *Quercus floribunda* is the one which is subjected to heavy lopping and exists in a limited scale.

6) Scrub Forests are mostly occupy low lying areas of Udhampur Range confined to lower limits of Chir forests. *Buxus wallichiana* locally known as "Chikhri" is found in compartments. Common trees found in *Acacia modesta* (Falaii), *Acacia catechu* (Khair), *Bombax ceiba*, *Cassia fistula*, *Dalbergia sissoo*, *Ehretia laevis*, *Syzygium cumini*, *Flacourtia indica*, *Grewia optiva*, *Lannea coromandelica*, *Olea ferruginea*, *Pistacia integerrima*, *Emblica officinalis*, *Zyzyphus jujuba*, *Ficus bengalensis* and *Mangifera indica*

5.2 Study Area (Project Location and Outline)

The project area is located in Kaunullah village of Ramnagar tehsil of Udhampur, JKUT. Kaunullah village is located at a distance of about 18 km Udhampur City and at a distance of about 21 km from Ramnagar town. At the proposed site, two bridges have been proposed be constructed on the Ghordi Nallah and Barmeen Nallah respectively of 58.0 m and 50.0 m length. During high precipitation in the rainy season, the villages across the Ghordi Nallah and Barmeen Nallah gets disconnected with other habitations and people of the area especially students, patients face a lot of difficulties in absence of connectivity over said Nallah. To address the demand of the public, it was proposed to construct "Construction of 58.0 mtr span (2- Lane) Steel motorable bridge from Katheel Ganjoo to Barsoa over Ghordi Nallah and 50.0 mtr span (2-lane) motorable bridge from Barsoa to Patri over Barmeen Nallah" under Jhelum and Tawi Flood Recovery Project (JTFRP).

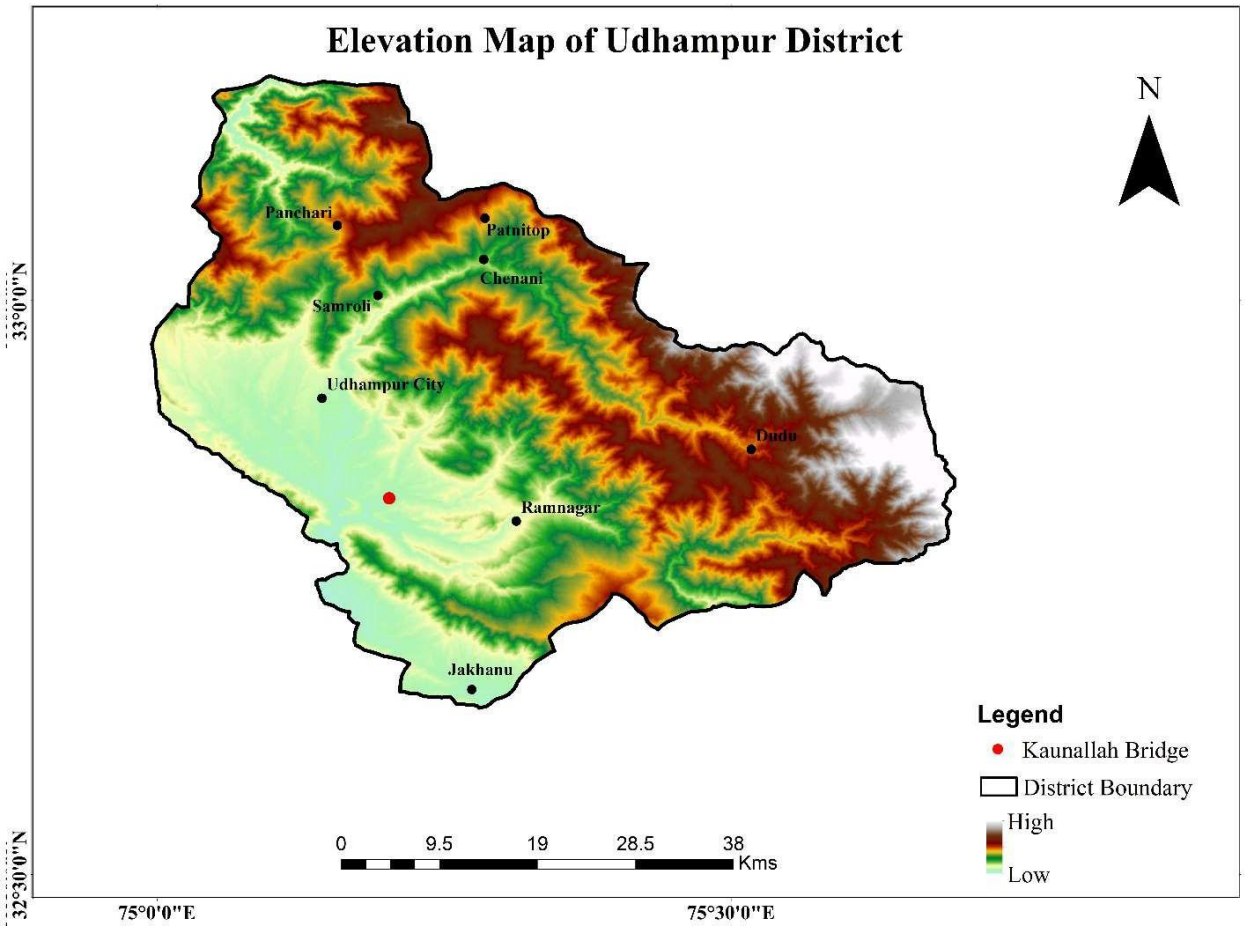


Figure 5.2: Map showing elevation profile of District Udhampur, Jammu and Kashmir

Since the district lies in the mighty Himalayan Range, very small portion of the district (only 17% of total reporting area) is available for cultivation. Agriculture is the main source of livelihood as nearly more than 70% of working population is engaged in agriculture. Total area of district is 4310.11sq km, Forest area is 1917.74 sq km, area not available for cultivation is 1075.35 sq km, net area sown is 696.32 sq km and the areas under miscellaneous tree crops is 181.30 sq km. Total area under forest in the district is near about 44.49%. Maize, Wheat and Paddy are the principal crops of the district. Maize is harvested in Kharif season whereas wheat in Rabi season. Other crops grown in the area are Rice, Bajra, Whaet, Barlet, Millet, Pulses, Fodder crops, Oil seeds, etc There is well established rail and road connectivity to the Udhampur district. Udhampur is located on National Highway NH-44, which is the only national highway that connects Srinagar to the rest of India. Bus services (both private and state owned) are the most common mode of public transportation to and from Udhampur.

The proposed bridges are to be constructed near the Kaunallah village of tehsil Ramnagar of Udhampur District. The land-use/ land-cover are mainly agricultural, residential set-up in pockets, and patches of forests etc.

5.3 Geomorphology, Soil Type & Hydrogeology

5.3.1 Geomorphology

Physiographically, the district is characterized by mountain ranges trending NW-SE direction, deep narrow valley and terraces, valley fill deposits with gentle slopes. The district is covered partly by Pir Panjal ranges and partly by Outer Himalayas. The altitude of Udhampur district varies from 600 to 3000 meters above mean sea level. The gentle terrain occurs in southern and southwestern part while in northern part is covered by complex and high mountainous terrain. Major slope of the terrain is towards south and southwest. The hilly terrains with high hills exist in the northern and eastern part of the area and vary in elevation from 1100 m to 2400 m amsl. Structural hills belonging to Murree and Siwalik groups are mostly longitudinal with altitude varying between 700 m to 2200 m amsl. Five river terraces are occurring on either bank of Chenab River. In this area between Talwara and Derababa these are developed in pairs along the riverbank, known as paired terraces. Near Reasi, a Bida etc. non-cyclic terrace moderately dissected by various streams. The alluvial terraces are also observed along is the Tawi River. Meanders are seen in the lower reaches, scrolls, paleo-channels are common in Chenab and Tawi-Sutlej. Major part of the district is occupied by rocks belonging to Murree and Siwalik formations of tertiary period. Sirban limestone occupies the area north west of Udhampur town near Reasi.

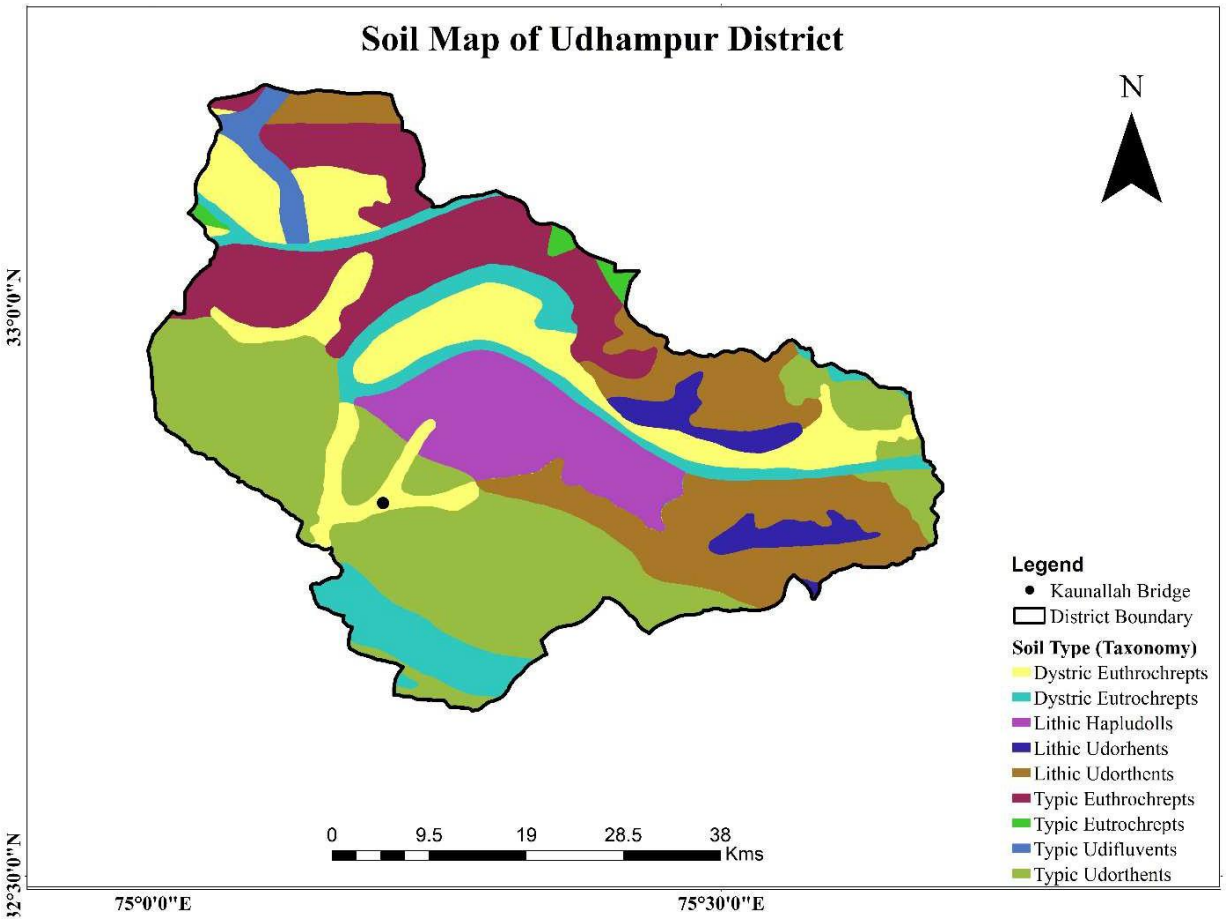


Figure 5.3: Soil Map of District Udhampur, Jammu and Kashmir.

The occurrence of Quaternary alluvium is generally confined to the area bordering the flood plains of the rivers and nalas. Two major terraces deposits occur in the study area. River deposits are observed from Arnas to Akhnoor and Katra along Chenab River. They are grouped in to Vaishno Devi formation, Akhnoor formation and Chenab formation and mainly comprises of boulders, pebbles, cobbles, gravels of angular to sub-angular shape mainly of carbonate rocks. Between Siwalik hill ranges, alluvial terrace deposits occur which are called Udhampur Dun deposits and are important from ground water point of view.

5.3.2 Soil Type:

The high hill slopes of various gradients restrict the development of soil profiles; whereas on gentle slopes of hills, mountainous soil are developed.

Table 5.1 Soil types and characteristics of Udhampur district

S. No	Soil types	Characteristics
1	Sandy loam	Medium O.M. content, Low to medium N and Medium phosphorous and High in K content. Illite is dominating clay mineral.
2	Clay loam	Medium O. M. content, Low to medium N and Medium phosphorous and high in K content. Illite is dominating clay content

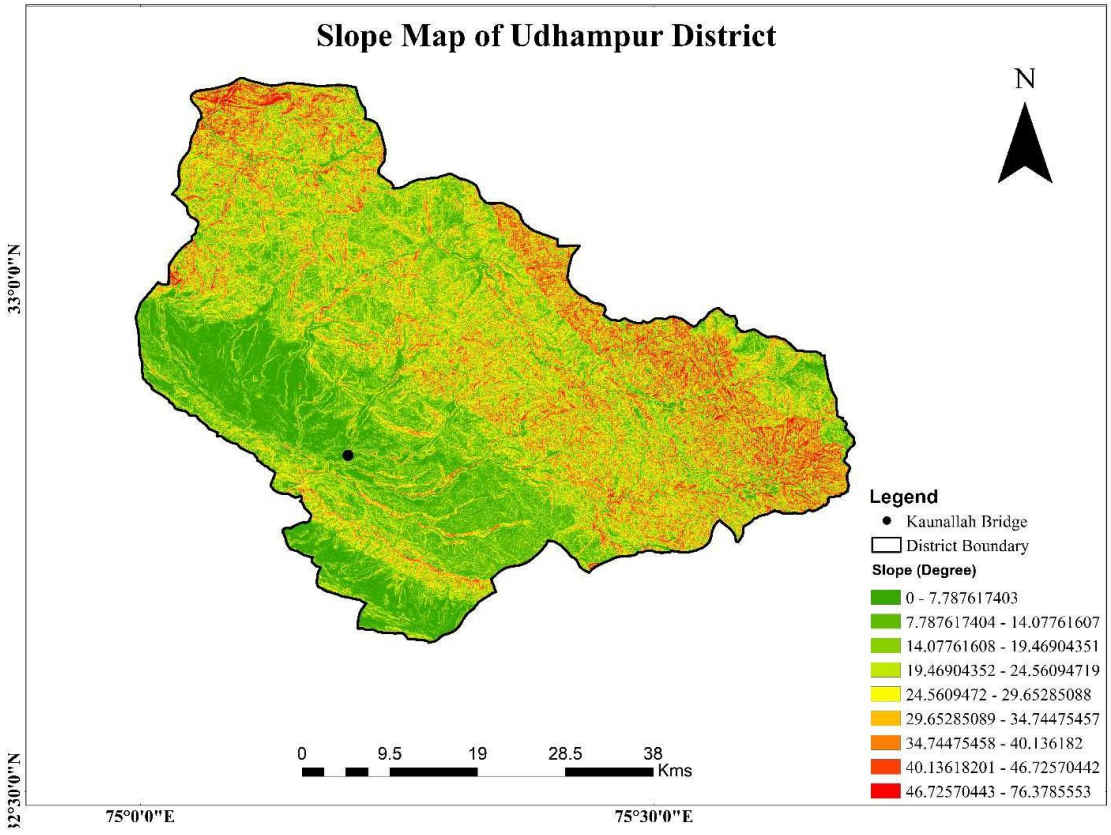


Figure 5.6: Slope Map of District Udhampur, Jammu and Kashmir

5.3.3 Hydrogeology:

Geologically, Stratigraphic Succession in the district ranges from Archean to Recent period as under.

Table 5.2: Stratigraphic succession in Udhampur district

Age	Group/Formation	Lithology
Recent to Sub-recent	Alluvium/Terrace deposit	-
Pliocene to Pleistocene	Upper Siwalik	Sandstone, mudstone, pebble beds and boulder, conglomerate
Late Miocene	Middle Siwalik	Sandstone with interbedded mudstone
Late Miocene to Middle Miocene	Lower Siwalik	Sandstone, mudstone, conglomerates
Early Miocene to Pliocene	Murree Group	Sandstone, claystone, shale, sandstone
----------Unconformity----------		
Eocene	Subathu formation	Nummulitic limestone, shale sandstone
Precambrian	Salkhala Group	Phyllite, Schist, Gneiss and Quartzite with granodioritic intrusive
Precambrian	Sirban limestone	Dolomitic limestone with quartzite on top

(Source: CGWB Report)

Ground water in the area occurs under water table condition in alluvium and confined condition in the underlying rocks of the older age. The ground water occurrence is mainly controlled by topography, drainage, structure and lithology. In the area, ground water occurs in the pore spaces of saturated part of the alluvium and underlying Siwalik groups of the rocks. Springs are common in hard rock/sedimentary formation formed along predominantly weathered zones at the contact of formation in low topographic areas. Rainfall & snowmelt is the main source of recharge to ground water body. Hard rock of Murree, Siwalik and older rocks comprises of fissured formations where ground water occurs in weathered, jointed and fractured parts. Hilly and mountainous areas with steep slopes form run off zones. In general, the ground water potential in Siwalik and Murree formation are poor. In these areas springs are main ground water sources. Springs are the main ground water sources widely distributed at varying altitudes. Majority of springs occur along fracture zones. The discharge of springs varies from less than 1 lps to more than 10 lps. In general, springs from limestone or fracture zones have higher discharges and traditionally been used a dependable source of water supply.

5.4 Natural Hazards

J&K is a multi-hazard prone region with natural disasters like earthquakes, floods, landslides, avalanches, high-velocity winds, snowstorms, cloud bursts, besides manmade disasters including road accidents and fires etc. occurring in various parts of the erstwhile state. Along the subproject areas/ project influence area comes under flood hazard, earthquakes (under Zone-V classification), and man-made disasters including road accidents and fires which is synonymous with the roads in Kashmir due to lack of road safety.

5.5 Floods

Although flooding is a major hazard to lives and infrastructure the world over, mechanism and trends in flood hazards are poorly understood. Normally, the prolonged 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 human life and the infrastructure that cohabit its backyards since millennia.

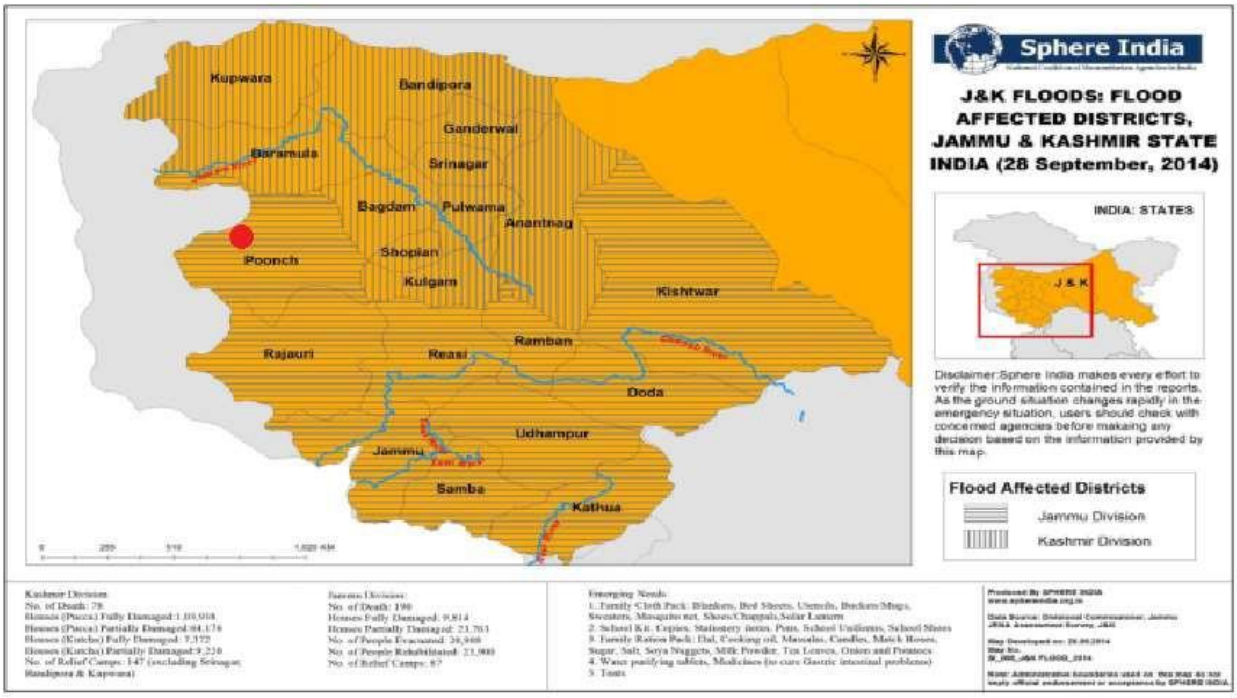


Figure 5.6: Flood Affected District Map (September 2014 Floods in J&K)- **Red dot** showing (only for the illustration) proposed bridge site in Udhampur District

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 destruction of the capital city, Srinagar. Even though there is a 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 flooding. Dilapidated flood control infrastructure, shrinking of the wetlands, deforestation. The importance of road connecting with district headquarters is manifold as discussed above, and it was proposed to construct the bridges at the proposed site. The bridge will also serve indirectly to thousands of other souls of the adjoining areas as it links these areas with their agricultural produce, education, medical facilities etc.

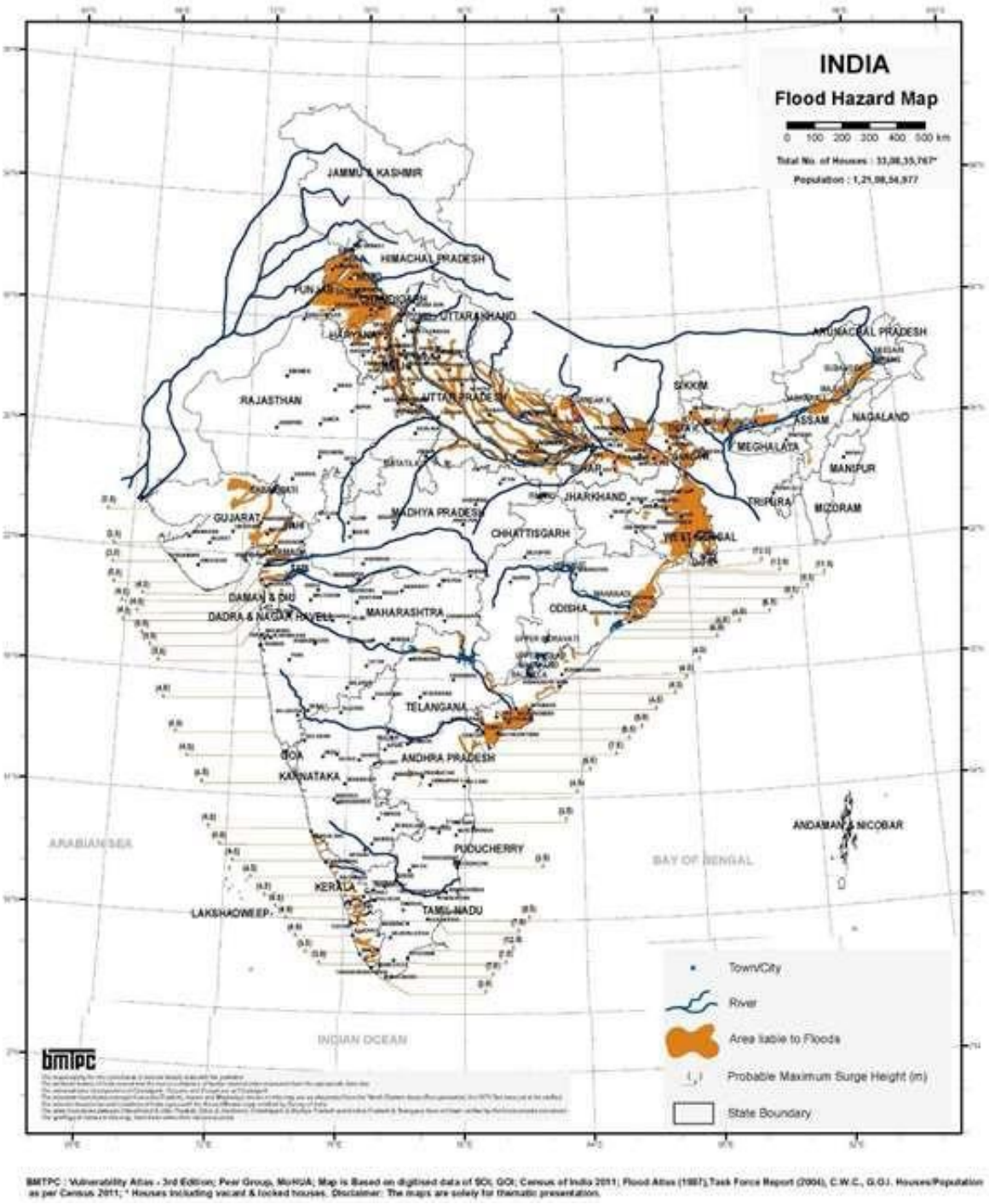


Figure 5.7: Flood Hazard Map of India

5.6 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 ofseismicity 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 Jammu & Kashmir region is the westernmost 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 run 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 erstwhile 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.

5.6.1 Earthquake History

The state of Jammu & Kashmir is the western most extension of the Himalayan mountain range in India. Here it comprises of the Pir Panjal, Zaskar, Karakoram and Ladakh ranges. The boundary of the Punjab plain and the mountains forms the Himalayan Frontal Thrust (HFF), which in this area is the Murree Thrust. The Main Boundary Thrust (MBT) underlies the Pir Panjal Range and is known as the Pir Panjal Thrust in the region. The Zaskar range which are part of the Great Himalayan range are underlain by the Zaskar Thrust. The Kashmir Valley lies between the Pir Panjal and the Zaskar thrusts, making it very vulnerable to earthquakes. Other northern parts of Jammu & Kashmir are heavily faulted. Along the Zaskar and the Ladakh ranges runs a NW-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 further away, as damage from earthquakes depends on numerous factors such as subsurface geology as well as adherence to the building codes. The country has been classified into different zones indicating the intensity of damage or frequency of earthquake occurrences. These zoning maps indicate broadly the seismic coefficient that could generally be adopted for design of buildings in different parts of the country. These maps are based on subjective estimates of intensity from available information on earthquake occurrence, geology and tectonics of the country.

5.6.2 Region-wise major earthquakes in India

India on account of unique geo-physical setting is highly prone to earthquakes of varying intensities. The country has faced several devastating earthquakes in the past resulting in a large number of deaths and severe property damage. During the last century, five earthquakes measuring M8 or more had struck different parts of the country; Great Assam earthquake (1897), Kangra earthquake (1905), Bihar-Nepal earthquake (1934),

Andaman-Nicobar earthquake (1941) and Assam earthquake (1950) had caused untold misery to the affected community and enormous damage to infrastructure and public and private property. In the recent years damaging earthquakes had been experienced in different parts of the country (Table 1) e.g. Assam (1988) M7.2, Bihar- Nepal (1988) M6.5, Uttarkashi (1991) M6.6, Latur (1993) M6.4, Jabalpur (1997) M6.0, Chamoli (1999) M6.8 and Bhuj (2001) M6.9. Some of the earthquake events (Muzaffarabad earthquake, 2005 M7.6; Great Sumatra earthquake, 2004 M9.1), which did occur outside Indian Territory, had a very severe bearing on the nation as well. Table -1, shows region wise frequency of occurrence of earthquakes for last 110 years

Table 5.2: Region-wise major earthquakes in India

Seismic Region	No. of Earthquakes of Magnitude				Return Period
	5.0-5.9	6.0-6.9	7.0-7.9	8.0+	
Kashmir & Western Himalayas	25	7	2	1	2.5-3 yrs.
Central Himalayas	68	28	4	1	1 yrs.
North East India	**200**	**128**	**15**	**4**	**<4 months**
Indo-Gangetic Basin and Rajasthan	14	6	-	-	5 yrs
Cambay and Rann of Kutch	4	4	1	1	20 yrs.
Peninsualr India	31	10	-	-	2.5-3 yrs.
Andaman & Nicobar	80	68	1	1	<8 months

5.6.3 Seismic Zoning

The country has been classified into different zones indicating the intensity of damage or frequency of earthquake occurrences. These zoning maps indicate broadly the seismic coefficient that could generally be adopted for design of buildings in different parts of the country. These maps are based on subjective estimates of intensity from available information on earthquake occurrence, geology and tectonics of the country. The Indian seismic zoning is a continuous process which keeps undergoing changes as more and more data on occurrence of earthquakes becomes available. Considering the recorded history of earthquakes in the country, seismologists have classified 59% of the land mass of India as prone to earthquakes of different magnitudes - 11% in very high-risk zone V, 18% in high risk zone IV and 30% moderate risk zone III. The capital cities of Guwahati and Srinagar are located in seismic zone V, while national capital of Delhi is in zone IV and the mega cities of Mumbai, Kolkata and Chennai are in zone III. 38 cities with population of half a million and above each and a combined population of million are located in these three regions.

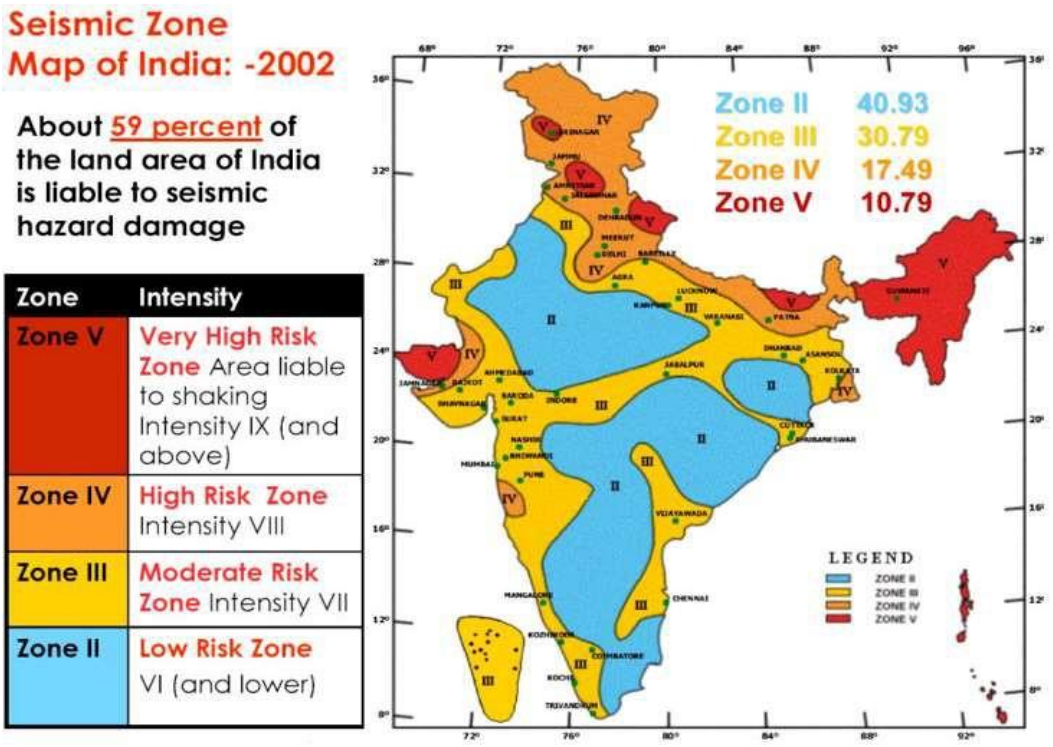


Figure 5.8: Seismic Zonation and Intensity Map of India (Source: National Institute for Disaster Management)

List of Indian standards dealing with Earthquake resistant construction are:

1) IS 1893 (Part 1): 2002 'Criteria for Earthquake Resistant Design of Structures : Part 1 General provisions and Buildings'
2) IS 1893 (Part 4): 2005 'Criteria for Earthquake Resistant Design of Structures : Part 4 Industrial Structures Including Stack Like Structures'
3) IS 4326:1993 Earthquake Resistant Design and Construction of Buildings - Code of Practice
4) IS 13827:1993 Improving Earthquake Resistance of Earthen Buildings - Guidelines
5) IS 13828:1993 Improving Earthquake Resistance of Low Strength Masonry Buildings - Guidelines
6) IS 13920:1993 Ductile Detailing of Reinforced Concrete Structures Subjected to Seismic Forces - Code of Practice
7) IS 13935:1993 Repair and Seismic Strengthening of Buildings - Guidelines

The proposed bridges in the Ramnagar in district Udhampur falls in a seismically active part (Zone-IV). The design parameters for the proposed Bridge conform with the BIS Code of Practice. Keeping in view the maximum credible earthquake magnitudes in the region, the site area is classified in Zone-IV 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:

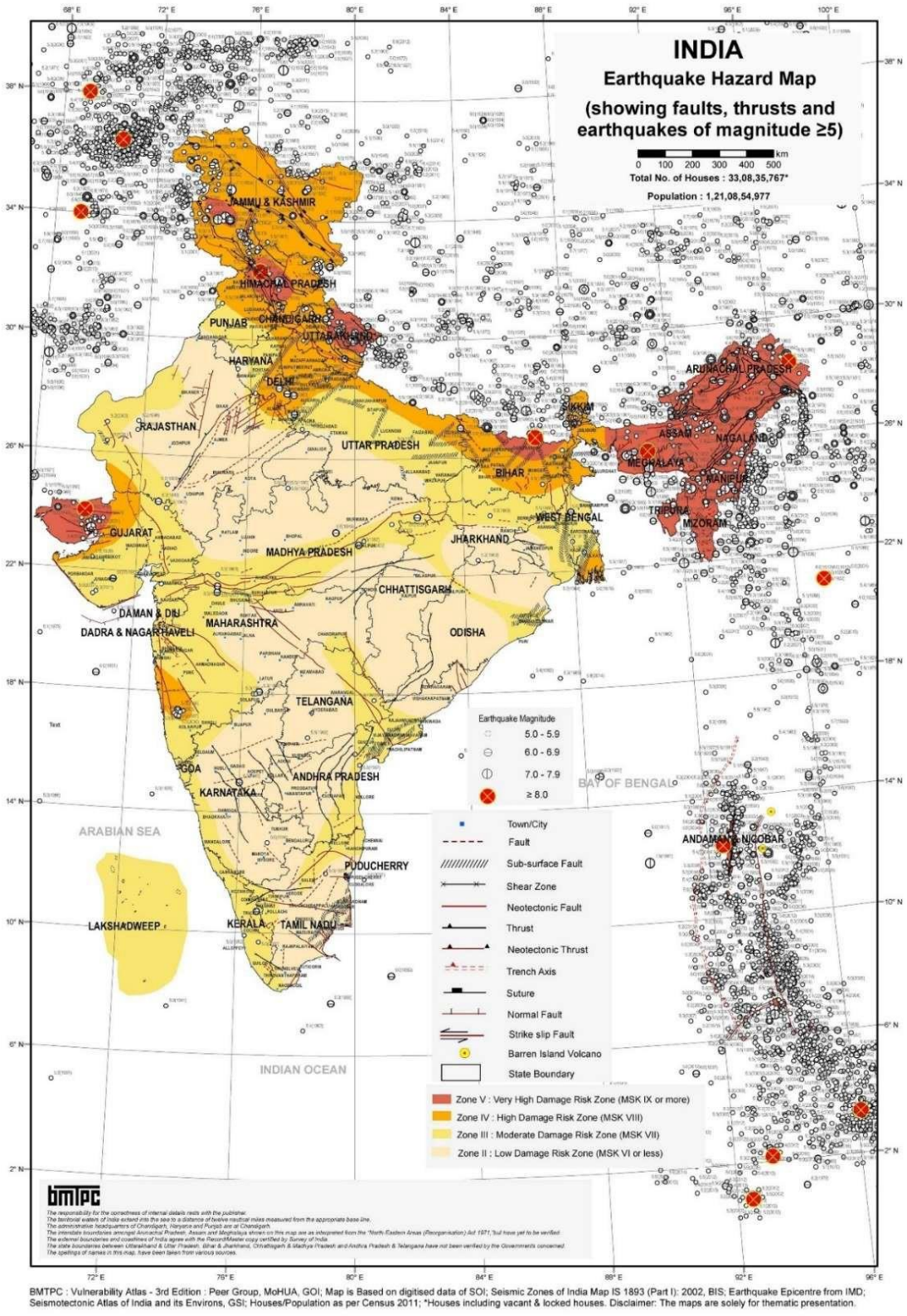


Figure 5.9: Earthquake Hazard Map of India (Source: BMTPC)

5.7 Air Environment:

5.7.1 Meteorology and Climatology

There is a wide variation in climatic conditions in different parts of the district due to variation in altitude from 600 to 3,000 meters above mean sea level. The district experiences a typical temperate climate in high altitude which experience snowfall and cold winter whereas tropical climate at low altitude. The summer season starts from April to June followed by rainy season from July to September. The October and November although generally dry and most pleasant season of the year. The winter season begins from December and ends in March. The high-altitude areas experience very cold winter and mild summer. The temperature in the snowfall zone varies between sub-zeros to about 35°C. Sub-tropical climate prevails in the low altitude area where there is cold winter but scorching summers. In Udhampur, temperature rises continuously after January and May is the hottest month (max. 42°C, min. 23°C) and January is coldest month (max. 17.4°C and min 2.8°C) of the year. Normal annual rainfall at Udhampur is 1400 mm. Mostly rainfall (~70% of the total annual rainfall) is received from southwest monsoon. The monsoon usually arrives in the first week of July and remains active up to September. Rainfall is also received during winter season due to western disturbances.

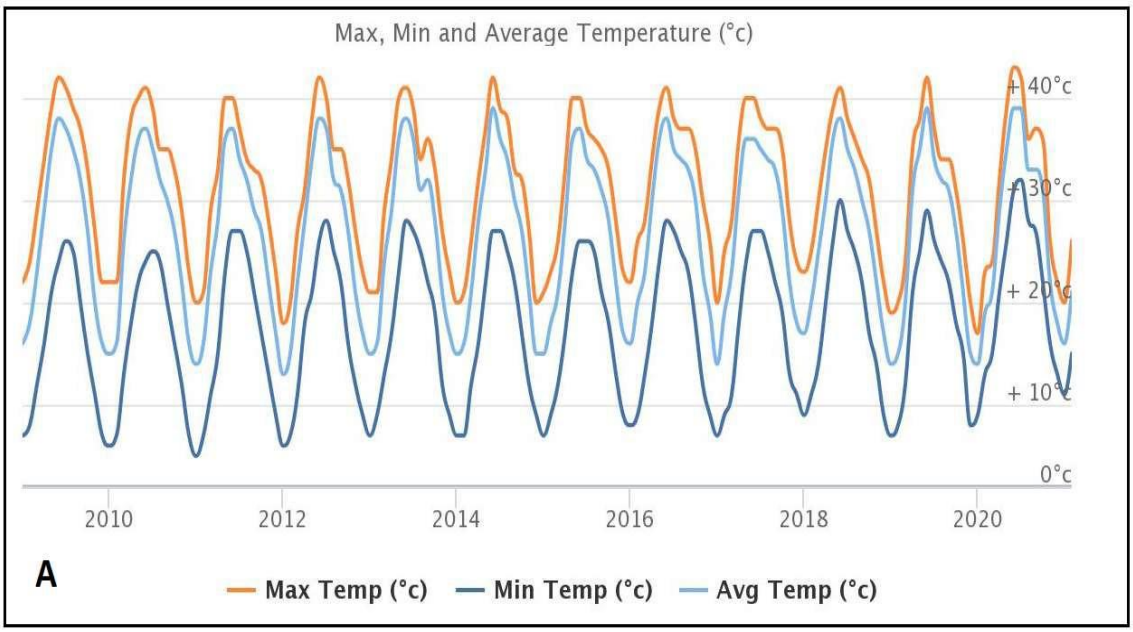


Figure 5.10: Showing annual average variation in Udhampur district

(Source: www.worldweatheronline.com)

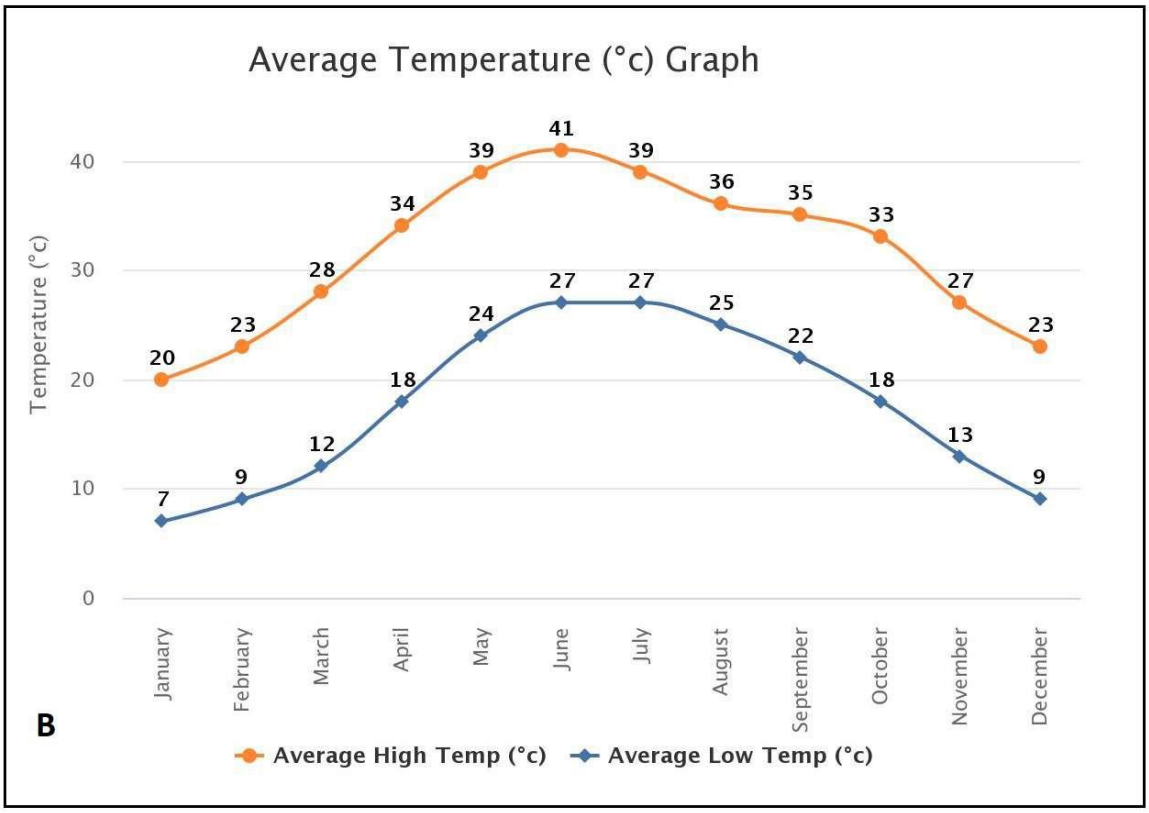


Figure 5.11: Monthly variations in averaged temperatures in Udhampur district

(Source: www.worldweatheronline.com)

Wind speed and wind directions have a significant role in the 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 the upwind direction no effect is observed and in crosswind directions, a 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 northwesterly. In the summer, winds are generally from the north-westerly direction but on some day they blow from the southeast.

March to July are the 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.

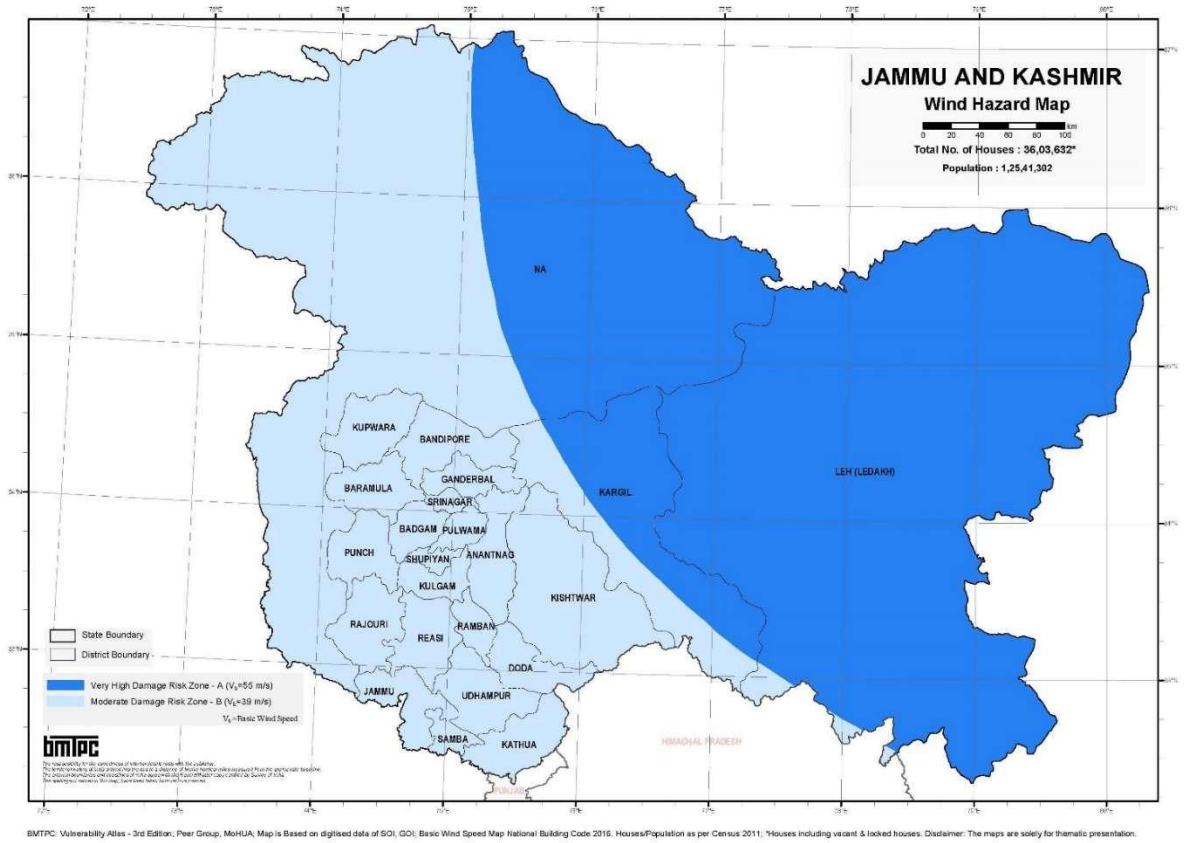


Figure 5.12: Wind Hazard Map of JKUT (Source: BMTPC)

5.7.2 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. The main source of noise at the proposed bridge site 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 constructions as well as operation stages.

5.7.3 Water Environment

Hydrological inputs play a vital role in the planning, execution and operation of any water related structure. As per hydrology study, the total catchment area of this nallah is 385 sq.km and annual rainfall is 123 mm. The calculated peak runoff is 1651.4 Cumecs. And as per consultation with the locals, the Ghordi Nallah and Barmeen Nallah experience high discharge/flooding condition during episodes of heavy rainfall as evident in September 2014 floods. To withstand extreme flooding condition at Ghordi Nallah and Barmeen Nallah, protection around both sides of bridge abutments walls needs to be designed using appropriate protection techniques, which can withstand devastating floods. For bridge protection, simple stone pitching may not be durable and may result in deformation and collapse during heavy rains and flood. No other surface water body exists within the project influence area (PIA) of the proposed bridge site.

5.7.4 Biological Environment

Plant and animal communities are indicators of the environment. They respond not only to one environmental factor but also an interacting group of factors. The plant and animal communities integrate these influences and react 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 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 in the study area (Project Influence Area) of proposed bridge site was undertaken.

5.7.4.1 Forests

Udhampur district has a total geographical area 4550 Sq. Km out of which 2343 Sq. Km (51.49 % of the total geographical area) fall under the forest type (Source: www.jkenvis.org). The proposed construction is located in the Tehsil Ramnagar of Udhampur District. There is no natural forest-like Reserved Forest, Protected Forest or natural heritage sites of national and international importance within the 500m of project influence area.

5.7.4.2 Flora

The forest in the Udhampur are broadly classified into following categories:

1) Alpine Forest: Only few plants species exist in this type of forest due to extreme climatic conditions. However, these are rich in herbaceous flora. The main Broad Leaved species present are Rhododendron campanulatum, Betula utilis with Viburnum and Euhorbia species
2) The Deodar – Kail Forests which occur between 1700-2500 m elevations. The common floral species in such forests includes *Quercus leucotrichophora* (Banj Oak), *Quercus floribunda* (Moru Oak), *Toona ciliata* (Hill Tum-Deri), *Aesculus indica* (Ban Kher), *Prunus cerasoides*(Bharat), *Juglans regia* (Walnut), *Fraxinus hookeriana* (ash), *Machilus duthei* (Sangla) and *Alnus nitida, Berberis lycium, Indigofera heterantha, Princepia utilis, Desmodium elegans, Rubus niveus, Parrotiopsis jacquemontiana, Viburnum grandiflorum, Daphne cannabina* etc..
3) The Fir *Forests* lies between 2100-3700m. Common species found in such forests are Fir *(Abies Pindrow) & Spruce (Picea smithiana)* Other species found are Acer species, Horse Chestnut, Walnut, Ash etc.
4) Chir *(Pinus roxburghii) Forests having the* main crop in the low lying areas of tract is Chir pine (*Pinus roxburghii*), which being a heavy light demanderm occurs almost pure in the main stretch. Chir occurs between 500 to 1700m elevations. Chir forests are well developed between in the low lying areas of the entire Division. It is often found associated with many broad leaved species. The proportion of broad leaved species increases both along lower and upper limits of Chir. The chief associates on the lower limits are *Dodonaea viscosa* (Santha), *Carissa opaca* (Carna), *Mallotus philippensis* (Kamila), *Woodfordia fruticosa* (Lhawi), *Euphorbia royleana* (Thohar), *Emblica officinalis* (Aunia), *Acacia modesta* (phulli), *Cassia fistula* (Amaltas), *Adhatoda vasica* (Branker), *Myrsine africana*, *Berberis lycium* (Kameloo), *Zizyphus jujuba* (Ber), *Rubus ellipticus* and occasional *Pyrus pashia* (Batang).
5) The Oak forests have in Udhampur division have all the three Oak species e.g *Quercus leucotrichophora* (Banj), *Quercus floribunda* (Moru) and *Quercus semicarpifolia* (Kharshu). Banj oak occurs in appreciable stretch either in pure or admixture with Machilus, *Rhododendron arboreum*, *Lyonia ovalifolia* and *Olea ferruginea*. Kharsu Oak caps fir forests mostly in pure form. Out of the three, *Quercus floribunda* is the

one which is subjected to heavy lopping and exists in a limited scale.

6) Scrub Forests are mostly occupy low lying areas of Udhampur Range confined to lower limits of Chir forests. *Buxus wallichiana* locally known as "Chikhri" is found in compartments. Common trees found in *Acacia modesta* (Falaii), *Acacia catechu* (Khair), *Bombax ceiba, Cassia fistula, Dalbergia sissoo, Ehretia laevis, Syzygium cumini, Flacourtia indica, Grewia optiva, Lannea coromandelica, Olea ferruginea, Pistacia integerrima, Emblica officinalis, Zyzyphus jujuba, Ficus bengalensis* and *Mangifera indica*

5.7.4.3 Protected (Scheduled) Trees of the J&K.

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 of Jammu & Kashmir.

No rare or endangered plant species were observed around the proposed construction site. As per the site assessment, no tree needs to be cut down during the construction of the bridge on both sides of the approach road. As there would be no loss of trees during the construction, no compensation has to be made for transplantation of trees. In general, the loss of trees if any would be compensated by 1:6 ratio (i.e. for loss of 1 tree 6 trees will be planted) or greater and transplantation of the same trees may be envisaged wherever applicable.

5.7.4.4 Fauna

No forest is present at the project site or in project influence area; the terrestrial fauna is common domestic animals/ livestock. There are no Schedule-I terrestrial mammals‟ species observed near the site. Animals were mainly observed are domesticated livestock like cows, goats, sheep, etc. and stray dogs and cats. Discussion with inhabitants suggests that occasionally animals like The Leopard or Panther (*Panthera Pardus*), The Jackal (*Canls aureus*), The Indian Fox (*Vulpes bengalensis*) , The Jangle Cat (*Felis Chaus*) , The Himalayan Black Beer (*Selenaractos Thibetanus*), The Five striped Palm squirrel (*Funambulus Penanti*), The Indian Porcupine (*Hystrix Indicia*), The Common Indian Hare (*Lepus Negricolis*), The Indian Field Mouse (*Mus boodnga*), The Indian Wild oar (*Sus scrofa*), The Rhesus Macacue (*Macaea Mulatta*), The Red Jungle Fowl (Gallus), Common Peafowl (Pavo Cristatus), The Black Partridge (*Francolinus Francolines*), The Grey Partridge (*Francolinus Ponicerianus*), The Chakore (*Alectoris Graca*), The Grey Quail (*Conturnix*), The Blue Rock Pigeon (*Columba Livia*), The spotted Dove (*Streptopelia Chinensis*), White Beaked Bengal Vultures (*Pseudogyps Bengalensis*), The Indian Mynah (*Acridotheres tristis*), The Jungle Crow (*Corvous Macrorhynchos*), The House Crow (*Corvous splendens*), The Koel (*Eudynams Scolopacea*), The Indian Robin (*Saxicolaides Fulicata*), etc. The construction and operation would have no possible effects on the animal habitats in the proposed area.

5.7.4.5 Wetlands

There is no wetlands site within one km radius of the proposed bridge project. High altitude lakes in the Peer Panjal are located at least 40 km away from the proposed sites.

5.7.4.6 Ecological Sensitive Areas

The proposed bridge project at Ramnagar is hilly and rolling terrain area. The project corridor (approaches and a bridge site) does not pass through any Biosphere Reserve, National Park, Wildlife Sanctuaries and or any other ecologically sensitive areas.

5.7.4.7 Recreation Resources

The recreational sites include Amusement Park, centre for musical & cultural activities. There is none of any recreational sites nearby of the proposed bridge project.

Archaeological, Historical, Heritage Sites and Religious/ Cultural Sites

No Archaeological monuments under ASI's listing are located in the proposed Ramnagar bridge site witin the 1 km radius of the influence.

5.7.4.8 Sensitive Environmental Receptors

A small temple diety is located in between the two proposed bridges

Table 5.4: Sensitive Environmental Receptors near Bridge Site at Ramnagar .

S. No	Sensitive Feature	Location	Chainage	Alignment (RHS/LHS)	Distance in meters (m) from the central alignment of the approach road
2	A temple diety	In between two bridges	20 meters of the approach road	LHS	20 meter

** LHS-Left Hand Side RHS-Right Hand Side*

6. POTENTIAL ENVIRONMENTAL IMPACTS

6.1 Project Impacts & Issues

This section presents identification and evaluation of anticipated impacts during pre-construction, construction and operation phases of the proposed construction of bridge at Kaunallah in Udhampur District. The planning of proposed project intervention points towards the impacts in the pre-construction, the construction stages and the operation stages. The subsequent sections deal with the prediction of impacts due to the project on the physical, biological environment and socio & cultural environment Tables 6.1 & 6.2 below presents the general environmental impacts expected due to the proposed construction site. Impacts havebeen assessed based on the information collected from the project activities as per design parameters/ drawings collected from the EPC contractor which is awarded to M/s S.R.M Contractors, screening & scoping of environmental attributes, and baseline data collected during the EIA study. The quantum of all the impacts on physical & biological and socio-economic environment has been discussed in details in subsequent paragraphs. The impact matrix for the project is given below in Table 6.1;

Table 6.1: Impact Matrix for Project

S.No.	Parameters	Const. of 3×55mbridge at Ramnagar, Udh.
	Negative Impacts	
1.	Hand Pumps/Springs	1
2.	Pond Area	Nil
3.	Relocation Religious Properties	Nil
4.	Transfer of Agriculture Land (ha)	Nil
5.	Nos of trees to be felled	Nil
	Positive Impact	
1.	Enhancement Sites (Nos.)	Accesibility of villlages to Udhampur town
A.	Cultural/Religious Properties (Nos.)	1
B.	Silt and debris/waste traps at the outfall of drains	-
C.	Safe Access/traffic calming at Educational Institutes, hospitals etc (Nos.)	1
D.	Trees Saving (Nos)	-
E.	Wastes Reuse	-
F.	Proposed Plantation	Nil
G.	Proposed Compensatory Plantation (if tree cutting requirement arises)	Nil
3.	**Bridge/ Approach Road Safety Measures**	
A.	Intersection/Access Improvement	2 (Approaches)
B.	Signage Boards (Nos.)	As per IRC Guidelines
C.	Sidewalk	Available (1.5m both sides)
D.	Traffic Calming Measures Locations	--

6.2 Consideration of Environmental Impacts During the Design Stage of the Bridge Project

6.2.1 Hydrological Study

Hydrological study and runoff calculations for extreme flood/rains under the climate change scenarios is carried out and considered for designing of the proposed Construction of 58.0 mtr span (2- Lane) Steel motorable bridge from Katheel Ganjoo to Barsoa over Ghordi Nallah and 50.0 mtr span (2-lane) motorable bridge from Barsoa to Patri over Barmeen Nallah Ramnagar (Complete Job) in Udhampur District with excess runoff flow/flood safeguard. No hydrological data were available for the Ghordi Nallah and Barmeen Nallah therefore the hydrological study was carried out and calculated based on the standard methodology of discharge based in the catchment area by Empirical & Rational Formula.

6.2.2 Impact on Soil

Soil is one of the most important components of the physical environment. During construction of the proposed bridge, the potential impacts on soil are discussed below

6.2.2.1 Construction Phase

During construction of the proposed bridges, the contamination of the soil is anticipated due to improper disposal of oily wastes, solid wastes, spillage of fuel oil at camps site, open defecation by construction workers, raw sewage disposal from the camp site, etc. Improper disposal of used oil generated from the maintenance of vehicles, construction equipment and DG sets at the campsite/batching plant may also result in soil contamination.

6.2.2.2 Operation Phase

No impact is anticipated on the soil during the operation phase of the proposed bridge.

6.2.3 Impact on Water Resources

6.2.3.1 Construction Phase

For the construction of the proposed bridges, the foundation excavation debris and construction wastes on the course of nallah may also affect surface water hydrology and flow. Excavation of slurry from the foundation wells may result in contamination and turbidity issue of the Ghordi Nallah and Barmeen Nallah. Proper management of excavation of foundation wells and disposal of the slurry will, However, the extent of such impact will be minor as nallah remain in lean flow most of the time.

Table 6.2: Anticipated environmental impacts on the physical, biological and socio-economic environment

Project Activity	**Planning and Design Phase**	**Pre-construction Phase**		**Construction Phase**					**Bridge/ Approach Road Operation**
Environ mental com-ponent 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 in the project area	Dust generation	Asphalt odour and emissions	Dust, Pollution	Soot, Odour, Gaseous Dust, Pollution	Odour / Smoke from Cooking of food	dust, véhiculer emissions
Land	Impact on productive land if land acquisition required	Generation of debris	Erosion and loss of topsoil	Erosion and loss of topsoil	Land contamination due to improper disposal of bitumen waste/solid wastes	Contamination by fuel and lubricants and compaction	Contamination and com-paction of soil at camp& Plants	Contamination from Wastes and sewage	--
Water	Impact on Water Sources/ Surface Water Body	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 groundwater re-charge 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 vegetation	--		Lower productivity, Use as fuel wood	Felling trees for fuel	Compensatory plantation and nullah bank protection measures

6.2.3.2 Operation Phase

During the operation phase, drainage pattern or hydrology of the Ghordi Nallah and Barmeen Nallah will not be affected. Therefore, no impact is anticipated during the operation phase.

6.2.4 Degradation of Water Quality

6.2.4.1 Construction Phase

The surface and groundwater quality due to the proposed construction may be degraded mainly in the following ways:

- by improper disposal of solid wastes, slurry during the excavation of foundation wells, oily wastes, used oil waste, etc.
- by raw sewage generated from camp, batching plant and bridge construction site,
- open defecation by workers on the course of Ghordi Nallah and Barmeen Nallah.
- During the construction phase, debris and construction wastes, if not cleared, may deteriorate surface water quality of the Ghordi Nallah and Barmeen Nallah.

6.2.4.2 Operation Phase

During the operation phase, there is no probability of degradation of water quality during normal operations of the proposed bridge at Ramnagar.

6.2.5 Impact on Ambient Air Quality

6.2.5.1 Construction Phase

During the 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 of the proposed bridge while emissions from fixed sources include diesel generator set, construction equipment and excavation activities, those produce dust emissions.

A certain amount of dust and gaseous emissions will also be generated during the construction phase from the batching plant. The pollutants of primary concern include Fine Particulate Matter (PM2.5) and Respirable Particulate Matter (PM10). However, suspended dust particles may be coarse and will be settled within a short distance of the construction site. Therefore, the impact on ambient air quality will be temporary and restricted within the closed vicinity of the construction activities for the proposed bridge and batching plant. A considerable amount of exhaust emissions of carbon monoxide (CO), unburned hydrocarbon, sulphur dioxide (SO2), particulate matters, nitrogen dioxide (NO2), etc, will be generated from the DG set, construction equipment and batching plant. Batching plant should be located away from the populated areas and be fitted with the air pollution control equipment and emission shall meet National Emissions Standards/J&K Pollution Control Board standards. Further, the batching plant must be sited at least 250 m in the downwind direction from the nearest human settlement. Ambient air quality monitoring should be carried out during the construction phase. If monitored parameters are above the prescribed limited, suitable control measures must be taken.

6.2.5.2 Operation Phase

No adverse impact is anticipated on ambient air quality during the operation phase. Traffic movement on the bridge will result in vehicular emissions, which will be mingled with the ambient air within 500m from the bridge.

6.2.6 Impact on Noise

6.2.6.1 Construction Phase

The proposed construction of the proposed bridge be confined to the Ghordi Nallah and Barmeen Nallah. During the construction phase, the noise will be generated from the batching plant, operation of construction equipment's at a bridge construction site, operation of DG sets and vehicles transporting construction materials. During the construction phase, the noise levels are expected to be increased between 10 - 20 %. However, these noise levels will be temporary and intermittent mostly during works in day time only.

Table 6.3: Source of Noise Pollution and Impact Categorization.

S.No	Phase	Source of Noise pollution	Impact categorization
1.	Pre-construction	• Man, material & machinery movements • establishment of labour camps, onsite • offices, stockyards and construction plants	• all activities will last for a short duration and 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 temporary as the construction site will go on changing with the progress of the works.

Construction - Related Noise

With regards to noise-related impacts, the construction phase is a difficult stage. During this period noise impacts will be high due to operation of construction machinery and the conflict with the regular traffic (through access road to the bridge construction site) requiring more honking of vehicle horns and more stop and go (acceleration and deceleration process).

All temporary noise-related impacts near the project will occur during the construction activities. This will occur along the construction zone as well as construction camps, hot mix plants, WMM plants, crusher and quarry sites (if required). Typical noise levels associated with the construction is given in Table 6.4. The magnitude of the 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

S.No	Activity Noise Levels	(d(B)A)
1.	Grading & Clearing	84
2.	Excavation	89
3.	Foundations	88
4.	Finishing of Road	84

6.2.6.2 Operation Phase

During the operation phase, the noise will be generated through the movement of the vehicles on the bridge.

6.2.7 Management of Spills and Wastes

During the construction of the proposed bridge, demolition wastes excavated earth from the foundation, construction derbies, used oil from the maintenance of DG set and construction equipment, lube oil containers, solid waste, etc will be generated. Such wastes may cause deterioration of soil quality and surface water/runoff flow in Ghordi Nallah and Barmeen Nallah. These wastes must be collected and disposed of appropriately

6.2.8 Impact on Flora, Fauna and Ecosystem

During the construction and operation phases of the proposed bridge at Ramnagar, no adverse impact is anticipated on fauna. No cutting of trees is required during the construction and operational phases of the proposed Bridges.

6.2.9 Impact on Socioeconomic Environment

As per the study the sub-project, "Design and Construction of 58.0 mtr span (2- Lane) Steel motorable bridge from Katheel Ganjoo to Barsoa over Ghordi Nallah and 50.0 mtr span (2-lane) motorable bridge from Barsoa to Patri over Barmeen Nallah Ramnagar (Complete Job) in Udhampur District" can be categorized as Category S-2 as per ESMF. The project involves land acquisition for approach road to the bridge. However, this shall be donated by the landholders. The construction and operation phases of the proposed bridge will have a beneficial impact on the social environment. Increase in income of local people is expected as some of local unskilled, semiskilled and skilled persons may gain direct or indirect employment during the construction phase of the proposed bridge. Since the immigration of the workforce during the 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.

6.2.9.1 Construction stage

The influx of Construction Workers

Although the construction contractors are likely to use un-skilled labour drawn from local communities, use of specialized construction equipment will require trained personnel not likely to be found locally. Sudden and relatively short-lived influxes of construction workers to communities in the project area 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 Ramnagar, in Udhampur District will be in the order of about 35-50 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. Few shopkeepers exist near western side main road near approach road, due to the construction activities these general stores will also get benefitted as well. 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 the economy as a result of the purchase of construction materials and the payment of wages and salaries.

6.2.9.2 Operation Stage

During the operation phase, the proposed bridge will provide safe movement of traffic and reduce the travel time. The proposed bridge will also facilitate the movement of people and vehicles and ease of access due to the construction of proposed Bridges. The agricultural produces in the benefitted area areas will be easily procured and delivered to the main town and city centre. Also, the proposed bridge is more essential as the connecting road is vital in reaching to agriculture fields. Therefore, a positive impact is anticipated on the socio-economic environment during the operation phase.

Impact on Religious Structures and Cultural Properties

A small diety temple is located close to the construction site in the middle of the two bridges. Stocking/ stockyard near diety may disturb the religious sentiments of the community hence such will be avoided. Another funeral site is located on the westwards side of the proposed bridge. A motorable link may be provided to the funeral site and stocking of any material may be avoided during the construction phase.

Common Property Resources

No such structure is located close to the proposed construction site. The partial or total impact on these common property resources is anticipated due to the construction of the project. Adverse socio-economic impacts include all disruptions on the social and economic interactions of communities due to the project. This involves an effect on both the adjacent communities (mostly direct) as well as the nearby communities (mostly indirect).

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, the risk from mosquito and reptile etc at the construction workers camp will impact human health and safety.

Safety Aspects

Safety for workers at the worksite 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.

Impact of Pandemic Disease Covid-19 (Coronavirus)

Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus. In the workplace of construction sites, labour campsites, site offices etc., the best way to prevent and slow down transmission is be well informed about the COVID-19 virus, the disease it causes and how it spreads. To protect yourself and others from infection by strictly following the COVID-19 Standard Operational Procedures (SOP's) of the Government protocol and guidelines from World Health Organization (WHO), International Labour law (ILO) and other agencies.

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 and geometrics) best-fit alignment is followed. The component 2 of Jhelum and Tawi Flood Disaster Recovery Project" is 'to restore and improve the connectivity disrupted due to the disaster (deluge of September 2014) through the reconstruction of damaged infrastructure like 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. Based on the above assessment, bridge design parameters have been adopted as per the latest official design guidelines mandated for the seismic Zone-IV as per BIS standards for the construction of the proposed bridge at Ramnagar in Udhampur District. The synoptic descriptions of the design parameters are presented in Chapter 2 are flexible in design to avoid most of the impacts. An analysis of various alternatives is attempted to arrive at the technically and Environmentally and socially best-fit alternative. The analysis of alternative is a documented illustration/evidence to show and ensure that final decisions taken are;

Following 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.
- Following the World Bank policies and procedures.
- To create climate-resilient and flood-proof bridge/road infrastructure.

These were also an integral part of the analysis of alternatives throughout the project preparation.

As per environmental screening exercise and assessment survey/ database, the essential bridge connectivity is missing between affected area and Udhampur City and the rest of the adjoining habitations/ villages due to the lack of a bridge. There has been a long pending demand from the villagers for the construction of a bridge at the proposed site.

7.1 With or Without Project Scenario

The 'with' and 'without' project scenarios are analyzed for the development of the erstwhile state by the back-drop of the requirement of reliable quality infrastructure for sustained growth economy and consequent well-being of local people. The proposed work "Design and Construction of 58.0 mtr span (2- Lane) Steel motorable bridge from Katheel Ganjoo to Barsoa over Ghordi Nallah and 50.0 mtr span (2-lane) motorable bridge from Barsoa to Patri over Barmeen Nallah Ramnagar (Complete Job) in Udhampur District" to be carried out in the

tehsil Ramnagar of Udhampur district would connect the villages like (a) Kuhnallah, (b) Barta, (c) Barshua, (d) Bari, (e) Sanetar and (f) Bhatyari of the area.

Providing better connectivity will ensure that goods and people from areas covered by the bridge construction can move in and out of the areas quicker and save time. Increased trade and commerce activity are expected as agriculture and horticulture are the main activity for growth. By construction of bridge, climate-resilient and flood-proof infrastructure. The project has been designed to connect the various settlements with better access.

If the bridge project is not constructed, there is every likelihood that the people of the project area will continue to suffer and quality of life will be deteriorated. As a present scenario of no bridge exists, people will continue to suffer due to the lack of any connectivity. As residents and village habitants have to cross nallah to access the paved roads for nearby towns, schools and markets, it is extremely difficult to cross this nallah during rainy season and episodes of the heavy downpour. Construction of bridge would help villagers to move to safer places during such events. In the absence of the project, the J&K Govt may find it difficult to generate resources for such a bridge infrastructure which is required and for the benefits of the people at large. Increased air pollution is anticipated mainly attributed to the movement of construction vehicles which is temporary and site-specific. Noise levels will rise due to the operation of machinery and construction vehicles as well.

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 construction of the bridge project at proposed site 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 Bridge.

8. PUBLIC CONSULTATION AND DISCLOSURE

8.1 Introduction

Consultation during project preparation is an integral part of the Environmental assessment process. It not only minimizes the risks but involves the public as stakeholders in project preparation process, promotes public understanding of the project and leads to timely completion of the project. The views and suggestions received during stakeholder's consultations also helps in better identification of social impacts and incorporation of mitigation measures in EMP to address these impacts. The specific objectives of the consultation process were to:

- Provide clear and accurate information about the project to the beneficiary community;
- Obtain the main concerns and perceptions of the public and affected families and their representatives regarding the project
- Improve project design and, thereby, minimize conflicts and delays in implementation
- Increase long term project sustainability and ownership

Public consultation/meetings were conducted on sub-project location number of times viz., on 30.11.2018, 9.03.2019 and January 2021. Consultation has been done in accordance with the World Bank's ESMF-JTFRP requirement which is the pre-requisite for the social and environmental safeguards. The purpose and objective of stakeholder's consultation is the identification and involvement of potential Project Affected people, nearby communities and other stakeholders in order to make them cognizant about the proposed bridge sub-project activities. 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 bridge project activity of the subproject. Consultation with the stakeholders/ participants were conducted and participated based on the procedural guidelines of reaching public required for the preliminary baseline characteristics of environmental and social screening. Details of the consultation are captured in Table 8.1 below;

Table 8.1 Public consultation details

S. No.	Name of the Project	Location of Consultation	Date of Consultation	Geo-coordinates of Location
1.	Design and Construction of 58.0 mtr span (2- Lane) Steel motorable bridge from Katheel Ganjoo to Barsoa over Ghordi Nallah and 50.0 mtr span (2- lane) motorable bridge from Barsoa to Patri over Barmeen Nallah Ramnagar (Complete Job) in Udhampur District	Ramnagar in Udhampur District	06-01-2021	Lat: 32°49'43.59"N Long: 75°12'6.75"E

A reconnaissance survey was also conducted the proposed bridge in Kaunallah Village at tehsil Ramnagar in Udhampur district. Baseline information was also collected from the adjoining areas in close proximity

within the Project Influence Area (PIA) in January 2021. Formal and informal consultations were undertaken with the project stakeholders to take the views and propositions about the project activities.

The following section highlights the 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 the (i) Local community (ii) Potential PAPs (iii) Roadside shop owners (iii) Road users and (iv) Community Leaders and (v) and officers of PMU and PIU in order to identify the stakeholders. So that the interested persons can be taken on board before finalization of sub-project proposal and plan.

A reconnaissance survey of the proposed bridge site was also conducted. Baseline information was collected from the adjoining areas in proximity within the Project Influence Area (PIA) Formal and informal consultations were undertaken with the potential PAPs and project stakeholders to take their views and propositions about the project activities.

Table: 8.2 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, Assistant Engineers, Junior Engineers), PWD (R&B, Government of J&K. • Other project stakeholders such as official of line Department

8.3 Consultations with Stakeholders

Consultation with the community was carried out at Kaunallah Village of the sub-project to inform and educate the potential Project-Affected-People (PAP's) and other stakeholders about the proposed action before the finalization of design to include their inputs. The consultation was also carried out to identify the problems associated with the proposed project and the needs of the population likely to be impacted by the sub-project. In each of these consultations, the villagers were briefed about the land requirements, revenue records obtained from revenue department, potential positive and adverse impact of the proposed intervention.

The signatures/photographs of participants in the public consultation are given in Annexures.

8.4 Objective of the Public Consultation

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

- To educate the general public, especially potentially impacted or benefited communities/individuals and stakeholders about the proposed sub-project activities;
- To familiarize the people with technical and environmental issues of subproject 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 bridge project at Kaunallah village are given below:

- Proposed bridge design, source of assistance and its implementation/execution etc.
- Information on perceived benefits from the proposed bridge project including travel time, fuel cost, noise and air pollution.
- COVID-19 issues and mitigation measures.
- Land revenue record and land requirement for approach road.
- Inconvenience and problems during execution of the sub-project.
- Social and Environmental policy of the World Bank.

8.6 Outcome and Feedback received from the Public Consultation

During the consultation process of the proposed sub-project, people have expressed keen interest in the proposed bridge project at Ramnagar village. The local people are expecting flood resilient bridge to be developed and were apprised about the project details. People are ready to donate their land for the approach road of the sub-project.

- Geometric correction/ alignment of approach road surface should be followed strictly as per design protocol.
- Construction materials should not be stored in the nearby cremation ground.
- Proper and timely disposal of construction wastes shall be ensured.
- Local people must be preferred for employment in the project activity. As enough labourers are available in the area which will be beneficial for the contractor.

9. ENVIRONMENTAL MANAGEMENT PLAN (EMP)

9.1 Introduction

Environmental Management Plan (EMP) has been prepared which mainly centered on the understanding of the interactions between the environmental and social setting and the project activities and the assessment of the likely impacts. Mitigation measures for anticipated environmental and social impacts have been elaborated as specific actions which would have to be implemented during the project implementation. The EMP would help the contractor and PIU to implement the project in an Environmentally sustainable manner and where contractor for this bridge project, understand the potential environmental and social impacts arising from the proposed bridge construction on Ghordi Nallah and Barmeen Nallah at Ramnagar in District Udhampur and to take appropriate actions/ mitigation measures to properly mitigate/manage such environmental and social impacts. EMP can thus be an overview document for contractor of this bridge project that will guide EMP of all anticipated impacts. This EMP may also be considered as flexible and will be further developed by the Contractor in the Contractor's Environment Management Plan (EMP).

9.1.1 Proposed Works of Ramnagar Bridges

The proposed components of construction of bridge project consist of the following works:

1. Construction of Construction of 58.0 mtr span (2- Lane) Steel motorable bridge from Katheel Ganjoo to Barsoa over Ghordi Nallah and 50.0 mtr span (2-lane) motorable bridge from Barsoa to Patri over Barmeen Nallah (Complete Job)
2. Construction of Approaches on both sides

9.1.2 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 construction of proposed bridge. 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 Contractor will commit to the identification of the environmental impacts at the project site. In case of any future changes in the bridge 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 Contractor of this bridge project with the overall accountability resting with the JTFRP-PMU. Whereas, the TAQAC will ensure periodic quality audit/ guidance to the PIU and Contractor and by imparting regular training, monitoring, and ensuring that all EMP provisions and requirements are translated into contract document and that these requirements are implemented to their full intent and extent. 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.

9.1.4 Hydrological Study for Design of Proposed Bridge

Hydrological study and runoff calculations for extreme flood/rains under the climate change scenarios are

carried out and considered for designing of the proposed bridge with excess runoff flow/flood safeguard. No hydrological data were available for the Ghordi Nallah and Barmeen Nallah and therefore the hydrological study was carried out and calculated based on the standard methodology of discharge based in the catchment area by Empirical & Rational Formula.

9.1.5 Seismic Factor in Design Bridge

The proposed bridge is located in Seismic zone IV and prone to high-intensity earthquakes. Therefore, seismic load factor must be taken into consideration while designing of bridge components.

9.1.6 Approaches for Bridge

The approach/approach slab provides a transition between the road pavement and the bridge. The approach/approach slab acts as an intermediate bridge to span the portion of embankment directly behind the abutment which was excavated to construct the abutment. Therefore, approach slab as per IRC guidelines and well-designed approaches to connect the bridge with the existing road should be ensured during the design of the bridge.

9.1.7 Safety Signage for Bridge

For the safety of road users and bridge, necessary road safety signage, hazard signage and warning signage with reflective tapes need to be provided before and at the proposed bridge as per IRC guidelines.

9.1.8 Environmental Management Plan (EMP)

The Environmental Management Plan (EMP) will guide the Environmentally-sound construction of the 58.0 mtr span (2- Lane) Steel motorable bridge from Katheel Ganjoo to Barsoa over Ghordi Nallah and mtr span (2-lane) motorable bridge from Barsoa to Patri over Barmeen Nallah Ramnagar (Complete Job) in Udhampur District and ensure efficient lines of communication/coordination between the PIU, Contractor, PMU and TAQAC. The EMP has been prepared for three stages of bridge project construction activities as (i) Pre-construction Stage; (ii) Construction Stage; and (iii) Demobilization Stage.

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 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. EMP for operation stage will be implemented by PIU/PMU.

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 a contravention of clauses, if environmental damage ensues due to negligence, the contractor fails to comply with corrective action measures or other instructions issued by the PIU / JTFRP-PMU within a specified timeframe and the Contractor fails to respond adequately to complaints from the public.

9.1.9 Environmental Management Plan (EMP) - Protection of Clause for Non-conformity to EMP

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.

Table: 9.1 Environmental Management Plan (EMP) of Construction of 58.0 mtr span (2- Lane) Steel motorable bridge from Katheel Ganjoo to Barsoa over Ghordi Nallah and 50.0 mtr span (2-lane) motorable bridge from Barsoa to Patri over Barmeen Nallah Ramnagar (Complete Job) in Udhampur District

S. No.	Environmental Issues	Environmental Mitigation Measures	Responsibilities	
			Implementation	Supervision/ Monitoring
A.	**Design Phase**			
A.1	Hydrological Study for designing of Bridge	• A temporary existing bridge could not withstand high floods in past as it was washed away in September 2014 floods. The hydrological study have been carried out for designing of the proposed bridge with flood safeguard.	Design Team	PIU
A.2	Erosion at Bridge Abutments During Floods/ High Discharge	• Bridge protection works around both sides of abutment walls will be provided with proper slopes and as per design Wire Crate works with granular backfill have been used for the nallah training works and to be followed.	Design Team	PIU
A.3	Impact of Seismic Activity/ Earthquake on Bridge	• The proposed bridge is located in Seismic Zone IV and prone to high-intensity earthquake. Therefore, seismic load factor must be taken into consideration while designing of bridge components.	Design Team	PIU
A.4	Dislocation of Span of During Seismic Activity/ Earthquake	• As the bridge is located in high Seismic Risk Zone IV. Therefore, Seismic Arresters should be provided to withstand horizontal force during the earthquake	Design Team	PIU
A.5	Approaches for Bridge	• Approach slab as per IRC guidelines and well-designed approaches to connect the bridge with the existing road both sides should be ensured during the design of the proposed bridge.	Design Team	PIU
A.6	Safety of Proposed Bridge and its Uses	• For the safety of road users and bridge, necessary road safety signage, hazard signage and warning signage with reflective tapes need to be provided before and at the proposed bridge as per IRC guidelines.	Design Team	PIU
B.	Pre-Construction Stage			
B 1	Pre-construction Activities by the Contractor			

B 1.1	Appointment and Mobilizationof Environment & Safety Officer	• The contractor will appoint qualified and experienced Environment & Safety Officer (ESOs) who will work dedicatedly and ensure implementation of EMP including Occupational, Health and Safety of workers issues at the camp, batching plant and bridge construction work site. • Contractor to inform the PIU for the appointment and mobilization of Environmental Safeguard Officer (ESO).	Contractor	PIU, Supervision Consultant
B 1.3	Regulatory Approvals	• Labour license from the Department of Labour. • 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 and Batching Plant, D.G Sets- Consent to Establish and Consent to Operate will be obtained from J&K Pollution Control Board (J&KSPCB) or if contractor intends to procure construction materials from local authorized third party agencies then the contractor will collect and submit necessary clearance/approval from authorized third party agencies.	Contractor	PIU
B 1.4	Arrangements for Temporary Land Requirement for Camp	• The contractor as per prevalent rules will carry out negotiations with the landowner for obtaining their consent for temporary use of land for construction camp etc.	Contractor	PIU, Supervision Consultant
B 1.5	Location of Batching Plant	• **The batching plant will be sited sufficiently away from settlements. Such plant will be located at least 250 m away from the nearest settlement preferably in the downwind direction.** • **Consent to Establish and Consent to Operate will be obtained from J&K Pollution Control Board (as required) before the establishment and operation of batching plant.**	Contractor	PIU, Supervision Consultant
B 1.6	Other Construction Vehicles, Equipment and Machinery	• All vehicles, equipment and machinery to be procured for construction of the bridge will conform to the relevant Bureau of Indian Standard (BIS) norms/Central Pollution Control Board (CPCB) standards. The discharge standards promulgated under the Environment Protection Act, 1986 and Motor Vehicles Act, 1988 will be strictly adhered to. • The silent/quiet equipment like DG set as per regulations will be used at the bridge construction site. • 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 verification whenever required.	Contractor	PIU, Supervision Consultant

B 1.7	Procurement of Aggregate	• The contractor will finalize the approved quarry/crusher for procurement of aggregate for the proposed bridge construction after assessment of the availability of sufficient materials, quality and other logistic arrangements. • The Contractor will also work-out road network and report to PIU, which will be inspected before approval.	Contractor	PIU, Supervision Consultant
B 1.8	Labour Requirement	• The contractor preferably will use unskilled/semiskilled labour from the local area to give the maximum benefit to the local community. Contractor to be followed strictly the Covid-19 protocol while mobilizing the labourers from the local community or outside	Contractor	PIU, Supervision Consultant
B 1.9	Construction Vehicles, Equipment and Machinery	• All vehicles and equipment to be procured for the proposed bridge work at Ramnagar, Udhampur 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, Supervision Consultant
B.2	**Pre-Construction Activities by The PIU**			
B 2.1	Tree cutting	• As per site assessment, no cutting of tree is required at proposed site	PIU	PIU
B 2.2	Environmental Monitoring-Baseline Data	• Ambient air quality, noise levels and water quality monitoring on the six-monthly basis as per environmental monitoring plan and following the instruction of Environmental Specialist of PMU.	PIU	PIU, Supervision Consultant

B 2.3	Information Dissemination and Communication Activities	• Before 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 EIA / 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 at Ramnagar Bridge Approach Side. • 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	Contractor	PIU, Supervision Consultant
C	**Construction Stage**			
C.1	**Site Clearance (Clearing and Grubbing)**			
C 1.1	Clearing, grubbing and Levelling	• If required vegetation will be removed from the construction zone (approaches) before the commencement of construction.	Contractor	PIU, Supervision Consultant
		• 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.		
C 2.	**Protection of the Trees**			
C 2.1	Safeguarding of Trees and Plantation	• **No scheduled trees (protective trees) of the J&K is observed around the construction site. No cutting of trees would be required during construction phase of the proposed bridge.** • **No stockpiling of any construction will be allowed around or close to any 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.**	Contractor	PIU, Supervision Consultant
C 3.	**Water Pollution**			

C 3.1	Impact on Water Resource during the construction of the bridge	• The following mitigation measures are recommended during the construction of the proposed bridge at Ramnagar • Construction of proposed bridge should be done during least flow or no flow area. • Curtain should be provided over the flowing water to avoid the falling of construction material in water. • Construction wastes should be collected and disposed of in an Environmentally sound manner as soon as construction is over. • The construction of the bridge should not affect existing flow pattern and drainage system around the proposed bridge at Ramnagar, Udhampur • Flowing water will be diverted with guide bunds and cofferdams at pier locations	Contractor	PIU, Supervision Consultant
C 3.2	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 of in rivers or water bodies.	Contractor	PIU, Supervision Consultant
C 3.3	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 refuelling 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 before 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 refuelling 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 refuelling areas will be treated in an oil interceptor before discharging into on land or into surface water bodies or other treatment systems. • In all, fuel storage and refuelling areas, if 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 following J&K Pollution Control Board (JKSPCB) guidelines.	Contractor	PIU, Supervision Consultant

C 3.4	Water Pollution from wastes	• The contractor will take all precautionary measures to collect and dispose of construction wastes generated from the proposed bridge construction site (if any). • No solid or hazardous wastes (oil contaminated waste) from the campsite will be dumped on nallah or in open areas. Such wastes will be collected and disposed of in an Environmentally sound manner as per environmental regulations. • At the bridge construction site at Ramnagar, portable wet/dry toilets (bio-digestion type) shall be provided for workers.	Contractor	PIU, Supervision Consultant
C 3.5	Waste Water from Labour Camp	• Wastewater generated from the sanitary facilities at labour camp will be treated in 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 a septic tank and soak pit will be provided for workers at the camp site.	Contractor	PIU, Supervision Consultant
C 4	• **Air Pollution**			
C 4.1	Dust and Gaseous Pollution	• The contractor will take every precaution to reduce the level of dust and gaseous pollution from the batching plant and bridge construction site. • The contractor will procure the batching plant and construction machinery, which will conform to the • pollution control norms specified by the MoEF&CC/CPCB/J&KPCB. The excavated materials at	Contractor	PIU, Supervision Consultant
		• the bridge construction site will be collected and disposed of properly so that it does not generate fugitive dust emissions. • LPG shall be used as fuel for cooking of food at construction labour camp instead of fuelwood. • Personal Protective Equipment (PPE) should be provided as a mandatory effort to the construction workers at the batching plant. • Regular maintenance of vehicles (project vehicles and material transportation) and equipment's will be carried and vehicular pollution check should be made mandatory. • Mask and sanitizers may be provided to the worker as per the COVID-19 guidelines GOI		

C 4.2	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 the chimney of adequate height as per CPCB guidelines (Height of stack in meter = Height of the building + 0.2 √KVA).	Contractor	PIU, Supervision Consultant
C 5	**Noise Pollution**			
C 5.1	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. • Noise monitoring shall be carried out in construction areas through the approved monitoring agency.	Contractor	PIU, Supervision Consultant
C. 6	**Procurement of Construction Materials**			
C 6.1	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 (winter and summer) frequency of water sprinkling will be increased in the settlement areas and PIU will decide the sprinkling time depending on the local requirements. The contractor will rehabilitate the borrow areas as soon as the borrowing of soil is over from a particular borrow area following the approved borrow area Redevelopment Plan.	Contractor	PIU, Supervision Consultant

C 6.2	Transporting Construction Materials	• All vehicles delivering fine materials like aggregate, cement, earth, sand, etc, to the bridge site at Ramanagar should be covered by Tarpaulin to avoid spillage of materials. • The existing road used by vehicles of the contractor or any of his subcontractor 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, Supervision Consultant
C 6.3	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, Supervision Consultant
C.7	**Construction Works**			
C 7.1	Slope Protection and Control of Soil Erosion	• The Contractor will construct slope protection works as per design parameters, to control soil erosion and sedimentation through use of Retaining Walls, 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 wherever applicable: • After completion of 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.	Contractor	PIU, Supervision Consultant
C 7.2	Handling of Cement Bags	• Cement bags will be stored and emptied in a covered area 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	Contractor	PIU, Supervision Consultant

		purpose, the trolley will be used.		
C 7.3	Work-zone safety Management	• The Contractor shall prepare the bridge construction/ work zone 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 before the start of bridge works. • Both sides of the bridge to be barricaded and to delineate construction zone as well as material stacking areas. The bridge construction site shall be appropriately barricaded to prevent entry and accidental tress passing of workers, staff and others into the site. • Contractor to take necessary safety measures at the bridge construction work zone during events of torrential rains or in rainy season. • Public/ local entry to the construction will be highly restricted. • 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. • 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 (especially during excavation/ well foundation works) for generating awareness among the local community	Contractor	PIU, Supervision Consultant
C 7.4	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, Supervision Consultant
C 8	Archaeological Resources and Cultural properties			

C 8.1	Chance Found Archaeological Property	• All fossils, coins, articles of the 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 acquaintss 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, Supervision Consultant
C 8..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 design and in consultation with the local community. Access to such properties from the road shall be maintained clear and clean.	Contractor	PIU, Supervision Consultant
C 9	**Personal Safety**			
C 9.1	Personal Safety Measures for Labours and Staff	• The contractor will take necessary measures for the personal safety of all workers during the construction of proposed Bridge; • 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.	Contractor	PIU, Supervision Consultant

		• The Contractor will not employ any person below the age of 14 years for any work.		
C 9.2	Traffic and Safety	• 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 of construction, a Traffic Control Plan will be devised and implemented to the satisfaction of the Environmental Expert of PIU.	Contractor	PIU, Supervision Consultant
C 9.3	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 camp site, fuel storage site, construction site etc. • Designated vehicles, which can be used as an ambulance will be available at the construction site at all the time	Contractor	PIU, Supervision Consultant
C 9.4	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 the bridge project site, embankment development, protection works, ancillary sites to be prepared by the contractor and will identify necessary actions in the event of an emergency.	Contractor	PIU, Supervision Consultant
C 9.5	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 Factories Rules will be maintained all the time by the contractor. • Availability of first aid Box 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, Supervision Consultant
C 9.6	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, Supervision Consultant

C 10	**Labour Camp and Project Site Management**			
C 10.1	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 PIU before their construction. • The contractor will maintain necessary well ventilated living accommodation, toilets, bathrooms and ancillary facilities functionally and hygienically. • 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, Supervision Consultant
C 10.2	HIV/AIDS Prevention Measures	• Necessary HIV/AIDS prevention measures will be taken at the labour camp • HIV/AIDS awareness program will be organized by the contractor's Environment & Safety Officer.	Contractor	PIU, Supervision Consultant
C 10.3	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: • 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). • 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. • If water is drawn from any existing well/ hand pump, which is within 30 meters proximity of any toilet, drain or other sources of pollution, the well will be disinfected before water is used for the drinking.	Contractor	PIU, Supervision Consultant

		• PIU will be required to inspect the labour camp once in a week to ensure the compliance of the EMP		
C 10.4	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,	Contractor	PIU, Supervision Consultant
		• Separate toilets/bathrooms, as required, will be provided for men and women, marked in vernacular language, • Toilets will be provided with septic tank followed by 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.		PIU, Supervision Consultant
C 10.5	Waste Disposal	• The contractor will provide garbage bins in the camp & construction site and ensure that these are regularly emptied and disposed off hygienically according to Solid Waste Management Plan as per Solid Waste Management Rule 2016. • Burning of wastes at the construction site, labour camp and bridge/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, polyethene bag, etc) wastes. Polyethene/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 the compost pit.	Contractor	PIU, Supervision Consultant
C 11	**Environmental Monitoring**			
C 11.1	Environmental monitoring-Construction Stage	• The PIU will carry out environmental monitoring for Ambient Air Quality, Noise levels and Water Quality on the six-monthly basis as per environmental monitoring plan and in accordance with the instruction of Environmental Specialist of PMU.	PIU	PIU, Supervision Consultant
C 11.2	Compensatory Plantation	• No compensatory plantation needs to be done as no tree would be cut during the construction and operation phase of the proposed bridge.		
D	**Contractor's Demobilization**			

D.1.1	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 before demobilization from the construction site and labour camp. The contractor will clear all temporary structures, debris, construction wastes, garbage, night soils, etc in an Environmentally 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, Supervision Consultant
D.1.2	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 following the pre-approved management plan for each borrow pit. The Contractor shall liaise with the PIU regarding these requirements.	Contractor	PIU, Supervision Consultant
E	**Post Construction (Operation) Stage**			
E 1	**Activities to be Carried out by the PIU**			
E.1.1	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 the six-monthly basis as per environmental monitoring plan and in accordance to the instruction of Environmental Specialist of PMU.	PIU	PIU, Supervision Consultant
E.1.2	Slope/Protection Monitoring	• During rains regular monitoring will be carried for bridge & nallah protection works and scour protection work/ slope management. In case any indication of erosion, deformation and collapse of protection, necessary measures will be taken to control such issues.	PIU	PIU, Supervision Consultant

9.1.10 Environmental Monitoring Plan

The monitoring program consists of performance indicators, reporting formats and necessary budgetary provisions. The Contractor's monitoring plan should be following 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 environmental monitoring plan is discussed below:

Ambient Air Quality Monitoring (AAQM)

The ambient air quality parameters viz: Sulphur Dioxide (SO2), Nitrogen Dioxide (NO2), Particulate Matter (PM10 and PM2.5), shall be monitored six monthly at identified locations from the start of the construction activity. The ambient air quality parameters shall be monitored following 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.

Noise Quality Monitoring

The noise levels shall be monitored at designated locations following 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.

Surface Water Quality Monitoring

Surface Water quality parameters such as pH, BOD, COD, DO coliform 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 The monitoring requirement for the different environmental components have been prepared is presented in the Table below

Table 9.2: Environmental Monitoring Plan

Attribute	Project Stage	Parameter	Special Guidance	Standards	Frequency	Duration	Location	Implementation
Air	Pre-Consuction, Construction & Operation Stage	PM10, PM2.5, SO2, NO2, 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 of Sampling	Bridge site, Batching Plant, Workers Campsite, Project Office Site	PIU through Environmental Monitoring Laboratory
Surface Water	Pre-Construction, Construction & Operation Stage	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	Bridge site	PIU through Environmental Monitoring Laboratory
Noise	Pre-Consuction, Construction & Operation Stage	Hourly Level Equivalent (Leq) on dB (A} scale	Equivalent noise levels using an integrated noise level meter kept at it a distance of 1 m from the edge of the pavement	MoEF Noise Rules. 2000	Quarterly (Summer and Post Monsoon Seasons)	Leq in dB(A) of daytime and nighttime	Bridge site, Batching and HMP Plant, Workers Campsite,	PIU through Environmental Monitoring Laboratory
Borrow Area	Construction Phase	As per Guidelines	Visual Observations	-	Before opening at least once in a month during operation, Post Rehabilitation.	-	Borrow area Location	Contractor/PIU, TAQAC

9.1.11 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 the efficacy of environmental management measures in the 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 the efficacy
- and utility of the proposed mitigation measures

The performance indicators of the proposed bridge at Ramnagar is provided in Table 9.3 below:

Table 9.3: The Performance Indicators 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	Baseline (pre-construction) Construction Post-construction	PMU, PIU Environmental Monitoring Laboratory of PMU through TAQAC
2	Noise Levels	Quarterly, Hourly Level equivalent (Leq).	Baseline (pre-construction) Construction Post Construction	PMU, PIU Environmental Monitoring Laboratory of PMU through TAQAC
3	Water Quality	Nearby rivers, surface water body, six-monthly summer and post-monsoon seasons	Baseline (pre-construction) Construction Post Construction	PMU, PIU Environmental Monitoring Laboratory of PMU through TAQAC agency
B	**Environmental Management Indicators and Monitoring Plan**			
1	Construction Camp	Locations of construction camps have to be identified and parameters indicative of the 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 the environment in the area has to be reported	Pre-Construction	PIU/Contractor

3	Tree Protection	Protective Measures of Trees	Pre-Construction/ Construction	Contractor/PIU
4.	Occupational Health & Safety Measures	Occupational, Health & Safety of workers engaged in construction activities	Daily	Environment & Safety Officer of the Contractor.
5	Bridge Protection Work and Scour Protection	Monitoring of Bridge Protection and Scour Protection	During rains	PIU/ TAQAC

9.1.12 Monitoring Plans for Environment Conditions

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 already presented in Table below. 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 safety of the construction site. The brief description of measures has been given in **Table 9.4** below:

Table 9.4: Brief Description of Measures

S. No.	Locations of Work Site	Bridge Site Safety Measures
1	Construction Sites	• Caution boards, Safety Cones, Delineators
2	Deep Cutting	• The construction zone should be barricaded with applicable safe G.I Sheet or arrangement to be made as per the 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 • Diversion with reflective tape for illumination at night at the all diverted locations
4	Safety for the Workers	• Helmets, Safety-Shoes, Goggles, Dusk mask. etc

Reporting System

The contractor will follow the reporting system for the implementation of the environmental management plan and its 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 the photographic evidence (with date, time and geo-reference) for implemented mitigation measures in the monitoring reports.

Table 9.5: The Reporting System and Requirements

S.No	Item	Stage	Contractor	PIU/ TAQAC
			Implementation & Reporting to PIU	**Supervise/ Field Compliance Monitoring**
1.	Setting up of construction Camp	Pre-Construction	One Time	
2.	Identification of disposal locations for constructional & other wastes from Bridge Project	Pre-Construction	One Time	One Time
3.	Tree cutting	Pre-Construction	One Time	One Time
4.	Topsoil Preservations	Pre-Construction	One Time	
5.	EMP Implementation Report	Construction	Monthly	Monthly
7.	Pollution Monitoring	Construction	Six Monthly	Six Monthly
8	Cleaning and Restoration on Demobilization	On completion of Construction of Bridge at Ramnagar	One Time	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 bridge construction work activities creating pollution to environment and other causes as a consequence of methods of operations.

9.1.13 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 and effective implementation of COVID-19 Standard Operating Procedures (SOP) as per Govt. guidelines/ measures to be followed by the contractor have been included in the annexures of this EIA report.

The indicative split up of capital and recurring cost for the environmental management plan for the project is presented in following Table 9.6:

Table 9.6: Budgetary Allocation- Indicative Cost for EMP Implementation for the "Construction of 58.0 mtr span (2- Lane) Steel motorable bridge from Katheel Ganjoo to Barsoa over Ghordi Nallah and 50.0 mtr span (2-lane) motorable bridge from Barsoa to Patri over Barmeen Nallah Ramnagar (Complete Job) in Udhampur District"

S. No.	Component	Item	Unit	Unit Cost (INR)	Quantity	Total Cost	Responsibility
A	**Pre-Construction Stage**						
1	Air	Baseline Monitoring Ambient Air Quality at 1 location especially near sensitive receptors	No.	10000/	24 hr sample, One time monitoring Location ($PM_{2.5}$, PM_{10}, SO_2 and NO_2)	10000	PMU
2	Water	Surface Water Quality sample from Betar Nallah location	No.	7000/-	Grab Sample from Betar Nallah Location (pH, TSS, TDS, BOD, COD, Oil & Grease, Turbidity)	14000	PMU
3	Noise	Noise Measurements at 1 location near sensitive receptors	No.	5000	Hourly measurements for 24 hours	5000	PMU
B. Construction Stage							
4	COVID-19 "Standard Operating Procedure" as per Govt. Guidelines for Construction site/ Workplace/ Campsite	Masks, Sanitizer Equipments (sensor-based/ dispenser based), appointment of Covid -19 "Marshal for SOP implementation"			Lump Sum	100000	PIU/ Contractor
5	Tree Cutting	Nil	No.				PIU/Contractor
6	Air	Ambient Air Quality at 1 bridge location within the construction zone and operational plant sites. (3 times in a year except for monsoon)	No.	10000/-	24 hr sample, One-time monitoring 3 Locations (Six monthly) ($PM_{2.5}$, PM_{10}, SO_2 and NO_2)	30000	PMU

8	Water	Surface Water Quality at 1 location (six monthly) 1 Ground Water/ Public Water Source (six monthly)	No.	7000/- 7000/-	Grab Samples at 1 Location at Betar Nallah (pH, TSS, TDS, BOD, COD, Oil & Grease, Turbidity) Parameters as per IS 10500:2012	42000 21000	PMU PMU
9	Noise	Noise measurements at 1 location near sensitive receptors/ Settlements within the construction zone (Quarterly)	No.	5000/-	Hourly measurements for 24 hours.	30000	PMU
10	Air	Dust Suppression Measures	Cost part of civil works				
11	Labour camp and Ancillary Facilities	Labour Camp and all associated facilities as per EMP	Cost part of the civil works.				
12	First Aid Kits	First Aid Kits at the construction site, camp and ancillary sites	Cost part of the civil works. -				
Project Enhancement by PMU-JTFRP							
14	Embankment Protection/ Slope Stability	Plantation/ Grass engraining with indigenous shrubs	Lump Sum			50000	PMU
15	Median Plantation						PMU
C. **Operation Stage (Post Construction Monitoring)**							
16	Air	Ambient Air Quality at 1 location near the sensitive receptor	No.	10000/-	24 hourly sample, one-time monitoring (Post Construction)	30000	PMU
17	Noise	Noise Levels at 4 locations near sensitive receptors	No.	5000/-	One time monitoring (Post Evaluation) 4 Samples	20000	PMU
18	Water	Surface Water Quality at 1 location	No.	7000/-	One time monitoring (Post Evaluation) 4 Samples	42000	PMU
Total Budget						**3,96,000.00**	

Annexure – 1

Formats For Reporting

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

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 a copy of regulatory permissions/consents/clearance, geo-referenced photographs with date and time for EMP/mitigation measures implementation, environmental monitoring report, accidents report, etc

Environmental and Social Screening Datasheet

Part A: General Information

1. Name of the sub-project	Design and Construction of 58.0 mtr span (2- Lane) Steel motorable bridge from Katheel Ganjoo to Barsoa over Ghordi Nallah and 50.0 mtr span (2-lane) motorable bridge from Barsoa to Patri over Barmeen Nallah Ramnagar (Complete Job) in Udhampur District	
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	Jammu (J&K State)	
▪ Name of the District	Udhampur	
▪ Name of the Block	Udhampur	
▪ Name of the Settlement	Ramnagar, Udhampur	
▪ Latitude	Lat: 32°49'43.59"N	
▪ Longitude	Long: 75°12'6.75"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)	Construction of 58.0 mtr span (2- Lane) Steel motorable bridge over Ghordi Nallah and 50.0 mtr span (2-lane) motorable bridge over Barmeen Nallah (Complete Job)
5. Land Requirement (in hac./sq.mt.)	
▪ Total Requirement	Nil
▪ Private Land	--
▪ Govt. Land	No information provided
▪ Forest Land	Nil
6. Implementing Agency Details (sub-project level)	
▪ Name of the Department/Agency	PIU(Transport), J&K ERA
▪ Name of the contact person	A.K. Khokhar
▪ Designation	Project Manager
▪ Contact Number	9419253376
▪ E-mail Id	pmtransportera@gmail.com
7. Screening Exercise Details	
▪ Date on which it was carried out	
▪ Name of the Person	Vikash Sharma/ Charanjeet Singh/Sudeep Shukla
▪ Contact Number	+919419125803, +91 9419893392, 9873674030
▪ E-mail Id	sharmasociologist@gmail.com, jcharan.sim@gmail.com, sudeepshukla@gmail.com

Part B (1): Environmental 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 category of Forest		No	
l. Wetland		No	
m. Natural Lakes		No	

n. Rivers/Streams	Yes		Bridge is proposed to be constructed over Ghordi Nallah and Barmeen Nallah at Ramnagar
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 500m 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)		No	
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?	6.0 mtr above the nallah bed		
5. Is any scheduled/protected tree like Chinar, Mulberry or Deodar likely to be affected/ cut due to the project?		No	
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	No
2.	Environment Clearance Required	No
3.	Forest land Clearance/Diversion	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	Only Statutory clearances and NOC's / PUC's for establishment or operation of stone crushers, generators, vehicles etc shall be required to be obtained by the Contractor during execution stage.

Annexure – 2

Overall Screening Outcome:

The proposed sub-project will not have any significant environmental impact because the project will not involve diversion of forest land, destruction of ecological resources, displacement of people, demolition/removal of existing structures and major Environmental threat/risk.

Statutory Clearances/ No Objection Certificate:

This is only the Construction of bridges on nallahs which is long pending demand of local people. Only Statutory clearances and NOC's / PUC's for establishment or operation of stone crushers, generators, vehicles etc shall be required to be obtained by the Contractor during execution stage.

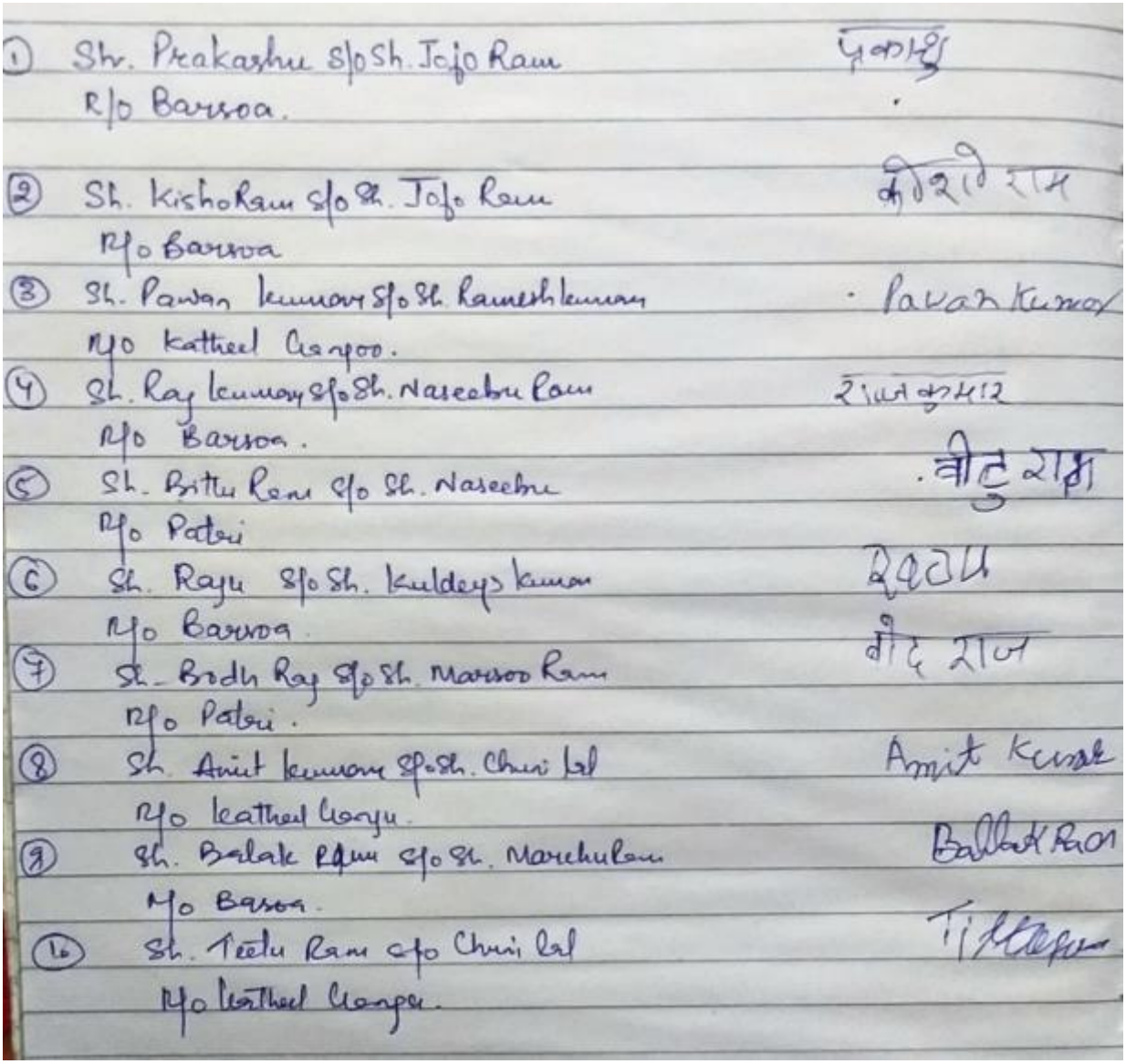
Annexure – 3

Photographs: Public Consultation

	
Bridge Site at Barmeen nallah	Bridge Site at Gordi nallah
	
Existing dangerous practice to cross on foot	Existing dangerous practice to cross on foot
	
Woman crossing the nallah in unsafe conditions	Children crossing the nallah in unsafe conditions

	
Public Consultation at Bridge site	**Public Consultation with the villagers**
	
Disclousre of land donation process and cpnsultation	**Meeting with Sarpanch and disclosure of information**

Public Consultation, Dated: 30/08/2018 and 11/11/2018



1. Sh. Prakashu s/o Sh. Jojo Ram
   R/o Barsoa.
2. Sh. Kisho Ram s/o Sh. Jojo Ram
   R/o Barsoa
3. Sh. Pawan kumar s/o Sh. Ramesh kumar
   R/o katheel Ganpoo.
4. Sh. Raj kumar s/o Sh. Naseebu Ram
   R/o Barsoa.
5. Sh. Bittu Ram s/o Sh. Naseebu
   R/o Patri
6. Sh. Raju s/o Sh. Kuldeep kumar
   R/o Barsoa.
7. Sh. Bodh Raj s/o Sh. Marsoo Ram
   R/o Patri.
8. Sh. Amit kumar s/o Sh. Churi Lal
   R/o katheel Ganju.
9. Sh. Balak Ram s/o Sh. Marchu Ram
   R/o Barsoa.
10. Sh. Teelu Ram s/o Churi Lal
    R/o katheel Ganpoo.

Site Photographs


Latitude: 32.828309
Longitude: 75.194482
Accuracy: 2700.0 m
Azimuth: 140° (SE)
Pitch: -13.5° (-1.0°)
Time: 26-01-2021 11:40
Note: Bridge 2 abutment 1
Powered by AngleCam


Latitude: 32.833141
Longitude: 75.197399
Accuracy: 2900.0 m
Azimuth: 223° (SW)
Pitch: -19.2° (2.0°)
Time: 26-01-2021 11:33
Note: Bridge 2 abutment 2
Powered by AngleCam